ASSESSING THE ECONOMIC JUSTIFICATION FOR GOVERNMENT INVOLVEMENT IN SPORTS FACILITIES AND EVENTS IN NEW ZEALAND

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ABSTRACT

The major objective of this research is to critically examine the justification for government involvement in the construction of sports facilities and the hosting of major sport events in a New Zealand context. There has been an increased focus on the appropriateness of the involvement of government (at all levels) in such projects. Almost all sports-related projects, including facility construction projects or the hosting of events, have been justified by ex-ante economic impact studies that predict the creation of jobs and income generation as outcomes that accrue to host economies.

The research within this thesis seeks to answer several questions that contribute to the overall research objective. Firstly, a case study example of Wellington's Westpac Stadium is analysed with a view to examining whether local and regional government involvement in the construction of the stadium was justified on economic impact grounds. The research then focuses on evaluating the ex-post economic impacts of sports projects in a panel context across New Zealand. Realised outcomes of facility construction and the hosting of internationally oriented events are estimated through the development of models for territorial local authority (TLA) sector-specific employment and real GDP.

The research then considers a potential explanation for why governments continue to subsidise events and facilities, why ex-ante projections of economic impacts often fail to materialise, and why some ex-post analyses have found negative realised outcomes. A game theory model is developed in which cities compete to host an event, with a subsidy as part of the hosting arrangement. The final analytical contribution of this research involves the estimation of consumer surplus benefits from a demand model for representative rugby in Wanganui. The consumer surplus benefits are then compared to the cost of local council involvement in the upgrade of the playing facility to evaluate whether the council's involvement was economically justified.

Findings of the research suggest that the economic impact argument for government involvement in the construction of sports facilities and the hosting of internationally oriented events is generally not justified, and that the measurement of benefits are needed to evaluate the desirability of government intervention in such projects.

DEDICATION

I dedicate this thesis to my wife, Laura and my children, Andy, Evie and Holly, who matter more to me than they will ever know.

This thesis is also dedicated to the loving memory of my late grandfather, Ross Richardson, and my late grandmother, Anne Andrews.

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THESIS INTRODUCTION

1.1. INTRODUCTION

Since the mid-1990s, New Zealand has seen an explosion of sports facility construction. Over $1 billion has been spent or committed to facilities already built or to be completed in 2010. In 2006, the New Zealand Government established the Major Events Development Fund, through which the government has contributed several million dollars towards sporting events of national and international significance that have been hosted in New Zealand. In the recent past, New Zealand cities have hosted many major sports events, including the 1974 and 1990 Commonwealth Games, the 1987 Rugby World Cup, the 1992 Cricket World Cup, the 1999-2000 and 2002-2003 America's Cup regattas, and numerous others. New Zealand is to host the 2010 World Rowing Championships, the 2011 Rugby World Cup, and co-host the 2015 Cricket World Cup (jointly with Australia). This research is motivated by the fact that there has been no empirical research conducted in New Zealand on the realised economic outcomes of sporting facilities and events. With the increasing level of involvement by government in these developments, this research is of critical importance.

This chapter is organised as follows. The nature of the New Zealand sporting landscape is outlined in Section 1.2, and the research objectives and questions are presented in Section 1.3. Sections 1.4 to 1.7 introduce each of the four analytical chapters, and the layout of the thesis in Section 1.8 concludes the chapter.

1.2. THE NEW ZEALAND SPORTING LANDSCAPE

New Zealand is a small South Pacific nation with an estimated population of 4.346 million people as of December 2009, according to Statistics New Zealand. Its origins as a British colony are evident in the sports in which it partakes. Dominant sports in New Zealand are rugby, cricket, rugby league, and football (soccer). New Zealand boasts a proud sporting history, having competed in Olympic and Commonwealth Games (New Zealand has hosted

the 1974 and 1990 Commonwealth Games in Christchurch and Auckland respectively) since their inception[1], played in the 1982 (and qualified to play in the 2010) FIFA World Cup Finals, hosted and won the inaugural Rugby World Cup in 1987, and competed in the Cricket World Cup. New Zealand athletes compete in a wide range of sports, and it would be fair to say that New Zealand is proud of "punching above its weight" on the world sporting stage. New Zealand has a long and often fierce rivalry with their trans-Tasman neighbour, Australia. Many sporting codes compete for coveted trophies against Australia when the two nations meet on the sporting fields.

The sports sector is generally considered an important part of New Zealand society. Economic consultants Business and Economic Research Limited (BERL) estimated the real gross output of the physical leisure sector in New Zealand in 1999 to be $1,973 million, with real value added of $886 million (Goodchild, Harris, Nana, and Russell, 2000). This corresponded to approximately 0.8 percent of New Zealand's GDP in 1999. Over 22,000 full-time equivalent jobs were associated with the sports sector (Goodchild, et al., 2000), or 1.2% of the New Zealand workforce at the time.

There have been several important developments in the sporting landscape of New Zealand in the past 20 years, including the hosting of internationally oriented events, the establishment of the Major Events Development Fund, and the tremendous growth in facility construction. Each of these is considered in turn in the following sections.

1.2.1. Internationally Oriented Events Hosted in New Zealand

New Zealand has played an active role in hosting sporting events of an international nature in the past two decades. New Zealand hosted the 1990 Commonwealth Games in Auckland, with Mt Smart Stadium being upgraded for that purpose.[2] Prior to this, New Zealand jointly hosted the 1987 Rugby World Cup with Australia, with games being played at different venues across the country, an arrangement that was replicated with the hosting of the Cricket World Cup in 1992.

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[1] New Zealand athletes originally competed in the Olympic Games as part of an Australasian team with Australia in 1908 and 1912. The first New Zealand team to participate in the Olympics was in 1920 in Antwerp. New Zealand boycotted the 1980 Moscow Olympics, where four New Zealanders competed as individuals.

[2] The 1974 Commonwealth Games were also hosted in New Zealand, in Christchurch, with the Queen Elizabeth II Stadium developed specifically to host the Games.

After unsuccessfully challenging for yachting's America's Cup in 1987, 1988 and 1992, New Zealand won the Cup in 1995 off the coast of San Diego, USA, and with it came the rights to host the Cup regatta. The regatta was held in Auckland in 1999-2000 and again in 2002-2003, after Team New Zealand successfully defended the Cup in 2000 against Italian syndicate Luna Rossa. New Zealand was defeated in 2003 by the Swiss syndicate Alinghi, and the race moved offshore.

In 2005, the British and Irish Lions rugby team toured New Zealand. Lions' tours have been held regularly in New Zealand every 10-12 years, with the previous tour being in 1993. Other world championship events hosted in New Zealand in the past 20 years include the FIFA U-17 Men's and Women's World Football Championships in 1999 and 2008 respectively, World Netball Championships in 1999 and 2007 (the latter at short notice when the original tournament host, Fiji, lost the rights to host due to political instability), the A1GP World Motorsport Round (hosted annually from 2007), the World Mountain Biking Championships in 2006 and the World Bowls Championships in 2008.

New Zealand will host the 2010 World Rowing Championships at Lake Karapiro, the 2011 Rugby World Cup (as sole hosts), and the 2015 Cricket World Cup (as co-hosts with Australia). In March 2010, the New Zealand Government decided against contributing half of the proposed total cost of $600 million to host the 2018 Commonwealth Games in Auckland, thus ending the feasibility of bidding for that event.

1.2.2. The Major Events Development Fund

The New Zealand Government formally acknowledged the importance of sporting events to New Zealand when the Major Events Development Fund was established in 2006, as part of the Ministry of Economic Development, to help sporting bodies attract, develop, and retain strategically important events. The Fund was administered by the Inter Agency Events Group (IAEG) (New Zealand Major Events, 2010c). The fund was originally $3.4m in 2006 (Dunphy, 2006), rising to $4m in 2009-2010. Dunphy also noted that as many as fourteen local councils had implemented events strategies as part of their tourism development initiatives prior to the creation of the Fund.

With the increased event hosting, increased central government involvement through the Major Events Development Fund, and facility funding, as well as the facility construction boom, greater emphasis has been placed on economic justification for these projects. This

is reflected in the criteria for events to be eligible for the Major Events Development Fund, which are shown in Figure 1.1.

Figure 1.1: Criteria for Major Events Development Fund Applications

One-Off Benefits

The extent to which government funding for events will contribute to achieving immediate additional benefits for New Zealand's economy, culture and society. For example:

- the creation of employment related to the event itself and beyond
- international exposure for New Zealand
- opportunities for New Zealanders to experience world class events
- enabling communities to showcase their regions and achievements nationally and internationally.

Legacy Benefits

The extent to which government funding for events will contribute to achieving additional enduring benefits for New Zealand's economy, culture and society, For example:

- the development of ongoing business or industry growth or investment opportunities, and the creation of longer-term employment
- the development of local, regional or national infrastructure and facilities
- fostering key international relationships
- growth in participation and high achievement in the field to which the event relates.

Event Capability Benefits

The extent to which government funding for events will contribute to building additional capability in New Zealand's events sector. For example:

- building event-management skills
- extending or improving systems and knowledge relating to event delivery
- increasing the available pool of trained volunteers
- enhancing New Zealand's reputation as an event host.

Source: New Zealand Major Events (New Zealand Major Events, 2010b)

Of particular interest for this research is the presence of (i) employment creation in the direct benefits section, (ii) growth opportunities and job creation, as well as (iii) the development of facilities in the legacy benefits section. In all of these areas, economic analysis has a critical role to play. Further scrutiny of the application process for the Major Events Development Fund reveals that applicants are expected to provide detailed evidence of one-off and enduring economic benefits under the category "Rationale for

Government Investment" in the Concept Proposal Stage One Application Template (New Zealand Major Events, 2010a). It is the measurement of these benefits and the resulting implications of these measurements that this study is concerned with.

1.2.3. Facility Construction in New Zealand

New Zealand has seen unprecedented growth in sports facility construction since the mid-1990s. 24 facility-related projects, including 12 new facilities, have been built since 1997 at a cost of in excess of $1.1 billion. Several of these facilities are in the process of being built or upgraded in time for the 2011 Rugby World Cup, including the upgrade of Auckland's Eden Park (approximately $240m) and the construction of Dunedin's Forsyth Barr Stadium ($198m). The majority of these projects have been funded by a mix of private and public financing, with the public financing component predominantly provided by local councils. In more recent times, central government has also contributed to several projects, including Eden Park ($190m), AMI Stadium ($15m), Forsyth Barr Stadium ($15m), and several other smaller grants.

1.3. RESEARCH OBJECTIVES AND QUESTIONS

There has been increased focus within the literature on the economic justification of government involvement in financing sports facilities and mega-events because they are not generally considered financially viable projects (Chapin, 2002; Noll and Zimbalist, 1997a). Governments, as a rule, tend to invest in projects that are economically rather than financially viable, that is, when benefits to society outweigh the costs (Chapin, 2002). A common thread throughout this area of research is the presence of different levels of government – local, regional, and central – in the financing of the construction of sports facilities and the hosting of events. This leads us to question how governments consider the construction of a facility or the hosting of an event as an economically viable project.

Many facilities and events have been accompanied by commissioned projections of economic impacts, including creation of jobs and economic growth. These impacts are estimated by predictive ex-ante analyses, the most popular of these being the economic impact study. These impacts are often used as justification for government involvement in the financing of sports facilities and events. The majority of independent, academically published ex-post research into these impacts, however, has failed to find significant supporting evidence for such claims (Coates and Humphreys, 2008; Siegfried and Zimbalist, 2000, 2006). The debate, nonetheless, has tended to focus not just on whether

the benefits exist, but whether the price paid by governments and communities is appropriate.

The principal objective of this research is to critically examine the arguments put forward for the economic justification for government involvement in sporting facility construction and events, and why, in the face of compelling evidence from the literature that tangible economic projections do not materialise, governments continue to subsidise these projects. This research develops a conceptual framework within which facility construction and event hosting are contextualised and the implications of these activities on the local economy can be considered. It is critical for governments at all levels to know just what the outcomes of such investments are, and to consider the implications of these investments.

There are several ways that this research seeks to address the research objective. Firstly, the case of Westpac Stadium in Wellington is considered. Major New Zealand facilities were built in the late 1800s and early 1900s, and many of these have been upgraded in a piecemeal fashion over time. Westpac Stadium was the first replacement facility in New Zealand to be built in a different location to the preceding facility (Athletic Park). Given the presence of an established body of literature in the assessment of ex-post economic impacts of facilities and events, and the presence of an ex-post economic impact study that suggested that the economic impacts from Westpac Stadium exceeded initial expectations, was local and regional government involvement in the facility construction justified on economic impact grounds?

The second strand of the research focuses on measuring the realised tangible economic outcomes of facility construction and the hosting of events for New Zealand cities in general. Specifically, does facility construction stimulate employment in the local construction sector? Do events stimulate employment in the local hospitality sector? Do either facility construction or hosting events impact on real GDP? Does the location of the facility affect the realised economic outcomes of events? The answers to each of these questions are investigated in a panel analysis of the ex-post effects of facility construction and the hosting of internationally oriented events on sector-specific employment and real GDP in local economies.

In light of the general findings of much of the literature, the research considers why governments continue to subsidise such activities. Are there perhaps other (possibly non-

economic) rationales for such behaviour? Using the backdrop of the negotiations for the hosting of the New Zealand round of the V8 Supercar series in the mid-2000s, a potential theoretical explanation is presented through the development of a game theory model in which two cities compete with each other to host an event. The role of subsidies in this competitive environment is the focus, and the thresholds for subsidies and the associated outcomes are developed.

The final question that this research considers is whether the so-called intangible benefits associated with sport are an appropriate economic justification for government involvement in facility projects. One such benefit is consumer surplus, which is also referred to by economists as the use value of an activity that is enjoyed by users of a particular activity (in contrast to non-use values, which are not dependent upon use of an activity, which include option value, existence value, etc.). The cost of the upgrade of the Cooks Gardens sports facility in the city of Wanganui and the Wanganui District Council's involvement in the project is compared to estimates of consumer surplus benefits associated with representative rugby. These benefits are derived from a model of attendance for rugby matches in Wanganui.

Each of these research questions are addressed in separate analytical sections of the thesis. Brief summaries of these sections follow.

1.4. WESTPAC STADIUM: THE IMPACT ON THE WELLINGTON REGIONAL ECONOMY

The construction of the Westpac Stadium in Wellington began in 1997. The purpose of the stadium was to replace the physically deteriorating Athletic Park, home of rugby and many major sporting and entertainment events in Wellington for much of the 20th century. A commissioned report by economic consultants Business and Economic Research Limited (BERL) into the effects of the first five years of the Stadium's operations found that economic impacts were more than double what was forecast pre-construction. The principal question motivating this analysis was whether government involvement in stadium construction in Wellington was justified on the basis of economic impact arguments.

This case study identifies the key features of the stadium construction process, including the rationale for change, the location of the new facility, and the role of government. The development of an empirical model for employment in the Wellington region using quarterly time-series data from 1989 to 2005 facilitates the ex-post analysis of the impact

of the Westpac Stadium on the local economy, during the construction stage and the first five years in particular.

1.5. Facility Construction and the Hosting of International Events in New Zealand: Ex-Post Impacts on Local Economies

In order to obtain general findings of the realised economic impacts of facility construction and the hosting of internationally oriented events for New Zealand cities, the Westpac Stadium case study is extended to and expanded across a panel of New Zealand cities that built either new or upgraded sports facilities, and for cities that hosted events with an internationally oriented focus (that is, world championship events or the like). This analysis has several objectives, including the estimation of ex-post economic outcomes of facility construction and the hosting of internationally oriented events on local economies, including sector-specific employment and real GDP. The analysis also considers whether the location of the facility influences the economic outcomes of internationally oriented events.

For the analysis of the effect of facility construction on local economies, a panel of data for facility construction for 15 territorial local authorities (TLAs) across the time period from 1997 to 2009 is constructed. 22 instances of facility construction are identified within the panel, and the effects of these projects on levels of construction sector employment and real GDP are examined.

The analysis of event hosting utilises a larger panel of 16 TLAs across the same time period. 11 internationally oriented events are identified within the panel, and the models developed for facility construction are modified for the analysis of events. The effects of events on levels of hospitality sector employment and real GDP are evaluated. The impact of facility location on the economic outcomes of events is considered in terms of proximity to the locality's central business district.

1.6. The Subsidisation of Events and Facilities: A Game Theory Approach

In light of the findings from the majority of the literature to date, explanations are sought for why, despite findings that facilities and events do not generate significant tangible economic outcomes, governments have continued to actively subsidise such activities. This question is analysed within the context of the hosting developments for the New Zealand round of the V8 Supercar series between 2005 and 2008, where the nature of

competition between cities for sporting events and the role of subsidies within such competition are considered.

A game theory model of two cities that compete to host a sporting event is developed. Each city has a choice: either host or not host the event. Two separate scenarios are examined within this model: (i) identical cities, and (ii) large city versus small city. Subsidies are explicitly factored into the model as costs of events, the thresholds for subsidies in each scenario are derived, and the outcomes of the varying levels of subsidies are examined with the aid of simple numerical examples.

1.7. Intangible Benefits and their Role in Government Funding of Sports Facilities: A Case Study of Wanganui Rugby

Findings from recent literature suggest that there is a strong case for the quantification of intangible values to economically justify government involvement in such projects. Indeed, a recent trend has seen the measurement of the use (that is, benefits derived from consumption of sporting events and facilities) and non-use (also known as public good) values associated with facilities and sporting activities. These benefits have been calculated in several ways. One such way is from the analysis of demand behaviour.

This final case study conducts an extensive demand analysis of provincial rugby attendance for the city of Wanganui between 1972 and 1994. An econometric demand model is estimated, which incorporates economic factors, consumer preferences, and sport-specific characteristics as explanatory variables. Several alternative functional forms of the model will be estimated, from which the appropriate functional form will be selected and the estimates of consumer surplus benefits will be derived.

The estimated benefits will then be compared to the contribution of local government funding towards the construction of the main Northern Stand in the Cooks Gardens facility in Wanganui in 1996. This project was a major part of the overall upgrade of the facility, and proceeded with the aid of substantial funding from the Wanganui District Council.

1.8. The Organisation of the Thesis

The thesis is structured as follows. Chapter 2 reviews the literature that provides the context within which this study takes place. The conceptual framework and the thesis methodology are developed in Chapter 3. Chapters 4, 5, 6 and 7 are the analytical contributions of this research as described in the previous sections. Chapter 8 contains the

conclusions and summarises the findings and contributions that this research makes towards the understanding of the economic justification for facilities and events in New Zealand. The thesis is rounded out with the limitations of the analysis along with suggestions for future research.

2

LITERATURE REVIEW

2.1. INTRODUCTION

Local, regional and central governments have become increasingly involved in the financing of sports events and facilities, not only in New Zealand but all around the world. Government-subsidised sporting activities have ranged in scale from upgrades to local facilities to the hosting of international mega-events (including the associated facility construction) such as the Olympic Games and FIFA World Cup Finals. Much of this activity has already taken place overseas in the United States, United Kingdom, and Australia, among others. Debate within the literature has centred on the measurement of benefits such as the income and job creation effects of stadiums (Noll and Zimbalist, 1997a). Recent research, however, has suggested that stadium construction has generated a broad range of economic and non-economic benefits, ranging from the role that sports stadiums and professional franchises play in the urban revitalisation development strategy, to the numerous intangible effects associated with stadium construction and the presence of professional sports teams, including community solidarity, the "major league city" image, and civic pride.

The reason for the focus on government involvement in financing sports facilities is that as projects, they are not generally considered financially viable. Baim (1994) examined financial data for 14 stadiums in the US and found that despite most stadiums "paying their way" by covering their variable costs, only one returned a positive overall value once subsidies were taken into account (Baim, 1994). This stadium was Dodger Stadium in Los Angeles, which was privately owned and operated. In fact, the four highest values were for stadiums in which the host cities incurred either zero or low construction costs (Baim, 1994).[3] Local and national governments have consistently invested in projects that were

[3] After Dodger Stadium, the next three highest values were all negative.

not considered financially viable, but when society's benefits and costs were evaluated, projects became economically viable (Chapin, 2002).

Stadium proponents have offered several arguments supporting public involvement in the construction of sports facilities, including a variety of tangible and intangible benefits. More recently, the "public good" argument has come into play as proponents have downplayed the economic impact dimension and accentuated the socio-economic benefits of facilities and events. Such benefits have included the communal experiences of attending events at the stadium, and the community identity and pride generated by a local championship team (Chapin, 2002). Indeed, the measurement of consumer surplus and the value of public goods associated with sport is the latest development in this literature.

Arguably the dominant justification put forth to date for greater public sector involvement in such projects has been the generation of tangible economic outcomes, including job creation and income generation. Facilities and events have been said to be effective sources of new spending which, in turn, stimulate economic development and growth. These claims are typically based on the outcomes of predictive (ex-ante) studies that have accompanied either a facility or an event. Much of the literature has been sceptical of such claims, and has pointed to the fundamental differences between economic impact analysis and cost-benefit analysis that question the appropriateness of economic impact analysis for this purpose. Nonetheless, some have argued that economic impact analysis has an important role to play in the evaluation of certain events, and have demonstrated the connection between the economic impact study and a cost-benefit analysis.

What follows in this review is a discussion of the independent evaluation of economic benefits and costs of facilities and events in Section 2.2. The tools used in evaluating the economic outcomes of facilities and events are outlined and evaluated in Section 2.3, and a determination of what should be evaluated to justify government involvement in such projects is presented in Section 2.4.

2.2. Independent Research into Economic Outcomes of Sports Facilities and Events

Stadium proponents have offered several arguments supporting public involvement in the construction of sports facilities. Lavoie (2000) noted five major reasons used for justifying the use of public financing in the construction of sports facilities. Firstly, the presence of

the franchise directly created additional jobs, for example, ushers, ticket sales clerks, parking attendants, garbage collectors, etc (Lavoie, 2000). This is known more generally as employment stimulation. It is worth pointing out that the jobs directly related to the stadium and/or franchise tended to be low-paying in nature.

Secondly, the franchise produced indirect benefits to the local economy that can be linked to the income multiplier (Lavoie, 2000). The extent of such income stimulation was dependent upon the size of the direct increase in economic activity. Thirdly, the franchise has been considered as a business attraction, an amenity that has enticed visitors from outside who spend money inside the community and increase the profitability of local businesses (Lavoie, 2000). The direct and indirect benefits from sports events and facilities are together commonly referred to as the economic impact. Fourthly, the franchise was believed to bring regional, national, and possibly international media attention and recognition to the city (depending on the nature of the sport or event in question), thus making the city "major league" and increasing the city's profile (Lavoie, 2000).

Finally, the positive and psychological benefits of being associated with a sports franchise and a winning team were also cited (Lavoie, 2000). The generation of image enhancement, "major league" status, civic pride, and community spirit, among other factors, is known as the public good argument for sports.

Initially, the economic impact and job creation arguments were emphasised by team owners in their quest for public financing of new facilities. Central to these arguments were economic impacts that included spending by spectators at events, by players in the community, and economic activity generated by related businesses as a result of the events themselves (Chapin, 2002). The common method of assessing these economic impacts was the economic impact study, which focused on expected revenue streams and capital requirements. Owen and Beitsch (1997) noted other impacts from a stadium included increased land values in the vicinity of the stadium, which generated higher tax revenues, increased hotel occupancy generated by out-of-town visitation, and increased sales tax revenues from greater hotel occupancy and retail demand (Owen and Beitsch, 1997). Such economic impacts exist as part of the normal operation of the economy, with jobs being supported by sports-related spending.

As proponents have down-played the economic impact dimension and accentuated the socio-economic benefits of facilities and events in more recent times, the public good argument has come into play. Such benefits included the communal experiences of attending events at the stadium, and the community identity and pride generated by a local championship team (Chapin, 2002). Indeed, the measurement of consumer surplus and determining the value of public good benefits are among the more recent developments in the literature. On their own, such benefits have been found in to be insufficient to justify the extent of involvement by local government in many studies. What follows in the subsequent sub-sections are category-by-category reviews of research that has independently assessed the outcomes of facility and event projects.

2.2.1. Income Generation

The ex-post analysis of the effect of new stadiums and professional sports franchises on local incomes has been dominated by two methods: pooled regression methods and individual city regression methods. Baade (1987) conducted separate regression analyses on standard metropolitan statistical area (SMSA) income levels and shares of regional income for nine U.S. cities from 1965-1983. The construction of a new stadium was found to have a positive influence on income levels for some cities; however, these effects were tempered by the finding of a negative influence attributable to the presence of the professional sports franchise. Seven of the nine cities experienced statistically significant reductions in their share of regional income, which were associated with stadium construction and/or a new professional sports franchise (Baade, 1987).

Baade and Dye (1990) examined the same nine cities as Baade's 1987 analysis, and extended the analysis to consider the effect of professional sports franchises and new facilities on retail sales. The construction of a new facility was generally considered to be negatively related to retail activity in the pooled model, although results for individual cities were mixed, with some experiencing increases and others decreases (Baade and Dye, 1990). Baade (1996) incorporated a variation to earlier studies by examining whether a new facility and/or sports franchise affected a city's trend-adjusted real per capita income, using a panel of 48 cities over a 30-year period (from 1958-1987) for the analysis, which included 13 cities without a professional sports franchise. Neither new facilities nor the presence of a sports franchise were found to be statistically significant (Baade, 1996).

Coates and Humphreys (1999) examined the impact of professional sport franchises and their venues on real per capita personal income in 37 metropolitan areas in the United States over the period 1969-1994. They substantially widened the scope of sports-related variables utilised in earlier research to include the effects of franchise existence, franchise entry and exit, stadium construction, and stadium capacity on the local economy for baseball, football (gridiron), and basketball. They found that:

> "[V]ariation in the vector of sports-related variables… helps to explain the observed variation in the level of real per capita income, and that the overall impact of the sports variables reduces real per capita income" (Coates and Humphreys, 1999, p. 614).

The level of significance of sports-related variables was, however, found to be sensitive to model specification. Coates and Humphreys (2001) used the framework developed in their 1999 paper to examine the economic consequences of strikes and lockouts in professional sport on local real per-capita personal income. The results from their study indicated that neither baseball strikes (1972, 1981, 1994) nor football (gridiron) strikes (1982, 1987) within the sample period of 1969-1996 had any effect on the per-capita incomes of metropolitan economies with sports franchises (Coates and Humphreys, 2001). Lertwachara and Cochran (2007) adopted an event study methodology to examine the effect of professional sports franchises on U.S. host cities. Results suggested that sports franchises did not affect per capita income levels, although they were responsible for both short-run and long-run declines in per capita income growth rates (Lertwachara and Cochran, 2007).

Some studies, however, have found results that have differed from the studies reviewed above. Using a dataset of all U.S. cities with populations in excess of 25,000 in 1988 and 1994, Gius and Johnson (2001) found that cities with more than one professional sports franchise had higher incomes than those cities with one or no franchise. This is perhaps unsurprising, given that very few cities that host major league sports only have one team. Indeed, between 1969 and 1994, only thirteen metropolitan areas hosted only one team (Nelson, 2001). The result did not provide evidence that the greater the number of teams, the larger the impact, as the independent variable in question was a dummy variable that took the value of 1 if a city had two or more franchises.

Nelson (2001) hypothesised that stadiums located within a city's central business district (CBD) were more likely to attract spectators and their spending than those located in suburban areas. The further from a city's CBD, Nelson claimed, the fewer opportunities

there were for spectators to spend outside the facility (Nelson, 2001, 2002). Nelson tested whether location of a facility in either the CBD, the fringe of the CBD or the suburbs impacted on the metropolitan area's share of state personal per-capita income for U.S. cities. Cities with teams playing in facilities located progressively further away from the CBD experienced greater losses in their share of state income, while facilities located within the CBD did not impact on the city's share of state income. Nelson (2002) estimated the effects for each metropolitan area separately in an extension of the 2001 study, and found that suburban facilities resulted in losses in the area's share of state income, and facilities located within the central city (although not necessarily within the CBD) were more likely to increase the city's income share.

Santo (2005) replicated Baade and Dye's (1990) method with updated data. Where Baade and Dye used data from 1965-1983, Santo used data from 1984-2001. 19 metropolitan areas were examined, and these included cities that built football (gridiron) and/or baseball stadiums, and/or gained or lost football and/or baseball franchises. A new baseball stadium was found to have a significant and positive effect on the share of state income that a city received, but results for other types of stadiums were not as clear-cut. It was suggested that the result may have been a result of stadiums being built as a part of the more recent push for revitalisation and tourist appeal (Santo, 2005). There were six cities in which a new football or baseball stadium was positively correlated with income share, and interestingly, all of these facilities were sited either in downtown or central city locations. Two cities had stadiums that were negatively correlated with income share: Arlington (Texas), whose baseball stadium was built in a suburban location, and Cleveland (Ohio), whose stadium was an inner-city facility; however, a positive (and significant) coefficient for a new football franchise was found to offset this effect (Santo, 2005). New teams were found to have significantly positive effects in a number of cities, including Tampa (Florida), Denver (Colorado), Jacksonville (Florida), Nashville (Tennessee), Cleveland and Anaheim (California). These findings contradicted those of Baade and Dye's original (1990) study. As the method used was identical between the two studies, the conflicting results indicated that context was particularly important when evaluating the economic effects of stadiums and franchises (Santo, 2005).

2.2.2. Job Creation

Just as claims have been made for sports franchises and stadiums as income-boosting activities, similar claims have been made proclaiming events and facilities as job-creating investments. According to the logic of the argument, job creation leads to economic

development, and thus is a valid justification for government involvement financing sports facilities and events. The success, or otherwise, of public investment in stadiums and franchises, as far as employment creation and economic growth is affected, is likely to be dependent upon the type of employment generated (Baade and Dye, 1990). Should employment generated consist only of low-wage employment, it is not likely that economic growth would be improved substantially, if at all (Baade and Dye, 1988a).

Baade and Dye (1988a) examined the effect of new stadiums and new professional sport franchises on manufacturing sector employment in eight cities from 1965-1978. No statistically significant result was found for either a new facility or a sports franchise for seven of the eight cities (Baade and Dye, 1988a). Baade (1996) examined the impact of franchises and stadiums on a city's share of state employment in the 'amusement and recreation' and 'commercial sports' sectors. Collectively, neither new professional sports franchises nor new stadiums had a statistically significant effect on job creation, results that were consistent with the findings of Baade's earlier studies (Baade, 1996). Baade and Sanderson (1997a) undertook a similar analysis of employment levels for 10 individual US cities that hosted professional sports teams from 1958-1993. As was the case in earlier research, there was no evidence of increased employment as a result of franchises and new facilities (Baade and Sanderson, 1997a).

Hudson (1999) reviewed the literature on urban and regional growth models and developed a supply-side employment growth model that was designed to examine the impact of the loss or gain of a professional sports franchise on a city's employment. Hudson's model estimated the impact of wages, education, taxes, electricity prices, and personal income alongside professional sports teams as determinants of employment. The impact of sports teams on employment growth was not found to be significantly different from zero. The effect of separating the teams into their respective sports did not change the earlier conclusion (Hudson, 1999). Miller (2002) examined construction employment in the St. Louis (Missouri) metropolitan statistical area (MSA) from the 1970s to the 1990s using a variety of econometric specifications. There was no statistically significant effect on construction employment found for the construction of either of the two facilities in question (the Keil Center and the Trans World Dome), both of which were built with substantial local government involvement (Miller, 2002).

Using a similar framework to that developed in their 1999 study, Coates and Humphreys (2003) empirically examined the impact of professional sports on earnings and

employment in the Services and Retail Trade standard industrial classification (SIC) sectors of 37 U.S. cities. They found that professional sports franchises had a statistically significant negative impact on the employment in the retail and service sectors in host cities. The results were found to be sensitive to model specification, however (Coates and Humphreys, 2003).

It has been suggested that professional sports franchises may have effects on worker productivity (Coates and Humphreys, 1999). Berument and Yucel (2005) theorised that the success of the local football team improved job performance and productivity. Results from the research showed football success positively and significantly affected the growth of industrial production (Berument and Yucel, 2005). On the other hand, Thoursie (2004) found evidence to suggest that productivity could have declined due to sporting events as more people reported sick to watch events. The increase in Swedish male employees reporting sick was 6.6 percent during the Calgary Winter Olympics, whereas the rate of absenteeism for females actually declined (Thoursie, 2004).

2.2.3. Earnings

Proponents have argued that investments in sports facilities and the attraction/retention of events or franchises can generate increased economic activity which will in turn stimulate employment and wage growth. Several studies have found inconclusive evidence of wage effects from the professional sports franchises and facility construction (Baade and Sanderson, 1997a; Coates and Humphreys, 2003). No study has found conclusive evidence of an economy-wide positive impact on wages outside of those industries directly related to the franchise or facility. Some studies have found evidence of a compensating wage differential in operation (Carlino and Coulson, 2004; Hamilton and Kahn, 1997). The presence of a sporting event, franchise or facility may result in employees accepting lower wages in return for the perceived quality-of-life improvements that sports bring.

2.2.5. Real Estate Values

Another common argument presented in favour of investment in sports facilities has been the suggestion that sports-related activity has had positive effects on real estate values in the vicinity of the stadium. Like in other areas of sports-related research, findings have been contradictory. Riess (1998) noted that research into the effects of stadiums on land use and property values in Atlanta, Chicago and New York in the early 20th century found that effects tended to be clustered around stadium entrances and were not widespread.

The stimulatory impact of stadiums on previously under-developed sites was small (Riess, 1998). Carlino and Coulson (2004) found a statistically significant rental premium of approximately eight percent existed in cities that hosted National Football League (NFL) (gridiron) teams (Carlino and Coulson, 2004). This result was questioned by Coates, Humphreys, and Zimbalist (2006). A modified re-analysis of the same data set resulted in a statistically insignificant finding (Coates, Humphreys, and Zimbalist, 2006). There was also no evidence of increased real estate values as a result of hosting a major league football franchise in Green Bay, Wisconsin (Palmer, 2002).

Tu (2005) used hedonic analysis to consider the difference in price between single-family housing units in the immediate vicinity of FedEx Field in Washington, D.C., and units with comparable attributes located further away from the stadium. Initial results suggested that properties close to the stadium sold at a discount when compared to comparable units away from the stadium, but differences-in-differences analysis that compared the impact of the stadium before and after its opening showed that the price discount actually existed prior to stadium construction (Tu, 2005). The differential was actually narrowed after the announcement of the selection of the site for FedEx Field, and was further reduced after the stadium was completed (Tu, 2005). In a different context, Davies (2005) examined the Millennium Stadium in Cardiff and City of Manchester Stadium in Manchester in the U.K., and found evidence that the sports facilities had positive impacts on residential values in the surrounding area. From the analysis of interview responses from a variety of local experts, it was found that "…[S]tadia in each city have generally impacted positively on the residential property market" (Davies, 2005, p. 271). It was also noted, however, that respondents found it difficult to isolate the stadium's effects from other local area developments (Davies, 2005). It was felt that the city's image was found to have improved as a result of the facility, as well as boosting civic pride (Davies, 2005).

2.2.6. Mega-events

While facilities and franchises have received considerable attention in the literature, events have become a similarly popular area of research. The impacts of the hosting of large events, known in the literature as mega-events, have commonly been justified by similar claims to those associated with stadiums and franchises, including increased tourism, job creation, and economic growth. Porter (1999), when summarising the argument, noted the following rationale used by event proponents:

> "'You may not go to the event,' they say, 'but those who do bring hundreds of millions of dollars into the community and that, in turn, generates several

> times as much spending in subsequent months as those enriched in the first wave of spending spend their new-found wealth'" (Porter, 1999, p. 61).

Porter (1999) evaluated the ex-ante impacts of the US Super Bowl in an ex-post study. Six Super Bowls for three hosts in the U.S. were examined; only one positive and statistically significant result out of 18 possible measures of impacts associated with the events on real sales expenditure was found, and it was concluded that ex-ante predictions of sales impacts were grossly exaggerated (Porter, 1999).[4] Baade and Matheson (2003) found, using an ex-post methodology, that ex-ante Super Bowl studies commissioned by the National Football League (NFL) were substantially inflated, in some cases by as much as 1,000%. Explanations for these results included the inclusion of gross rather than net spending (thus ignoring the substitution effect), failure to consider leakages from the host economy, and disregarding potential displacement effects and crowding out of local spending (Baade and Matheson, 2003).

Baade and Matheson (2000) assessed the economic impact of the Daytona 500 by measuring the impact on annual taxable sales in Volushia County, the host county of the Daytona International Raceway. Results indicated that annual taxable sales increased by an average of US$41.77 million between 1997 and 1999 (Baade and Matheson, 2000). Baade and Matheson (2001) investigated the impacts of Major League Baseball's All-Star games on employment and sales in host cities from 1973-1997 using an ex-post econometric methodology. Rather than consistently boosting jobs, the event had a mixed effect on employment (Baade and Matheson, 2001). 10 cities experienced decreases in employment, and 13 cities experienced increased employment, for an average decrease across all cities of 8,000 jobs per year (Baade and Matheson, 2001). Sales data from San Diego, Oakland and Anaheim (California) indicated that sales fell almost US$30 million below ex-ante projections on average (Baade and Matheson, 2001).

Jones (2001) also questioned the accuracy of the predicted economic impact of the 1999 Rugby World Cup in Wales, who sub-hosted the event:

> "Little or no profit accrued from gate receipts, much spectator expenditure occurred outside the Principality, and the longer term benefits are at least open to question. As a cultural and sporting event, the World Cup must rank of

[4] For each of the six Super Bowls, separate one-month, two-month, and three-month time-span variables were used as explanatory variables in an equation to predict real sales.

> incredible importance for Wales but as an avenue for economic development the jury on RWC99, and the mega-event in general, is still very much out" (Jones, 2001, p. 250).

Kasimati (2003) reviewed the literature on the economic impacts of the Olympic Games. It was found, perhaps unsurprisingly, that ex-ante studies projected significant impacts, with economic growth, increased tourism and greater employment as major impacts. Such studies were more often than not commissioned by interested parties, which possibly explained the optimism of the studies (Kasimati, 2003). Ex-post studies of the same events failed to find any evidence of these impacts (Kasimati, 2003). Hotchkiss, Moore, and Zobay (2003) analysed the impact of the 1996 Olympic Games on the host city of Atlanta (Georgia), and surrounding counties. Using a difference-in-differences method, positive impacts on both the levels and growth of employment were found, although there did not appear much in the way of evidence for a wage effect (Hotchkiss, Moore, and Zobay, 2003).

Baade and Matheson (2004) estimated a predictive ex-post model for the change in income of host cities in the 1994 FIFA World Cup Finals held in the United States. Of the 13 host cities, only four experienced gains in income, while the remainder experienced losses. The estimated overall effect on host cities was a net loss of over US$9 billion (Baade and Matheson, 2004). Hagn and Maennig (2009) utilised several methods from the literature, including those adopted by Coates and Humphreys (1999 and beyond), Baade and Matheson (2000 and beyond) and Hotchkiss, et al., (2003), as well as an extended differences-in-differences method, to determine the impact of the 2006 FIFA World Cup Finals on host cities' unemployment rates in Germany. None of the methods utilised in the study detected any impacts on unemployment in host cities (Hagn and Maennig, 2009).

Two relevant ex-post analyses of specific New Zealand events have been undertaken, with interestingly consistent results when one considers the international evidence presented thus far in this review. Garnham (1996) examined the effect of the Taranaki rugby team winning the Ranfurly Shield on the city of New Plymouth. Alternative leisure spending fell by up to 50% in the two weeks under observation, and surveys indicated that an increase in foot traffic in the central shopping area didn't translate into increased sales (Garnham, 1996). Survey respondents felt that the Shield's impact on the community was primarily psychological rather than economic in nature (Garnham, 1996).

The hosting of the America's Cup in 2000 generated mixed results for Auckland businesses (Johnston and Switzer, 2002). In spite of expectations of increased revenues for businesses across the Auckland area, downtown businesses did better than restaurants and cafés in the outer suburbs (Johnston and Switzer, 2002). In the post-Cup period, downtown businesses perceived a boom-and-bust effect for business in the greater Auckland area, a perception that was not borne out by actual experience (Johnston and Switzer, 2002). A majority of suburban restaurants anticipated increased revenues from the Cup, although nearly 60 percent of restaurants failed to see this materialise (Johnston and Switzer, 2002). Those who experienced increases in revenues attributed the increase to international customers and not local customers, and believed that local residents were diverted into the Cup Village and downtown at their expense (Johnston and Switzer, 2002). Far from the expected boom, evidence suggested that the net impact on business was uncertain across the wider Auckland area (Johnston and Switzer, 2002).

2.2.7. Intangibles

Despite questions surrounding the legitimacy of intangible benefits and costs, many studies have found evidence suggesting that intangibles are important and more tangible than first thought. Swindell and Rosentraub (1998) conducted a survey of residents to measure the intangible benefits of sports franchises, events and amenities in Indianapolis (Indiana). Supporters of each of the amenities valued the intangible benefits higher than people who were not supporters (Swindell and Rosentraub, 1998). Professional sports ranked behind only museums in terms of generating civic pride (Swindell and Rosentraub, 1998). The Indianapolis 500 was ranked as the most important asset in defining the area's reputation (seventh in generating pride), with the Pacers basketball franchise a close second (Swindell and Rosentraub, 1998). It was noted that

> "[C]ivic pride, reputation, and image certainly are important factors for a city's overall development. Sports teams could make a substantial enough contribution to the quality of life and people's perceptions of their community to justify the use of tax money to build or maintain the facilities that attract teams" (Swindell and Rosentraub, 1998, p. 12).

Several studies have attempted to estimate the consumption benefits of sport to a city. Two of these studies have measured consumer surplus explicitly. The first was Irani (1997), who estimated a Marshallian demand curve for baseball games, and calculated net consumer surplus from the demand curve. Using price and attendance data for all Major League Baseball (MLB) teams from 1972 to 1991, a fixed-effects demand function was

estimated, from which net consumer surplus was calculated (Irani, 1997). The resulting consumer surplus values across MLB teams ranged from a minimum of $2.2 million to a maximum of $54.1 million (Irani, 1997). The second study was that of Alexander, Kern and Neill (2000), who estimated consumer surplus from selected price elasticity of demand estimates for all four major league sports (baseball, football (gridiron), basketball and ice hockey) in the United States. The consumer surplus measures ranged from a minimum of US$5 million to a maximum of US$46 million (Alexander, Kern, and Neill, 2000). For most franchises, the consumers' surplus from attending games was insufficient to justify building a facility at public expense on benefit-cost grounds (Alexander, et al., 2000). Demand for tickets had to be very price inelastic for consumer surpluses to exceed the annual cost of a new arena or stadium (Alexander, et al., 2000).

A more recent technique used to estimate consumption benefits has been the contingent valuation method. Several studies have adopted this technique, and some interesting results have been found. Johnson and Whitehead (2000) calculated the value of public goods generated by a proposed new facility (the University of Kentucky's new basketball arena).[5] 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 the survey respondents perceived economic benefits from stadium construction, with these anticipated benefits contributing almost one-third of estimated willingness to pay of almost US$74 million (Santo, 2007).

Schwester (2007) measured the willingness to support public subsidies for baseball stadia in Cleveland (Ohio) for Jacobs Field and Baltimore (Maryland) for Oriole Park at Camden Yards. The total value of public goods was decomposed into civic pride, national identity, reputation, and patrimony (Schwester, 2007). Whilst not reporting a total value of the worth of public goods, results showed that public goods were important determinants of the willingness to support public subsidies towards the facilities (Schwester, 2007).

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

Groothuis, Johnson, and Whitehead (2004) suggested, from their analysis of survey respondents in Pittsburgh, that the motivation for government subsidy of teams and stadiums was a mixture of public choice and public good explanations. The majority of respondents were unwilling to pay higher taxes to subsidise the local sports franchises, and people who believed that the sports franchises generated local civic pride were generally in favour of public subsidies (Groothuis, Johnson, and Whitehead, 2004).

Johnson, Groothuis and Whitehead (2001) estimated the value of public goods generated by the Pittsburgh Penguins NHL ice hockey team in Pittsburgh (Pennsylvania) in the context of the city purchasing the team. Johnson, Mondello, and Whitehead (2006) extended the applicability of the previous two studies by considering the effect of time on the WTP question in a different location. Neither of the earlier studies had explicitly clarified to survey respondents whether the WTP sought was an annual or once-only value (Johnson, Mondello, and Whitehead, 2006).[6]

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, Mondello, and Whitehead, 2007).

A particularly interesting finding from across these three 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 single study where the valuation scenario was pitched as a facility contribution, use values were markedly larger than non-use values. This may be because a facility itself has limited intrinsic value by comparison, and is perhaps seen more as part of the value of the

[6] The result of the valuation scenario described in Johnson, Groothuis and Whitehead (2001) was worded as "the team would never leave Pittsburgh", and on this basis, values of WTP were assumed as annual benefit streams received in perpetuity.

major activities which it hosts. This could explain the general experience of the majority of stadiums constructed in recent times across the U.S., which have been built to house existing franchises or to entice major league franchises rather than as civic monuments in their own right.

Owen (2006) used the contingent valuation method to estimate the value of sports teams in the states of Minnesota and Michigan. Of the seven teams evaluated in this study, the team with the largest willingness to pay was the Detroit Red Wings ice hockey franchise in Michigan (US$309 million) followed by the Minnesota Vikings football franchise (US$285 million) (Owen, 2006). Four of the teams registered aggregate WTP of below US$100 million. These values were typically well below the average cost of public involvement in financing facilities, but the value of the benefits estimated were substantial enough not to be inconsequential (Owen, 2006). Fenn and Crooker (2009) estimated the willingness to pay of Minnesotans for the Vikings franchise in light of the team's threat to relocate if a publicly funded stadium was not forthcoming. The average welfare measure of the Vikings franchise was US$770 million, the average welfare measure for a publicly-funded stadium was –US$330 million, and the average welfare measure for the combined team plus stadium package was US$440 million (Fenn and Crooker, 2009). The negative welfare measure for the stadium implied that locals thought a stadium was an inappropriate use of public funding (Fenn and Crooker, 2009).

2.3. Ex-Ante versus Ex-Post Analysis of Sports Facilities and Events

As noted in the introduction to this review, a number of economic arguments have been put forward as justification for government involvement in the financing of sports events and stadiums. Typically, approaches taken to measure the extent of such claims have been either (i) ex-ante studies, or (ii) ex-post studies (Bohanon and Peconga, 2003). Ex-ante studies are predictive studies conducted before the event, whereas ex-post studies are undertaken after the event and consider the effect of changes to the economy as a result of the event. The predominant tools utilised in the evaluation of sports facilities and events are reviewed in the following sub-sections.

2.3.1. Economic Impact Analysis

Economic impact studies have been the most commonly used ex-ante measurement tool in assessing the impact of sports and stadiums on local economies. Hefner (1990) argued that a correctly applied I-O analysis created helpful information about sports events and facilities for policymakers. Underlying the economic impact study is the input-output (I-O)

methodology. I-O analysis provides a comprehensive overview of an economy, utilising the patterns of flow of the goods and services between various sectors (Leontief, 1986). The I-O method essentially examines the impact of any increase in final demand expenditure on the level of output in each sector of the economy (Campbell and Brown, 2003). The measured impacts are the size and direction of the effect in each industry of the increase in final demand. The multiplier is a concept derived from I-O analysis. As Burgan and Mules (1992) explained, firms hire workers, purchase intermediate inputs, and produce output, which are decisions influenced by the demand for the output. This demand expenditure, in turn, creates incomes, which provides the basis for a multiplier effect to take place.

Economic impact studies are used to measure the economic return of an event or investment to a community, often as a measure of benefit alongside supplementary financial cost data provided to local councils (Crompton, Lee, and Shuster, 2001). These studies can be undertaken at a city, regional and national level. The economic impact study is typically conducted by measuring three areas of impact: the direct, indirect, and induced impact. The direct impact is the initial, or first round, effect of visitor spending. The indirect impact is the "ripple effect" of the first round spending through the local economy. The induced impact is the impact of spending by those who have increased incomes as a result of the increased spending then generating further ripple effects (Crompton, 1995).

A strength of the I-O technique is its disaggregated nature, particularly when dealing with expenditure impacts that are concentrated in certain industries (Burgan and Mules, 1992), as well as its flexibility and the policy neutral nature (Fletcher, 1989). The I-O method is flexible in that different models can be created depending upon what purpose they are to be used for. I-O analysis has been used to measure the short-term impact of an event on the economy in such economic terms as output and employment. I-O analysis has a potentially important role to play in a benefit-cost analysis, as benefits and costs would be likely to appear in an I-O analysis in some form or another as transactions within the economy (West, 1992).

Varying measurements of impacts for the same event utilising the I-O method, however, has meant that economic impact studies have been increasingly discredited in the literature, with many economists arguing that they are misleading and "little more than artful speculation" (Keating, 2001, p.3). Assumptions made in economic impact analyses are often difficult to substantiate in practice (Zaretsky, 2001). Arguably the dominant

criticism of economic impact studies surrounds the use of multipliers and their associated assumptions.

Multipliers are used within the I-O framework to estimate short-term economic impacts. The presence (or absence) of supply constraints has important implications for the use of multiplier analysis. The input coefficients measuring inter-industry flows between sectors are assumed constant in I-O models. This assumption is not an assumption of constant technology but an assumption regarding the steadiness of the purchasing patterns between sectors (West, 1992). If excess productive capacity exists in an economy, then this may be a reasonable assumption. If the initial impact is small relative to the size of the industry or the wider economy, then the assumption would not be that restrictive (West, 1992). If, however, the economy is in a position of full employment, then the only way a producer can increase production is to change their purchasing patterns of inputs, which will in turn necessitate a change in the value of the multiplier.

Cowen (1999) asserted that in the case of full employment, the multiplier effect of an investment would be ineffective, with factor prices being pushed up as a direct result. As a result, some have argued that ignoring resource limitations renders economic impact analysis incomplete (Dwyer, Forsyth, and Spurr, 2004). Long-term adjustments will influence the value of the multiplier over time (Coughlin and Mandelbaum, 1991). West (1992) pointed out that the main use of the I-O analysis is in short run applications and, as such, the dynamic long-run aspects of activities would be of less significance. Indeed, the transitory and localised nature of many events meant that there was unlikely to be substantial impacts on input costs (Burgan and Mules, 1992).

Recognising the role of interregional feedbacks is also of critical importance when using multipliers (West, 1992). The expansion of one sector due to an external stimulus causes the other sectors within a region to expand as well. The increase in size of the other sectors may subsequently cause an increase in the initial sector over time. Likewise, a changing pattern or expansion of trade resulting from the stimulus may well result in changing multiplier values. Other factors that may impact on the true value of the multiplier in the I-O framework include changing relative prices between inputs and commodities, as well as technological changes and the creation of new products (West, 1992). Another issue with I-O models is the derivation of regional I-O models from national I-O coefficients. The time lag present in publishing the national I-O tables

effectively contributes to a lower level of accuracy in the regional multipliers (Gazel and Schwer, 1997).

Whether or not to take the multiplier effects into account is, according to Campbell and Brown (2003), dependent upon whether or not similar effects take place without the project in question. Hudson (2001) suggested taking a closer look at how a sporting facility contributes to the economy once it is constructed rather than during construction, because any number of alternative buildings or facilities could generate the same economic impact in terms of jobs and incomes. Coughlin and Mandelbaum (1991) suggested that any analysis that examined the demand effects associated with spending on a stadium alone would overstate the multiplier effects of the project if a city was funding that spending through increased taxes. If the burden of the tax on local residents is large, then there will be a large reduction in demand for local production (Coughlin and Mandelbaum, 1991). The net effect, which must include the tax burden effects that offset some (or all) of the gains associated with increased stadium construction expenditures, is what is of the most importance to policymakers.

Siegfried and Zimbalist (2000) presented perhaps the most critical summary of economic impact studies of sports facility projects and events, identifying three major methodological shortcomings. The first of these is the presence of the substitution effect. Many economic impact studies have assumed that all spending accruing as a result of an event is "new spending", which is an extremely optimistic assumption. Spending typically consists of local and visitor spending, in addition to event organisers, sponsors, and media, among others. The larger the percentage of local residents attending the event, the more inaccurate the "all spending is new spending" assumption becomes. For an accurate estimate of the economic impact, West (1992) recommended careful consideration of the appropriate regional boundaries and the extent to which the impacts occur. It is often argued that local consumers would spend money in the locality regardless of whether the event was held or not (West, 1992). To this end, the only events that are likely to generate an economic impact would either (i) have a large proportion of out-of-town visitors or (ii) induce local consumers to spend more money than they otherwise would have spent (i.e. locals draw from their savings).

The second reason is the presence of leakages out of the local economy (Siegfried and Zimbalist, 2000). Not all production in an area is produced locally, and thus not all income generated by the expenditures attributable to an event is likely to be retained locally

(Siegfried and Zimbalist, 2000). A study of the economic impacts of the 1999 British Golf Open observed that the smaller the local economy, the larger the proportion of tourist expenditures was spent on imports, when compared to the national economy (Gelan, 2003).

The third reason why the economic impacts generated by economic impact studies did not materialise was the likely (negative) effect of subsidies on local government budgets (Siegfried and Zimbalist, 2000). An increase in government funding for a sports facility or event often necessitates a reduction in other areas of core government expenditures (Alexander, et al., 2000). This reduction of expenditure has a balancing effect on the local economy. If the new spending on sports is a net increase in spending rather than being simply diverted from other spending in the community, then a multiplier effect will exist. Multipliers for sports tend to be low, however, and as is the case with low multipliers, job creation is minimal (Palmer, 2002). Burgan and Mules (1992) cited the study of the Adelaide Grand Prix in which it was found that employers didn't hire any additional staff during the event despite over AU$20 million in additional income being generated (Burns, Hatch, and Mules, 1986).

There is also a growing school of thought that considers economic impact studies as serving the purpose of legitimising the positions of those commissioning the studies rather than providing accurate evaluations of economic impact (Crompton, 2006; Delaney and Eckstein, 2003; Mondello and Rishe, 2004; Noll and Zimbalist, 1997b). The impact of assumptions made by economic impact studies when measuring the economic impact of events has been examined in two studies. Crompton (1995) identified 11 separate sources of error when examining 20 economic impact study methodologies, some of which resulted from misunderstanding, while others reflected seemingly intentional fabrication. Hudson (2001) used meta-analysis to empirically examine the nature of 13 economic impact studies performed on professional sports teams and found that all of the studies in his analysis contained some of the same errors suggested by Crompton (1995) that had the effect of inflating the economic impact of the franchise being studied.

Matheson (2006) suggested that ex-ante studies of impacts for smaller events tended to be more accurate than for larger events. Reasons for this included the reduced likelihood of crowding out of local expenditures, lower costs of hosting and security, the reduced likelihood that the event would impact on regular economic activity, and a reduced incentive to seek assistance from government (Matheson, 2006). Burgan and Mules (1992)

stressed that I-O models were best used for measuring multiplier impacts of economic stimuli and thus should not be considered as evaluative tools. Because different assumptions can result in different outcomes, some have suggested that economic impact analysis should be considered as an educated guess at best (Crompton, 1995).

2.3.2. Computable General Equilibrium Analysis

The shortcomings of economic impact studies and multiplier analysis have given rise to computable general equilibrium (CGE) models which are designed to alleviate many of these limitations (Dwyer, et al., 2004). CGE models incorporate feedback effects between sectors of the economy, including factor supply constraints (Adams and Parmenter, 1999). Dwyer, et al., (2004) argued that the end result of a change in the economy may well be a change in the composition of the economy rather than a net increase in aggregate economic activity, and that CGE models can incorporate this possibility. Indeed, a net increase in aggregate economic activity could result if a change in composition resulted in scarce resources being reallocated to more productive uses (Dwyer, et al., 2004). Like economic impact studies, CGE studies are designed to estimate the impact of an event on employment and incomes. Madden (2006) examined the 2000 Sydney Olympic Games on the state of New South Wales and the wider Australian economy using a CGE framework, and found that the net impact of the Games was uncertain, and in at least one scenario, it was negative (Madden, 2006).

Like economic impact analysis, CGE models are essentially predictive analyses and are thus subject to several of the limitations of economic impact analysis already identified within this review. CGE models are more complex, and while possibly more accurate, are not as widely utilised as economic impact studies, or even ex-post methods. Reasons for this have included their relative expense when compared to economic impact analysis (Mules, 1999) as well as their relative complexity and the lack of available data at levels below regions (Hunn and Mangan, 1999).

2.3.3. Ex-Post Econometric Analysis

Growing dissatisfaction with predictive studies that have espoused sizeable benefits of sports facilities, franchises and events on host communities that rarely seemed to eventuate led several economists to conduct retrospective studies. Most of these studies are econometric analyses. The goal of these studies is typically to evaluate the realised impacts of sports and facilities on key economic variables for host economies, including income and employment, among others.

The ability of an ex-post econometric analysis to assess the realised outcome(s) of facility construction and the hosting of events is limited to those localities, cities or regions for which appropriate data is available, as well as the choice of an appropriate empirical model. To that end, several alternative models have been estimated in the literature. Case studies have utilised time-series data and associated techniques, but relatively few models have been derived from local or regional growth origins (Hudson, 1999). Perhaps the most-utilised technique has been pooling or panel-based analysis where the outcomes from multiple cities across several time periods have been considered. While panel data is often more costly to acquire, it does offer multiple advantages over time series and/or cross-section specific estimation, including greater accuracy of model parameters, and the ability to more deeply analyse and test complex human behaviour, among others (Baltagi, 2007; Hsiao, 2007).

Studies that have pooled data within the literature have predominantly selected samples consisting entirely of cities that either hosted or had previously hosted professional sports franchises (Baade, 1996; Baade and Dye, 1990; Coates and Humphreys, 1999, 2001, 2002, 2003; Gius and Johnson, 2001; Lertwachara and Cochran, 2007; Nelson, 2001). Some empirical studies in the literature have found that it is important to assess each city's situation within the appropriate context (Baade and Dye, 1990; Santo, 2005). In these studies (and this is often acknowledged), an insignificant stadium or event coefficient for a pooled analysis has potentially masked quite different outcomes in individual cities. The inherently individual motivations for hosting events and building facilities are not always able to be taken into consideration in such analyses, meaning that an individual city analysis may be more appropriate (Austrian and Rosentraub, 2002; Santo, 2005; Suchma, 2008). Such individual analyses do not always provide generalised conclusions, however (Yin, 2003).

Many ex-post econometric analyses have assessed the validity of anticipated positive impacts on the host economy at an aggregate level. The absence of statistically significant results has been interpreted in either (or both) of two ways: (i) that the economic impact of stadiums and franchises is insignificant at an aggregate level, and (ii) the result is sensitive to the choice of model used, and as such, the potential explanation for a result plausibly includes a statistical anomaly. Ex-post studies typically assume the failure to find an immediate impact (i.e. a statistically significant coefficient in model estimation) constitutes the rejection of the hypothesis that an event or facility has an impact on the local economy.

Econometric methods that have utilised pools or panels with macroeconomic-level dependent variables such as per-capita incomes and per-capita income growth rates frequently find that a single, aggregated variable (i.e. dummy variable for "new stadium") did not influence the key economic indicator in question. Some studies have analysed effects that vary over time and across cross-sections, including the "honeymoon effect" (the transitory impact of new facilities on event attendances) in different cities (Baade and Sanderson, 1997b; Clapp and Hakes, 2005; Coates and Humphreys, 2005; Leadley and Zygmont, 2005). If the effects of events and stadiums on key economic variables in different locations at different points of time are different, as one might reasonably expect to be the case, then painting the experience of different cities with the same brush (i.e. specifying a standard period for all cities in a sample within which the effect is expected to be detectable) may well be inappropriate. Others have pointed out that the effects of events and stadiums may be extremely difficult to detect in a model of an entire city's economy due to their relatively small size, and the myriad of industries and influences present in local and national economies over time (Baade, Baumann, and Matheson, 2008b; Delaney and Eckstein, 2003). This hasn't deterred researchers from attempting to detect such an effect. The increased availability of quarterly and even monthly data has resulted in more comprehensive analyses, and has enabled a renewed focus on the detection of tangible economic outcomes of sports projects for host economies.

2.4. The Economic Justification for Government Involvement in Sports Facilities and Events: What should be considered?

There has been wide variation in how pro-subsidy arguments in different places 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). A number of potential justifications for government involvement in sports facilities and events have been discussed throughout this review. The purpose of this section is to evaluate the appropriateness of tangible and intangible economic outcomes as justifications for government involvement in such projects.

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, et al.,

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 in light 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 (2006) 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 (1997b) 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, 1997b). 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, 1988b; Noll and Zimbalist, 1997b). 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 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.

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, consumer surplus can potentially be a large proportion of the overall benefits from a sports event (Hone and Silvers, 2006). The importance of consumer surplus as a benefit can be lessened 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, et al., 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. 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). The relevant consumer surplus from a local government perspective is the surplus that accrues to local residents. 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.

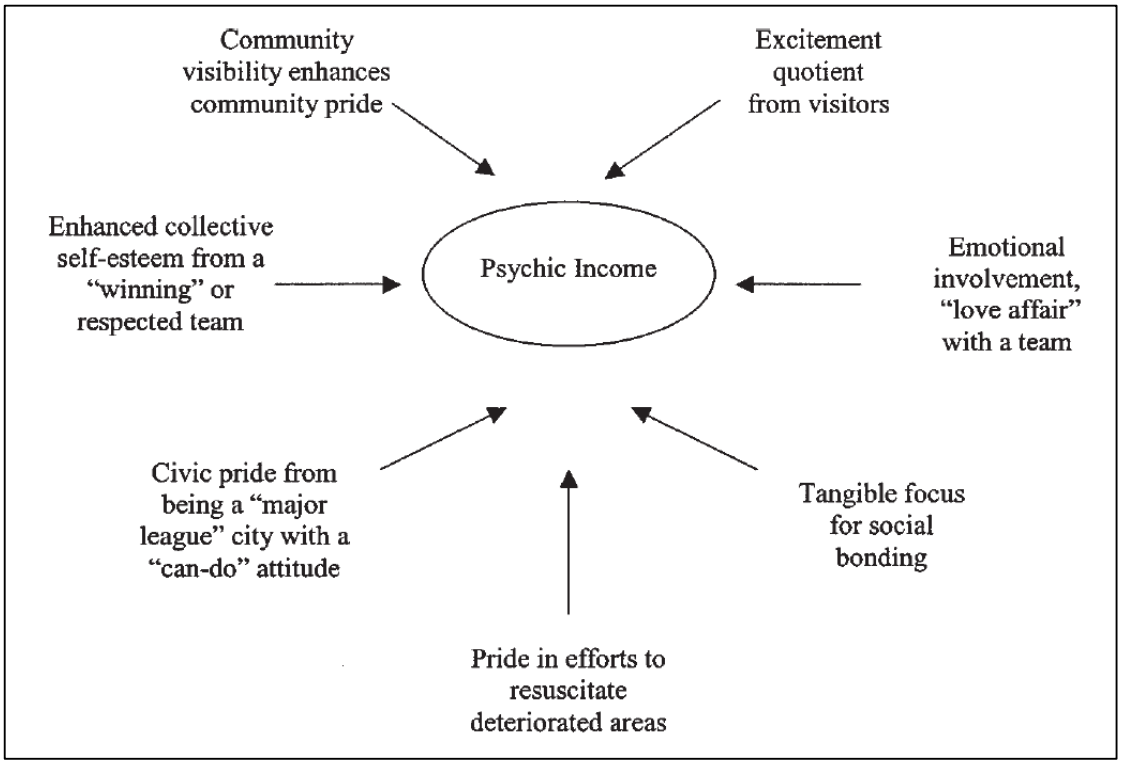
Further economic justification for public sector involvement of the public sector in events and facilities in cost-benefit analysis occurs in the presence of market failure. Market failure is when the costs and benefits to society are different from those of private consumers and producers, and the market 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 such 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. In the absence of government assistance, such public goods will not be provided and the market will be inefficient.

Crompton (2004) suggested a psychic income paradigm as a new focus for assessing public sector involvement in the financing of sports facilities. This paradigm focused on

the connection between local residents of a community and their team or facility, as shown in Figure 2.1, rather than the economic impacts created by an injection of out-of-town spending.

Figure 2.1: The Psychic Income Paradigm



Source: Crompton (2004, p. 56).

Psychic income benefits are principally public goods and thus could be considered a more legitimate rationale for public subsidies of such facilities than economic impact studies (Crompton, 2004). 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).

These benefits are inherently intangible in nature and include such benefits as the external image enhancement, where the new facility and associated franchise(s) results in the host community being perceived as "major league" by outsiders. The community may also develop an enhanced sense of pride and solidarity as a result of their association with the activities hosted by the facility. Such benefits are not universally accepted as genuine economic benefits, however (Meder and Leckrone, 2002). Siegfried and Zimbalist (2000)

refuted such benefits, saying they were "…at a minimum hard to measure, and there are even legitimate questions as to whether they are benefits at all" (Siegfried and Zimbalist, 2000, p.99).

There has been significant research conducted into the nature of intangible benefits in the past decade or so, as previously indicated in this review. Benefits previously considered unquantifiable have largely been quantified in more recent times through the use of various market and non-market valuation techniques, many of which have been adopted from the environmental economics sub-discipline. This advancement has led to a greater awareness of the relative sizes of the use and non-use benefits of sports facilities, franchises, and events and their importance (or otherwise) to host economies. Today's economist is better equipped in many respects to evaluate sports projects through the range of potential tools at his or her disposal.

2.5. SUMMARY

Several points can be made upon reviewing the literature. Firstly, the analysis of tangible impacts of stadium projects (incomes, jobs, earnings, real estate values) has revealed that, for the most part, facilities have not stimulated host economies. Secondly, assessments of the economic outcomes of mega-events have generally found that realised impacts on host economies were zero or even negative. The majority of studies have been conducted for major league sports facilities within the U.S. or large-scale mega events hosted in the U.S. and Europe. Within studies that have evaluated individual cities, a variety of outcomes were found; some cities experienced positive effects, some zero, and others were negative. No research has delved into the reasons why experiences differ across cities, with the emphasis instead being placed on the empirical results.

The study of events has raised similar issues. Although the general consensus in the independent literature is that events have had zero or negative realised impacts on local economies, studies of individual cities have found that some host cities have benefited, although these gains have been outweighed by losses in other host cities. Again, there has been no work done to investigate why some cities win and others lose within the context of these studies. It stands to reason that the mega-events that have dominated discussion in the literature are primarily aimed at attracting large numbers of international visitors to the host country, whereas smaller events are more likely to be (but not necessarily) oriented towards locals. There is more at stake for larger countries when hosting internationally-oriented events due to the costs associated with the event. Small countries

tend to host second-tier or age group international events rather than mega-events. Are the effects of event hosting and hence the justification for government involvement any different for host cities in a small country?

Given that it appears to be a prerequisite for today's event or facility promoter or proponent to produce an economic impact analysis for such a project, there is a very real need for appropriate economic analysis to clarify the extent to which economic impacts can realistically be considered as benefits. Certain analytical techniques appear better suited to evaluate particular aspects of facility and event evaluation from a government perspective than others. Arguments presented in the literature tend to suggest that the analysis of events that are focused on attracting non-local attendees (such as internationally-oriented events) may require an economic impact or CGE approach, as the benefits are likely to accrue to local producers rather than consumers. A consumers' surplus-oriented analysis would be more appropriate than an economic impact analysis for the evaluation of events that are locally oriented in nature.

3

METHODOLOGY

3.1. INTRODUCTION

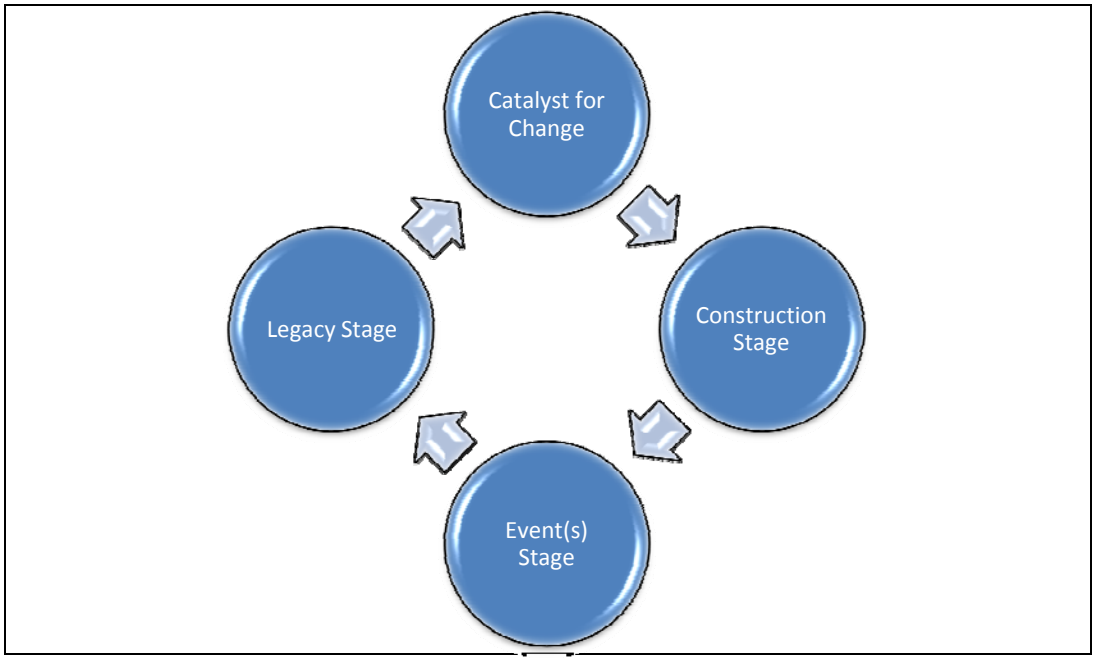
The major objective of this research is to evaluate the economic justification of government involvement in sports facilities and events. This research adopts what could be considered either a mixed-methods approach (Johnson and Onwuegbuzie, 2004) or multiple-methods approach (McKendrick, 1999) to addressing this objective, involving the use of two time-series based case studies as well as a theoretical analysis and a panel-based empirical analysis. A conceptual framework for the study is developed in which facility development is considered as a sequential process. Several methods within the literature have been used to analyse the outcomes of such projects. The econometric ex-post method is adopted in this research for several reasons, not the least of which is consistency with previously published research. This chapter of the thesis describes how the methodology for this research evolved from a case study analysis to panel econometric analysis and from the outcomes of a theoretical model to the empirical estimation of consumer surplus benefits.

This chapter is developed as follows. The conceptual framework for the research is developed in Section 3.2, and the methods adopted in each analytical section of the research are outlined in Section 3.3.

3.2 CONCEPTUAL FRAMEWORK

It is useful to visualise how the individual components of this research fit into a wider context. Facility development is essentially a sequential process, as shown in Figure 3.1.

Figure 3.1: A Conceptual Framework for Facility Development



There are four stages to facility development. For every facility development, there is always a catalyst for change or a reason to build the facility, be it physical or economic obsolescence of an existing facility (Baade and Dye, 1990), the need for a city or regional image enhancement (Rosentraub, 2003), a civic (re)development strategy (Logan and Molotch, 1987), among others. Following the decision to act on the catalyst, the construction of the facility occurs, and is followed by the event stage. A common occurrence for both of these stages is the quantification of economic outcomes – these stages are typically where economic impacts are highlighted. The final stage is the legacy stage, where the post-event outcomes are considered, including the long-term usage of the facility. The legacy stage is critical for identifying the benefits that should be considered for an overall evaluation of the project.

Throughout each of these four stages, local economy factors as well as macro-economic influences are important in determining the outcomes of each stage. For instance, a poorly performing or stagnant local economy is likely to be a contributing factor towards a redevelopment strategy that focuses on sports (Smith, 2005). The economic climate is likely to play a part in the construction stage, where facilities can potentially offset, delay, or displace other projects. Likewise, economic conditions also play a key role in influencing the nature of economic impacts from events – tangible or otherwise. The legacy of events and/or facilities is heavily dependent upon the state of the local economy,

in as much as facilities and events attempt to influence it. After all, if a facility or event changes the nature of the local economy, it may well lead to affluence, increasing expectations, and economic obsolescence of facilities, etc.

There are substantial political influences at play in the catalyst stage. Determining the role of government in such projects is an important consideration, as well as the decision of where to locate the facility. The first consideration, the role of government, has contributed to the proliferation of predictive (ex-ante) analyses of events and facilities, typically in the form of economic impact studies. The second consideration is an under-researched area when one views the recent experience of cities in New Zealand – in the four major cities, two (Wellington and Dunedin) have built (in the case of Dunedin, are presently building) replacement facilities in different locations, while the other two (Auckland and Christchurch) have opted to upgrade existing facilities. In Auckland, the choice of location for the major stadium to host the Rugby World Cup in 2011 was a nationally magnified debate. Essentially it came down to a choice between a new stadium on the waterfront (dubbed Stadium New Zealand) or upgrading the existing facility, Eden Park (Hickey, 2006a). The choice was made to go with the existing facility, but many people were left wondering, "What if?" The success of Westpac Stadium in Wellington was certainly a major contributing factor in Dunedin's decision to move away from Carisbrook to the Awatea Street location for the new Forsyth Barr Stadium at University Plaza. Advantages of the Westpac Stadium included proximity to a major public transport hub (rail) and the city's entertainment district, as well as the absence of nearby competing facilities in the lower North Island (Hickey, 2006b).

The level of government involvement in such projects is influenced by two further important factors, namely the nature of competition for events, and the nature of benefits accruing to the local economy. In many instances, events are monopolistic in nature – that is, the supply of such events is restricted by the event's governing body. When there is scarcity of events, the resulting effect, according to economic theory, is an increase in price of such events, which is what we generally tend to observe for most events, but this is even more pronounced for highly visible mega-events such as the Olympic and Commonwealth Games, Football World Cups and tournaments, Rugby World Cups, etc. At a lower level, the scarcity of events forces cities to become more innovative in the deals they offer to attract events. In many North American cities, deals offered to attract professional sports franchises typically include taxpayer-funded facilities, and often with very favourable lease terms, among other incentives (Noll and Zimbalist, 1997a). Cities fear that missing

out on a franchise or a particular event will negatively affect them in some way, so are often seen to spend "more than they should" to avoid such negative impacts.

This observation leads us to question the nature of benefits accruing to local economies as a result of events and facilities. If the predictions of ex-ante studies are realised, there are potentially significant tangible impacts in terms of income and job creation resulting from the hosting of events. While the connection between economic impacts and producer surplus in the context of a benefit-cost analysis is acknowledged, we have seen that the majority of the literature has cast doubt on these claims. Even if these claims were substantiated, the observation of the honeymoon effect that accompanies new events suggests that these impacts are likely to be transitory rather than permanent in nature. A more defendable explanation for short- and longer-term benefits associated with the event lies with the so-called intangible benefits. These benefits accrue to consumers of the event (although one does not necessarily need to consume the event to enjoy benefits from the event), and are linked to the public goods generated by the event. In the presence of public goods, economic theory tells us that the private market will under-provide the good in question, thereby creating a case for government intervention. The appropriate level of government involvement in each case will be dependent upon the level of benefits accruing to the relevant geographic area, be it local, regional or national.

The facility development framework provides the context for the subsequent analytical chapters of this research. In the first instance, investigating the contributing factors for the development of a facility or event provides the basis upon which an evaluation can or should be based. This is considered through the case study of the Westpac Stadium in Wellington in Chapter 4. In the second instance, the extent to which tangible economic impacts or benefits of facilities and events are realised can provide justification for their inclusion in the evaluation of the facility. An evaluation of the nature of ex-post economic impacts of facilities and events in a panel (cross-section, time-series) context is conducted in Chapter 5. A greater understanding of the effect of competition between cities for events can potentially explain why costs associated with events tend to be significant relative to benefits. It can also explain why cities commit substantial public funds to build facilities and to host events. A game theory model is developed in Chapter 6 for this purpose. The intangible benefits of an event are economically justifiable grounds for government involvement, and thus the quantification of these benefits is critical to the evaluation of an event or facility. Consumer surplus benefits are quantified for the case of attendance at rugby in the city of Wanganui in Chapter 7.

3.3. METHODS ADOPTED: A BRIEF SUMMARY

The methods utilised in this research are detailed more comprehensively in the individual analytical chapters, but are presented briefly in the following sub-sections.

3.3.1. Ex-Post Analysis of Economic Impacts

The chosen methods for Chapters Four and Five of this research are ex-post analyses of the impacts of sports facilities and events. This involves the development of models that determine the impact of facility construction and event hosting on employment and GDP of local economies while controlling for area-specific characteristics. The purpose of these analyses is to evaluate the claims made by ex-ante studies for facilities and events that there will be significant job creation and increases in incomes as a result of these projects.

The basic structure of the models adopted in the first two analytical chapters of this research is as shown in equation 3.1 below:

$$Y_{it} = \alpha X_{it} + \beta S_{it} + \varepsilon_{it} \qquad (3.1)$$

where Y_{it} is employment/real GDP for local economy *i* in time period *t*, X_{it} includes one or more variables to control for area-specific characteristics, S_{it} consists of sports environment variables, α and β are coefficients to be estimated, and ε_{it} is the error term.

There are several reasons for adopting this basic model structure. This structure underlies most of the published academic research conducted in this area, so the results generated in this study can be considered generally comparable and consistent with past research. One can also use this basic structure across several layers of analysis to examine the robustness of results.

An important point raised in several studies in the literature has been the context within which facilities are built and events are hosted. The first analytical chapter of this research focuses on the instrumental case study of the Westpac Stadium in Wellington, where the realised economic impact of the facility on employment in the regional economy is examined. Longer publicly-available time series data in New Zealand is only available at the regional level, hence the focus on the Westpac Stadium within the context of the Wellington regional economy. To obtain generalised conclusions, the model utilised in the

time series context is modified and applied to a broader group of cities over a shorter time period.

In Chapter 4, an empirical analysis of the contribution of the construction of the Westpac Stadium on regional employment is conducted, using time-series regression analysis. The models estimated use quarterly employment data for the Wellington region from the third quarter of 1989 to the fourth quarter of 2009. The model developed is largely derived from Hudson's (1999) and Miller's (2002) studies of employment, where employment is modelled as a function of theoretically and empirically important local and national economy characteristics in addition to the stadium construction variable of interest.

The model developed for the Wellington case study is modified for a panel data analysis in Chapter 5, with additional control variables borrowed from Hotchkiss, et al., (2003) and Claus and Claus (2002). The purpose of the panel study is to identify whether specific outcomes of the Wellington experience were present across all facilities and events in a wider context. A panel of quarterly data is collated for 15 New Zealand territorial local authorities (TLAs) over the time period 1997 to 2009. Fixed effects panel regression analysis is employed to determine the realised impact of facility construction and the hosting of internationally oriented events on levels of sector-specific employment and real GDP for host economies.

The depth of facility-specific variables used in Chapter 5 is unparalleled elsewhere in the literature. While some studies have adopted either single (e.g. facility construction) or group (e.g. stadiums, arenas, etc) dummy variable approaches to identifying the effects of facility construction, this research also explicitly examines individual projects within the panel context. To the best of the author's knowledge, this is the only study in the relevant literature that has considered the impact of (i) separate facility projects and (ii) multiple events in an ex-post panel context. Furthermore, only two studies have considered the impact of facility location in an empirical context; facilities in these studies were classified as being located within a pre-defined geographical area of the economy (Nelson, 2001, 2002). No previous study has explicitly considered the impact of facility location on the realised economic impacts of specific events. This study explicitly incorporates the distance of the facility from the central business district (CBD) alongside the capacity of the facility as additional explanatory variables in evaluating the realised economic outcomes of specific events.

3.3.2. Modelling the Strategic Nature of Facility and Event Subsidisation

Economic theory of competitive markets tells us that profits will be driven to zero as firms seek to capture profits (and avoid losses). This logic also applies to the competition that is often present when cities, regions and countries seek to host major sporting events. This analysis is intended to offer an explanation for why ex-post studies of economic impacts generally fail to find evidence of ex-ante predictions of job creation and income growth.

Chapter 6 develops a game theory framework in which the effect of event subsidisation on local economies in an environment where two cities compete with each other for events is considered. Theoretical values for tangible benefits and costs associated with hosting an event are developed, and the Nash equilibrium for the game is derived. Subsidies are considered explicitly as a part of the cost of hosting events, and the thresholds for subsidisation are also derived within this framework. Two alternative scenarios are presented for evaluation – when cities are identical (i.e. they have the same market potential), and a large city versus a small city scenario (that is, different market potentials).

3.3.3. Measuring the Consumers Surplus Benefits of Provincial Rugby Attendance

With many studies in the literature failing to find evidence of consistently positive outcomes of facility and event projects on local economies, there has been greater focus on quantifying the intangible benefits of these projects. The goal of this analysis is to consider the value of intangible benefits associated with a particular sport, and to utilise these values in an evaluation of local government involvement in the provision of a sports facility.

Chapter 7 involves the calculation of consumer surplus benefits from the attendance of representative rugby in Wanganui, New Zealand. This is a two stage process, with the initial estimation of a demand model developed using contemporary demand theory for sports attendance, and the choice of the appropriate functional form of the estimated model to determine the value of consumer surplus benefits. This analysis borrows from the literature on recreational demand to estimate consumer surplus values. The studies reviewed from this literature noted that the resulting values are often sensitive to the functional form of the model. As a result, estimates of consumer surplus values are presented for each of the estimated functional forms of the model for comparison

purposes. The estimated values are then critically evaluated as to their relevance within a facility evaluation, and are compared to the costs of the project in question.

4

WESTPAC STADIUM: THE IMPACT ON THE WELLINGTON REGIONAL ECONOMY

4.1. 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.[7] 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 forecasted at the outset of stadium construction (Arcus, Sanderson, and Goodchild, 2004).

This study seeks to address the potential conflict between the commissioned report of Arcus, Sanderson and Goodchild (2004) and the vast majority of ex-post studies in the literature to date that have failed to find any evidence of positive impacts of professional sports teams, events, or stadium construction on key economic variables. The question that this analysis seeks to answer is whether the experience of the Westpac Stadium on the Wellington region is consistent with the literature and justified local government involvement in its construction. There are two hypotheses that this analysis seeks to test: firstly, that the construction of the Westpac Stadium resulted in an increase in overall employment in the Wellington region, and secondly, that the first five years of the

[7] The shape of the Westpac Stadium will be familiar to North American readers as a "cookie-cutter", a term given to circular-shaped multiple-purpose facilities constructed in the 1960's and 1970's.

Stadium's operation was associated with an increase in overall employment in the Wellington region.

This analysis contributes towards the overall research goal in two ways. 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. The assessment of realised economic impacts during the facility and event stages of facility development can thus provide justification for local government involvement. The analysis will initially focus on the contributing factors to the Stadium development, and then develop an assessment of the ex-post economic impact of the Stadium on employment in the Wellington region.

The analysis develops with a discussion of international facility construction activity in Section 4.2, followed by the development of the Westpac Stadium in Section 4.3. Ex-post econometric models are developed in Section 4.4, the results of which are presented and discussed in Section 4.5, with the analysis concluding in Section 4.6.

4.2. FACILITIES: THE INTERNATIONAL EXPERIENCE

Facility construction around the world has boomed in recent years. Much of this activity has been associated with the hosting of mega-events, including the Olympic Games and FIFA World Cup Finals. The construction of facilities has been the subject of numerous studies, several of which are reviewed briefly in the country-specific sections that follow.

4.2.1. United States

Prior to World War 2, the vast majority of stadiums in the United States were privately owned. Before 1953, only one major league baseball club played in a government-funded stadium (Cleveland's Municipal Stadium hosted baseball's Cleveland Indians) and three-quarters of stadium financing for major league baseball was privately sourced (Keating, 2001). Only 12 of the 47 professional teams (26%) in the four major league sports (basketball (NBA), ice hockey (NHL), baseball (MLB) and gridiron (NFL)) played in facilities that were publicly funded (Quirk and Fort, 1992).

From the late 1950s, the professional sports industry in the United States experienced unparalleled growth as a result of steadily increasing attendance, broadcasting and

concession revenues (Noll and Zimbalist, 1997b). Indeed, throughout the 1990s, rapid economic growth, rising income inequality, and the increasing popularity of relative status combined to ensure that demand for professional sports was sustained (Siegfried and Peterson, 2000). The growing demand by cities for professional sports teams across North America, coupled with the restricted supply of franchises within monopoly professional sports leagues, created an environment where stadium subsidies and their perceived benefits became more and more widespread. By 1991, the percentage of publicly funded facilities in each of the four major professional leagues had increased to 65% or greater (Quirk and Fort, 1992).

Crompton, Howard and Var (2003) identified four "eras" of funding for major league sports facilities in the United States in the post-1950s. They identified the 1961-1969 period as the beginning of the increased role that government played in financing and building sports facilities for franchises which were located largely in the Northeast and Upper Midwest. From 1970-1984, professional sports experienced an enormous surge in popularity, with the combination of league expansions and increased demand from cities keen to attract franchises, resulting in cities spending money on building new facilities (Crompton, Howard, and Var, 2003). The beginning of the decline in government importance in stadium financing took place between 1985-1994, with the development of public/private partnerships between cities and franchise owners (Crompton, et al., 2003). The period between 1995 and 2003 saw stadium construction on an unprecedented scale, with 47 new facilities being built. Facilities were seen as becoming economically rather than physically out of date, and the costs for new facilities rose with the need for the facility to extract additional revenues from a variety of sources, rather than just ticket sales (Crompton, et al., 2003). This era also saw increased involvement financially from franchises as many communities became reluctant to fund facility projects in their entireties with property taxes (Crompton, et al., 2003). Zimbalist and Long (2006) noted that the average public contribution (as a proportion of overall facility construction costs) towards sports facilities in general increased from 65% in the 1995-1999 period to 75% in the 2000-2006 period. When the facilities were separated into stadiums and arenas, there was a fall in public contributions to stadiums (from 88% to 74%) but this was more than offset by a substantial increase in public contributions to arenas (from 43% to 72%) (Zimbalist and Long, 2006). Crompton et al., (2003) credited increased awareness of key economic issues such as opportunity cost and equity (fairness) as being important factors in the increased public reluctance to fully fund sports facilities, thus moving towards public/private partnerships where both parties had vested interests in these projects.

4.2.2. Europe

In France, the Stade de France was built from September 1995 to November 1997 for the 1998 FIFA World Cup Finals. It was built in the Paris suburb of Plaine-Saint-Denis, previously a heavily industrialised area. Despite a dream beginning publicity-wise[8], Newman and Tual (2002) noted that the post-World Cup impacts of the stadium were uneven in nature. The Stade de France proved successful in attracting quality events, including hosting soccer and rugby internationals, as well as opera and concerts. It was even a major part of Paris's bid for the 2008 Olympic Games (Newman and Tual, 2002). In contrast, it was noted that the stadium provided little by way of employment, areas of severe deprivation remained in Plaine-Saint-Denis, and long-term unemployment actually increased after stadium construction (Newman and Tual, 2002).

In Cardiff, the construction of the £130 million Millennium Stadium was supported by a £40 million national lottery grant, with the rest being obtained by a commercial loan (Jones, 2002). The new stadium replaced the old Cardiff Arms Park National Stadium. It hosted matches during the 1999 Rugby World Cup, which was jointly hosted in the United Kingdom, Ireland and France. In addition to the World Cup, the Millennium Stadium was utilised to a greater degree than the Arms Park was, with national rugby, club rugby, soccer, and speedway, among others, making for an ongoing regular schedule of events (Jones, 2002). The Millennium Stadium differed from U.S. facilities in that it served a national rather than civic need, as it was owned by sporting bodies and not privately owned franchises. Because the sporting bodies were long-term tenants, the effect of the stadium would be expected to be quite different to the outcomes experienced in the United States (Jones, 2002). 2001 research indicated, however, that around half of city-centre users were unlikely to shop there during event days because of concerns over anti-social behaviour, crowds, and transport (Jones, 2002).

van Dam (2000) described the recent redevelopment of Dutch football facilities as being determined to a large extent by negative attitudes towards old facilities and their undesirable inner-city locations. In contrast to what has been observed in the U.S., replacement facilities in the Netherlands tended to move away from the city towards the suburbs (van Dam, 2000).

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[8] It was the ground where France won the World Cup Final in 1998, defeating Brazil 3-0.

4.2.3. Australia

Recent construction in Australia has been dominated by the development of facilities in Melbourne and Sydney. The AU$425 million Docklands Stadium (presently known as Etihad Stadium) was a major project in the redevelopment of Melbourne's Docklands area (Dovey and Sandercock, 2002). A consortium of private investors, including News Corp and the Seven television network, built the stadium and redeveloped an adjacent area (Searle, 2002). Searle (2002) noted that a lack of off-season activity and lower-than-expected attendances resulted in a pre-tax loss of AU$41.2 million in the stadium's first financial year, and the value of the stadium was written down by AU$156 million. There has been tremendous development in the Olympic Park precinct. The Melbourne Cricket Ground, Melbourne's largest stadium, was upgraded for the 2006 Commonwealth Games to the tune of $A425 million, which included a AU$77 million contribution from the State Government (Egan, 2004). Construction of the Melbourne Rectangular Stadium (AAMI Park) began in 2007, at a cost of AU$265m, and is to be completed in 2010 (Major Events Victoria, 2010b). This facility was to be the home of the city's soccer, rugby, and rugby league teams. The Melbourne Park facility, which hosts the Australian Open tennis tournament, is presently being upgraded at a cost of AU$363 million (Major Events Victoria, 2010a).

In Adelaide, the upgrade of Hindmarsh Soccer Stadium for the 2000 Olympic Games exceeded initial estimates by over 250% to AU$30 million, the costs of which were borne by the state government (Searle, 2002). The costs of upgrading Bruce Stadium in Canberra also exceeded initial expectations by over 100%, to a final cost of AU$60 million, with local taxpayers liable for an amount that exceeded the costs of the facility (Searle, 2002).

In Sydney, the main stadium built for hosting the 2000 Olympics, the AU$463 million Stadium Australia, was opened in 1999, with AU$135 million in State funding. For most months the stadium was empty, with insufficient sporting events or rock concerts in Sydney to sustain the 80,000 seat stadium (Searle, 2002). The stadium ran at an AU$24 million loss in its first financial year, AU$11 million in its second year, and a similar size loss ensued the following year (Searle, 2002). It faced intense competition for sporting events from the Sydney Cricket Ground and the Sydney Football Stadium, both publicly controlled facilities. The 21,000 seat SuperDome was also built as a gymnastics and basketball stadium for the Sydney 2000 Olympics at a cost of AU$197 million, with state government funding totalling AU$142 million (Searle, 2002). It experienced similar

difficulties to Stadium Australia in that it competed directly with the state controlled Sydney Entertainment Centre, an established facility closer to the Sydney CBD, and was estimated to be losing AU$5 million annually (Searle, 2002).

When one examines the international experience of stadium construction, several striking points emerge. Stadiums generally haven't been profitable, they haven't revitalised the areas in which they have been built, and combined public and private ventures haven't been any more successful than publicly funded stadiums.

4.3. WESTPAC STADIUM: THE CATALYST FOR CHANGE

Several important factors contributed to the development of the Westpac Stadium in Wellington. What follows is a 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, a result which saw the venue 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). The Park continued to host international rugby up until the opening of the new facility after a NZ$300,000 upgrade met 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).[9]

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 Westpac Stadium and the growth of tourism due to the newly built national museum, Te Papa (Bedford, 1998).

[9] Essentially, non-recourse loans mean that as surpluses become available, the loans are to be repaid.

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).

An 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). Information on the Stadium website pointed out that on event days, the number of total staff employed could be anywhere between 400 and 1000 workers, while on non-event days, between 25 and 50 workers are employed (Westpac Stadium, 2010a).

Lilley (1998) noted that of the NZ$80 million in components contracts for the stadium that were awarded by December 1998, NZ$60 million were awarded to firms outside Wellington city. The breakdown of this work is shown in Table 4.1.

Table 4.1: 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)

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

Construction took place from August 1997 to December 1999 (Fletcher Challenge Construction, 2004b), and the stadium was opened in January 2000. 250 staff were employed on site, 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 had 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 have included rugby, rugby league, and football (soccer). One of the purposes of 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, 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 4.2.

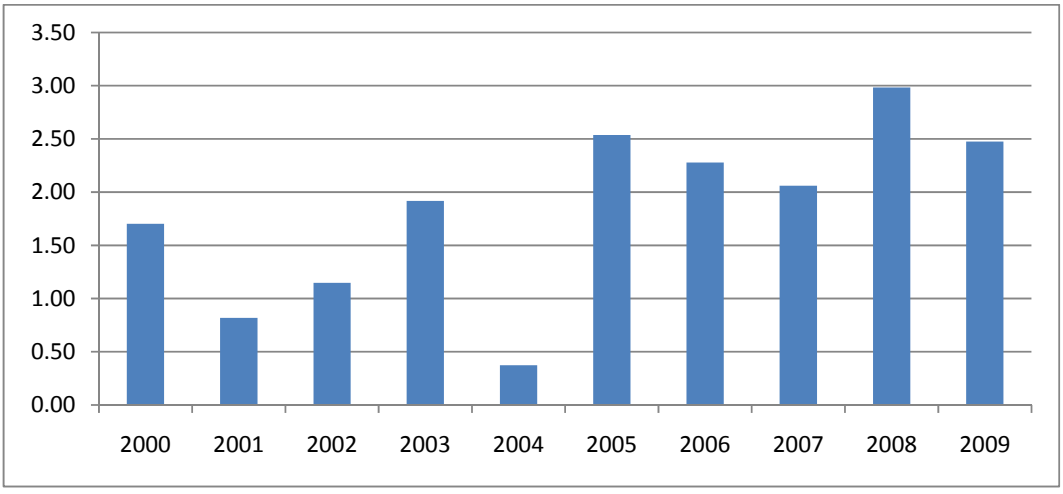
Table 4.2: Annual Attendance at Westpac Stadium, 2000-2009

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 2000-2001 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 can be seen graphically in Figure 4.1.

Figure 4.1: Net Operating Surpluses ($m): Westpac Stadium, 2000-2009



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

Bank debt was $30.6 million in 2003, over 200% more than the $15 million forecast in 1997, due to numerous cost overruns, including improvements to catering facilities and a $5 million replay screen. Stadium chief executive David Gray said 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 20 years to pay off. If a similar repayment schedule was maintained for the public loans, it was expected to take almost 30 years to repay (Loh Ho-Sang, 2003).

4.3.1. The First Five Years: An Evaluation

In 2004, BERL was commissioned to put together a report on the outcomes achieved in the first five years of operation of the Westpac Stadium. As mentioned in the previous section, BERL conducted the initial ex-ante 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 2004. Details of these are as shown in Table 4.3.

Table 4.3: Predicted Ex-Ante Impacts Versus Estimated Ex-Post Impacts

	1996 estimate (annual)	**2000-2004 (average)**	**Difference**
Direct spending by spectators ($m)	15	35	+20 (+132%)
Employment generated (FTEs)	270	569	+299 (+111%)
Total Value Added (GDP $m)	11.6	27	+15.3 (+131%)

Source: (Arcus, et al., 2004)

During 2000-2004, BERL estimated that activity at the Westpac Stadium sustained an annual average of 569 full time equivalent (FTE) positions. As a percentage of total employment in the Wellington region, the BERL estimates in each year were between 0.34 and 0.41 percent of total FTE positions. These calculations are shown in Table 4.4.

Table 4.4: Estimated Employment Effects on Wellington Region, 2000-2004

Year	Estimated Total Employment Effect	FTE (December quarter)	Percentage of employment
2000	617	150,600	0.4097
2001	573	152,400	0.3760
2002	585	152,400	0.3839
2003	518	150,500	0.3442
2004	550	154,100	0.3569
Average	569	152,000	0.3743

Sources: (Arcus, et al., 2004), Statistics New Zealand, author calculations.

These estimates, it must be pointed out, 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. 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 (1997b) 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, 1997b, p. 473).

Arcus, et al., (2004) used a 2004 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 impact of hosting the 2004 game on the Wellington region that was attributable to the new facility was in the order of $1m to $2m.[10]

Likewise, in the report, the terms impacts and benefits 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).

It must be emphasised that economic impacts are not necessarily benefits. In order to claim these impacts as benefits, one must be certain of the counterfactual scenario. For an impact to be a benefit, it must be the case that that spending would not have occurred in the absence of the Stadium. If the Stadium was not built, it is possible that Athletic Park may have been upgraded again, or another facility such as the Basin Reserve could have been upgraded. As it is difficult to say what would have happened in the absence of the stadium, it is also difficult to justify the impacts as benefits. For the purposes of this analysis, these outcomes are referred to as impacts and not benefits.

The results of the Arcus, et al. (2004) report 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. There are thus two hypotheses which are to be tested within this 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 five 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.

4.4. 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

[10] These values would only be meaningful if they were real values. Unfortunately it is not known whether the reported values are nominal or real values.

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.

4.4.1. 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 4.1 and 4.2:

$$FTE_t = \beta_0 + \beta_1 FTE\_NZ + \beta_2 LF_t + \beta_3 RAWE_t + \beta_4 INT_t + \beta_5 STAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME + e_t \quad (4.1)$$

$$FTE_t = \beta_0 + \beta_1 FTE\_NZ + \beta_2 LF_t + \beta_3 RAWE_t + \beta_4 INT_t + \beta_5 STAD_t + \sum \gamma POSTSTAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME + e_t \quad (4.2)$$

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 4.1 is estimated to assess the effect of construction of the stadium on the Wellington region, while equation 4.2 is estimated to assess the effect of post-construction stadium activity for the first five years of operation. In equation 4.2, the alternative $POSTSTAD_t$ specifications include a dummy variable 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), yearly post-construction dummy variables (that take the value of 1 for the post-construction year indicated, and zero otherwise) and a single post-construction dummy variable (that takes the value of 1 in each quarter in the post-construction period of the analysis).

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). Another possibility is that an increase in short term real interest rates increases the cost of borrowing and would reduce investment and employment, other things equal. A variable is needed to control for the effect of the construction of the $317 million Museum of New Zealand, Te Papa Tongarewa, which was built in Wellington from December 1993 to 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 Te Papa's influence in the economy into account, other variables 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 4.2 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 some multicollinearity issues. To eliminate potential 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 4.4.2), these variables were adjusted 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) components for 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[11].

The final models to be estimated are those shown in equations 4.3 and 4.4 below.

$$\begin{aligned} FTE_t &= \beta_0 + \beta_1 GFTE\_NZ + \beta_2 GRAWE_t + \beta_3 DLF_t \\ &+ \beta_4 INT_t + \beta_5 STAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME \\ &+ \beta_8 d99Q3 + e_t \end{aligned} \tag{4.3}$$

$$\begin{aligned} FTE_t &= \beta_0 + \beta_1 GFTE\_NZ + \beta_2 GRAWE_t + \beta_3 DLF_t \\ &+ \beta_4 INT_t + \beta_5 STAD_t + \sum \gamma POSTSTAD_t + \beta_6 TEPAPA_t \\ &+ \sum \delta Q_t + \beta_7 TIME + \beta_8 d99Q3 + e_t \end{aligned} \tag{4.4}$$

[11] 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.

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 (formerly INFOS) database. The definitions and summary statistics for the variables utilised in this analysis are as shown in Table 4.5.

Table 4.5: 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),	Household Labour Force Survey	240.93	238.10	201.60	298.10

	in thousands.					
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 4.6.

Table 4.6: 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 in EViews 5.1 are MacKinnon (1996) one-sided p-values (MacKinnon, 1996; Quantitative Micro Software, 2005).

The tests used for each variable series were Augmented Dickey-Fuller tests, computed by econometric software EViews 5.1. 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 ≤ 0.0587), hence the data do not need further adjustment for non-stationarity before use in model estimation.

4.5. RESULTS

Equations 4.3 and 4.4 were estimated using EViews version 5.1 (Quantitative Micro Software, 2005) and gretl version 1.8.5 (Cottrell and Lucchetti, 2009) econometric software packages. The results are presented in the following sections.

4.5.1. Facility Construction Effects

Equation 4.3 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 4.7.

The static model 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, and one of the causes of the presence of autocorrelation is model misspecification (Hendry, 1995). The model was subsequently re-estimated 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. Lagged growth in real average weekly earnings was not found to be significantly different from zero. To ensure that there were no lagged effects, a first period lag was also included, and was also 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. Indeed, a further test of the Breusch-Pagan LM test for autocorrelation revealed that there were no issues with autocorrelation and results of White's test for heteroskedasticity showed errors were homoskedastic.

Table 4.7: Stadium Construction and Employment – Estimated Parameters

	Model 4.3: OLS (static) Observations 1990:1-2009:4 (T = 80) Dependent variable: FTE		Model 4.3: OLS (dynamic) Observations 1990:1-2009:4 (T = 80) Dependent variable: FTE	
Variable	*Coefficient*	*Prob.*	*Coefficient*	*Prob.*
C	96.189	0.000	15.536	0.015
GFTE_NZ	0.619	0.033	1.273	0.000
GRAWE	0.298	0.356	0.254	0.140
GRAWE(-1)	0.129	0.679	-0.188	0.261
DLF	-0.027	0.598	-0.003	0.901
INT	1.787	0.000	0.348	0.019
STAD	-1.865	0.107	-0.269	0.665
TEPAPA	-5.031	0.000	-0.651	0.348
TIME	0.649	0.000	0.122	0.004
Q2	-0.205	0.846	0.312	0.576
Q3	-0.093	0.933	1.114	0.063
Q4	-0.228	0.833	-0.465	0.420
d99Q3	6.402	0.064	8.112	0.000
FTE(-1)	-	-	0.826	0.000

Mean dependent var	145.184	145.184
S.D. dependent var	14.520	14.520
Sum squared resid	628.222	173.503
S.E. of regression	3.062	1.621
R-squared	0.962	0.990
Adjusted R-squared	0.956	0.988
F statistic	142.437	482.265
P-value(F)	0.000	0.000
Durbin-Watson	0.714	-
White's test (LM) (p-value)	20.695 (0.295)	20.118 (0.451)
Breusch-Godfrey LM test (p-value)	14.064 (0.000)	1.075 (0.304)

The static model 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, and one of the causes of the presence of autocorrelation is model misspecification (Hendry, 1995). The model was subsequently re-estimated 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. Lagged growth in real average weekly earnings was not found to be significantly different from zero. To ensure that there were no lagged effects, a first period lag was also included, and was also 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. Indeed, a further test of the Breusch-Pagan LM test for autocorrelation revealed that there were no issues with autocorrelation 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 suggests that the effect of construction of the Stadium 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 increased during the construction period, then employment in another sector was likely to have fallen elsewhere in the regional economy.

4.5.2. Post Construction Stadium Activity: The First Five Years

Equation 4.4 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 4.4 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 4.4(ii), in which separate dummy variables for each of the first five years of stadium activity (*YEAR_1, YEAR_2, YEAR_3, YEAR_4* and *YEAR_5*) were included. The results are presented below in Table 4.8.

Following the same estimation procedure as for equation 4.3, the final estimation of each variation of equation 4.4 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 4.4(i) (p-value = 0.234), and marginally non-normal for equation 4.4(ii) (p-value = 0.083). Both models explained the variation in employment well (adjusted R-squared of 0.987 for equation 4.4(i), and 0.988 for equation 4.4(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 in Table 4.7. Most of the coefficients are significant and take consistent signs with those in Table 4.7, with the exception of *GRAWE* in equation 4.4(ii), where it was positive and statistically significant (p-value = 0.087). The variables of particular interest in this section are the alternative $POSTSTAD_t$ variables. In equation 4.4(i), the coefficient on the *FIRST_FIVE_YEARS* dummy variable is negative but not significantly different from zero. The $STAD_t$ coefficient is again negative and statistically insignificant (p-value = 0.577), as it was in Table 4.7. A test of the joint significance of *STAD* and *FIRST_FIVE_YEARS* showed that the two coefficients were jointly insignificant (p-value = 0.462).

Table 4.8: Post-Construction Activity and Employment – Estimated Parameters

Model 4.4: OLS (dynamic) Observations 1990:1-2009:4 (T = 80) Dependent variable: FTE				
	Equation 4.4(i)		Equation 4.4(ii)	
Variable	*Coefficient*	*Prob.*	*Coefficient*	*Prob.*
C	14.907	0.022	20.776	0.006
GFTE_NZ	1.296	0.000	1.241	0.000
GRAWE	0.238	0.171	0.311	0.087
GRAWE(-1)	-0.210	0.223	-0.115	0.523
DLF	-0.002	0.953	-0.001	0.978
INT	0.307	0.059	0.438	0.017
STAD	-0.357	0.577	-0.399	0.529
FIRST_FIVE_YEARS	-0.316	0.545	-	-
YEAR_1	-	-	1.084	0.249
YEAR_2	-	-	0.492	0.604
YEAR_3	-	-	0.021	0.984
YEAR_4	-	-	-1.594	0.077
YEAR_5	-	-	-0.814	0.362
TEPAPA	-0.709	0.314	-0.930	0.193
TIME	0.115	0.009	0.159	0.002
Q2	0.291	0.607	0.329	0.559
Q3	1.108	0.065	1.117	0.063
Q4	-0.508	0.385	-0.480	0.406
d99Q3	8.090	0.000	7.856	0.000
FTE(-1)	0.835	0.000	0.771	0.000

Mean dependent var	145.184	145.184
S.D. dependent var	14.520	14.520
Sum squared resid	172.521	158.080
S.E. of regression	1.629	1.610
R-squared	0.990	0.991
Adjusted R-squared	0.987	0.988
F statistic	443.570	353.656
P-value(F)	0.000	0.000

White's test (LM) (p-value)	21.781 (0.412)	26.586 (0.377)
Breusch-Godfrey LM test (p-value)	1.170 (0.283)	1.561 (0.216)

The coefficients in equation 4.4(ii) for each of the first five years (*YEAR_1* to *YEAR_5*) show an interesting pattern. The coefficients on *YEAR_1*, *YEAR_2* and *YEAR_3* were positive, *YEAR_4* and *YEAR_5* were negative, and the values decreased with each year, with the exception of *YEAR_5*, which is greater than the *YEAR_4* coefficient. Only the coefficient on *YEAR_4* was statistically significantly different from zero (p-value = 0.077), and it was negative – suggesting a fall in employment of 1594 jobs in the fourth year of the stadium's operations. The *STAD* coefficient was similar to what was found in equation 4.4(i), but remained statistically insignificant (p-value = 0.529). A test of the joint significance of the individual *YEAR* coefficients revealed that although the sum of the coefficients was negative (–0.812), the overall effect was not significantly different from zero (p-value = 0.766). A further test of the joint significance of the *STAD* and each of the *YEAR* coefficients indicated that although the overall effect was again negative (-1.211), the coefficients were not jointly significant (p-value = 0.668).

So, what do these results tell us about the importance of the Westpac Stadium to the Wellington regional economy? These results indicate that during the period of construction, the Stadium was not a significant influence on aggregate employment in the Wellington region, This is perhaps not a surprising result when one considers the size of the value of the facility relative to the region's gross domestic product. The Wellington region's gross domestic product from the September 1997 quarter to the December 1999 quarter was approximately $38 billion (data provided by Infometrics regional database). The $122 million cost of the Stadium was 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 years of the Stadium's operations. 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 can, however, call in to question the appropriateness of government funding in the Stadium project that would appear to have, at best, changed the composition of employment. The intent of 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) did not materialise at the aggregate level. At an aggregate level, the benefits of the Stadium were thus almost certainly not employment-related. The replacement nature of the Westpac Stadium meant that it was highly likely that employment levels would be maintained, rather than increased. Of course, employment may have fallen 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. Such a claim, however, would almost certainly be considered optimistic at best.

A change in the composition of employment may have important implications for the regional economy. Previous research in this area has pointed out a potential issue with a change in employment composition that may bring about a worsening in economic development relative to other regions. In particular, if a project results in the creation of low-skill employment and the loss of high-skill employment, the host region may well experience a deterioration in economic development (Baade and Dye, 1990). This analysis 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 to a facility-related project.

Ultimately, these results are consistent with the general conclusions reached by the majority of the literature that stadium construction and operations do not stimulate growth in employment and incomes. In Wellington's case, a best-case interpretation of the results of this analysis would be that stadium construction and operation retained employment, while a more critical interpretation would be that the Stadium did nothing more than change the composition of employment.

4.6. CONCLUSIONS

The findings of this research lend further weight to the argument that stadium construction should not be considered as an effective stimulus to aggregate employment. Indeed, results from this ex-post econometric analysis of employment in the Wellington region suggested that the effects of the construction of the Westpac Stadium and the first five years of post-construction operation were not significantly different from zero.

These results suggest that great caution should 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 Wellington; jobs created in a particular sector were only likely to have offset jobs lost from somewhere else within the local economy. As far as evaluating the Westpac Stadium as an investment, the jury is still out. There is more work to be done in determining whether the Stadium was an appropriate use of scarce government funds.

Governments (and ratepayers) should look closely at 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 stimulatory projects. This is not to say, however, that stadiums are bad investments. It may well be that benefits lie in other areas. Closer attention needs to be paid to possible flow-on effects on sectors which may be affected by a stadium investment, including the hospitality and construction sectors.

This chapter has addressed the unique experience of the Westpac Stadium in Wellington, New Zealand. To make general statements about the impacts of stadium construction in other New Zealand cities on the basis of the Westpac Stadium case study alone would be irresponsible and potentially misleading. There is a need to widen and deepen the analysis and examine the experience of several cities before even suggesting possible generalised implications.

The next chapter of this research sees an extension of the method utilised here across a panel of several local economies. The purpose of the next chapter is to analyse the most disaggregated level of economy in New Zealand, the territorial local authority (TLA), to examine whether the facility construction and facility operation outcomes found in the Wellington case study are realised in New Zealand localities.

5

FACILITY CONSTRUCTION AND THE HOSTING OF INTERNATIONAL EVENTS IN NEW ZEALAND: EX-POST IMPACTS ON LOCAL ECONOMIES

5.1. INTRODUCTION

Internationally, local, regional and central governments have become increasingly involved in the financing of sports events and facilities over time. Government-subsidised events and facilities have ranged from local to international in scale. As detailed in Chapter 4, this activity has already taken place overseas in the United States, Europe, and Australia, among others. Arguably the most-often cited piece of supporting evidence presented as part of proposals for these projects and as justification for government involvement in these projects has been the economic impact study, which typically presents an argument that events stimulate economic development through the attraction of spending from outside the locality, sustaining or creating employment and incomes, thus stimulating economic growth.

The analysis in this chapter considers the effect of facility construction and the hosting of internationally oriented events on local economies in New Zealand. Relevant sector-specific employment and real GDP growth are used as dependent variables for ex-post models that include facility construction and event hosting variables as independent variables. The analysis seeks to estimate the realised impacts of facility construction and event hosting on territorial local authority (TLA) host economies to inform future decisions of whether or not to commit public spending towards such activities on these grounds.

Ex-post panel data models of sector-specific employment and real GDP are built using data from 15 host economies, and are used to make several important contributions to the

literature. Initially the effects of facility construction on employment in the construction sector and on local GDP are considered in three ways. In the first instance, each construction activity is aggregated, initially into a single facility construction variable, and then being separated into facility types. Finally, each facility project is included in each of the models as a separate variable, making for a unique set of results where the outcomes of different facility projects are directly comparable.

The next major contribution that this chapter makes is in the analysis of the impact of major events on hospitality sector employment and real GDP. The realised outcomes of 11 internationally-oriented events are examined using a panel of 16 host economies. The effects of an event hosted on a local economy are then hypothesised as a function of the size and proximity of the event to the central business district of the city. The use of a distance-related function within the estimated models to test the impact of proximity to the local economy's CBD is the final contribution of this analysis.

The chapter develops as follows. The construction of facilities in New Zealand is outlined in Section 5.2, and internationally oriented events hosted in New Zealand are briefly discussed in Section 5.3. The development of ex-post panel models and discussion of the data takes place in Section 5.4, with the results of the analysis presented and discussed in Section 5.5. The analysis concludes in Section 5.6 with the conclusions and policy implications.

5.2. FACILITY DEVELOPMENTS IN NEW ZEALAND

Since 1997, stadium construction activity in New Zealand has undergone a period of significant growth. New stadiums in Auckland, Wellington, and Invercargill, several upgrades to existing stadiums, as well as several planned new facilities have seen in excess of NZ$1.1 billion either spent or proposed for sporting stadiums across the country. Details of the individual facility works in the North and South Islands of New Zealand can be seen in Tables 5.1 and 5.2 respectively. Many of the new stadiums were built or have been designed with multiple purposes in mind.

Table 5.1: Stadium Construction Details in the North Island, New Zealand, 1997-2009.

City	Stadium	Type of Construction	Construction period	Value of construction work	Public funding details
Whangarei	Okara Park (Northland Events Centre)	Upgrade	February 2009 - present	$18.5 million	Whangarei District Council: $3m; Northland Regional Council: $13m; Central Government: $2.5m (Dinsdale, 2009)
Auckland	North Harbour Stadium	Construction	January 1996 – March 1997	$42 million	60% (Pegden, 1997)
	Mount Smart Stadium	Upgrade	December 2003 – March 2004	$23 million	Auckland Regional Council: 100%
	Eden Park	Stand Upgrade	June 1998 – July 1999	$38 million	Auckland City Council: $10m ("Eden Park gets nod," 1998)
	Eden Park	Upgrade	May 2008 - present	$240.5 million	Central Government: $190m Auckland City Council: $20m Auckland Regional Council: $10m
	North Shore Events Centre	Upgrade	October 2000 – September 2001	$4 million	37.5% (Chapman, 2002)
	Trusts Stadium	Construction	February 2003 – August 2004	$28 million	Waitakere City Council: $12.5 million (Beston, 2004)
	Vector Arena	Construction	July 2004 – March 2007	$80 million	Auckland City Council $72.5m (Auckland City Council, 2007)

Tauranga[12]	Western Bay Finance Stadium at Baypark	Construction	November 2000 – October 2001	$15 million	0% (100% privately funded)
Hamilton	Waikato Stadium	Upgrade	November 2000 – March 2002	$37 million	Hamilton City Council: $18m (Taylor, 2003)
Rotorua	Energy Events Centre	Construction	July 2005 – March 2007	$28 million	-
Taupo	International Racing Track (Taupo Motorsport Park)	Construction	August 2005 – March 2006	$13 million	-
Napier	McLean Park (Graeme Lowe Stand)	Upgrade	September 2008 – August 2009	$7.8 million	-
New Plymouth	Yarrow Stadium[13]	Upgrade	January 2002 – September 2002	$18 million	Taranaki Regional Council: $9.6m (Brown, 2004; Major regional asset should not become a ratepayers' liability," 2003)
Wellington	Westpac Stadium	Construction	August 1997 – December 1999	$125 million	Wellington City Council: $15m; Wellington Regional Council: $25m (Beattie, 2000)

[12] The Tauranga Indoor Sports and Exhibition Centre was to begin construction in January 2010 on the Baypark site.

[13] Rugby Park was renamed Yarrow Stadium in 2002 after the Yarrow family were the major benefactors in the park redevelopment.

Table 5.2: Stadium Construction Details in the South Island, New Zealand 1997-2009.

City	Stadium	Type of Construction	Year opened/upgraded	Value of construction work	Public funding details
Nelson	Saxton Field Stadium	Construction	May 2008 – October 2009	$12.5 million	Nelson City Council: $5.4m Tasman District Council: $3.6m Central Government: $785,000 ("Government chips in for Saxton Field stadium," 2008)
	Trafalgar Park	Upgrade	November 2009 - present	$7.4 million	Nelson City Council: $5.9m Central Government: $1.5m ("Govt adds $1.5m to park upgrade," 2009)
Christchurch	Jade Stadium[14]	Upgrade	December 2000 – March 2002	$40 million	Christchurch City Council: $4m[15] (Bruce, 1999; Cheaper tickets from stadium loan - mayor," 2000)
	AMI Stadium[16] (East Stand)	Upgrade	May 2008 - January 2010	$60 million	Christchurch City Council: $20m (Pearson, 2008)
	WestpacTrust Centre	Construction	May 1996 – September 1998	$34.7 million	-

[14] Lancaster Park was renamed Jade Stadium after Aoraki Corporation bought naming rights for the park in 1998 at a cost of $4 million for 10 years (Riordan, 1998).
[15] The Christchurch City Council invested $4 million and agreed to underwrite the loan for the balance of construction costs.
[16] Lancaster Park was renamed AMI Stadium after the rights were sold to AMI in 2007 for an undisclosed sum.

Dunedin	Forsyth Barr Stadium at University Plaza	Construction	May 2009 - present	$198.3 million	Dunedin City Council: $98.5m Otago Regional Council: $37.5m Central Government: $15m (Dunedin City Council, 2010)
Invercargill	Stadium Southland	Construction	June 1999 – April 2000	$10.5 million	Invercargill City Council: $760,000 ("$760,000 loan for car parking," 1999)
	Homestead Stadium	Upgrade	February 2001 – August 2001	$7.3 million	Invercargill City Council: $1.3m (McKinlay, 2000)
	ILT Velodrome	Construction	May 2005 – May 2006	$11 million	Invercargill City Council: $150,000; Central Government: $1 million (Arnold, 2004; Burdon, 2005; New Zealand Government, 2006)

Of the 24 construction projects, 12 were new facilities that have either been built or are presently under construction. The facilities involving the largest outlays, Auckland's Eden Park, Wellington's Westpac Stadium, Christchurch's AMI Stadium (formerly Lancaster Park), and Dunedin's Forsyth Barr Stadium at University Plaza have been built or upgraded predominantly for the 2011 Rugby World Cup. As we can see from the following tables, there is a multitude of different financing arrangements for different facilities, but it is clear that many projects have considerable government involvement, be it local, regional, or central government.

Most New Zealand facilities were originally built in the late 1800s and early 1900s. Despite upgrades throughout their lifetimes, many remain in their original locations. The two largest new facilities, the Westpac Stadium in Wellington and the Forsyth Barr Stadium in Dunedin, have both replaced aging existing facilities (Athletic Park and Carisbrook, in Wellington and Dunedin respectively) and are sited in areas closer to the centre of the city than the original stadia were. Westpac Stadium is 1.4km from the city centre in Wellington, whereas Athletic Park was 3.4km from downtown. Forsyth Barr Stadium is sited adjacent to Otago University in the north of Dunedin, and is 1.7km from the Octagon, whereas the Carisbrook stadium was sited in South Dunedin and 2.3 km from the Octagon. Eden Park is located in the residential area of Mt Eden, some 3.4km from downtown. AMI Stadium is located 1.9km from the Christchurch city centre.

5.3. THE EVENTS

New Zealand has played host to a number of large-scale sporting mega-events, including the Commonwealth Games (twice), Rugby and Cricket World Cups, the America's Cup (twice), and numerous other events. All of these events have been hosted in New Zealand at least once during the past 25 years, and this has spurred a greater interest by sporting bodies and cities in New Zealand in hosting internationally-oriented events.[17]

In 2006, the New Zealand Government set up the Major Events Development Fund, a government initiative set up within the Ministry of Economic Development. With an annual fund of approximately $4m, the Fund was established to assist sporting bodies to attract and retain sporting events with a strategic importance to New Zealand. Such events

[17] The 2003 Rugby World Cup was to be jointly hosted by New Zealand and Australia but issues with facilities and advertising meant that New Zealand lost the rights to host the event and Australia took over as sole host.

are expected to produce immediate and enduring economic benefits, among other outcomes (New Zealand Major Events, 2010b).

During the period from 1997 to 2009, 11 internationally oriented events were hosted in New Zealand. The details of each event, including when it occurred and the host city for the event(s), are as shown in Table 5.3.

Table 5.3: Sporting Mega-Events hosted in New Zealand, 1997-2009

Event	Date(s) of Event	Host City
Netball World Championships	September – October, 1999	Christchurch
FIFA U-17 Football (Soccer) World Championships (Men)	November, 1999	Nationwide
America's Cup	October, 1999 – March, 2000	Auckland
America's Cup	October, 2002 – March, 2003	Auckland
IRB Rugby Sevens (New Zealand Round)	Inaugural tournament: February, 2000 (hosted annually)	Wellington
British and Irish Lions Rugby Tour	June – July, 2005	Nationwide
UCI World Mountain Bike and Trial Championships	August, 2006	Rotorua
A1GP World Cup of Motorsport (New Zealand Round)	Inaugural race: January 2007 (hosted annually)	Taupo
Netball World Championships	November, 2007	Auckland
World Bowls Championships	January, 2008	Christchurch
FIFA U-17 Football (Soccer) World Championships (Women)	October – November, 2008	Nationwide

Most of these events were staged in a single city. For the 1999 U-17 Men's Soccer World Championships, the 2005 British and Irish Lions Tour, and the 2008 U-17 Women Soccer World Championships, many cities staged games during these events. The allocation of games for these events was as shown in Tables 5.4, 5.5, and 5.6 below.

Table 5.4: Host cities for 1999 FIFA U-17 Soccer World Championships (Men)

City	Games Hosted
Auckland (North Shore)	6 Pool games (3 x NZ), 1 Quarter-Final, 1 Semi-Final, 3rd vs 4th Place game, Final
Napier	6 Pool games, 1 Quarter-Final
Christchurch	6 Pool games, 1 Quarter-Final, 1 Semi-Final
Dunedin	6 Pool games, 1 Quarter-Final

Table 5.5: Host cities for 2005 British and Irish Lions Tour

City	Games Hosted
Auckland	vs Auckland, vs New Zealand (Third Test)
Hamilton	vs New Zealand Maori
Rotorua	vs Bay of Plenty
New Plymouth	vs Taranaki
Palmerston North	vs Manawatu
Wellington	vs Wellington, vs New Zealand (Second Test)
Christchurch	vs New Zealand (First Test)
Dunedin	vs Otago
Invercargill	vs Southland

Table 5.6: Host cities for 2008 FIFA U-17 Soccer World Championships (Women)

City	Games Hosted
Auckland (North Shore)	6 Pool games (2 x NZ), 3rd vs 4th Place game, Final
Hamilton	6 Pool games, 2 Quarter-Finals
Wellington	6 Pool games (1 x NZ), 2 Quarter-Finals
Christchurch	5 Pool games, 2 Semi-Finals

New Zealand will host the World Rowing Championships at Lake Karapiro in September 2010, the 2010 IPC World Athletics Championships in Christchurch, the 2011 Rugby World Cup (as sole host) and the 2015 Cricket World Cup (jointly with Australia). There has been much talk and hype about the projected economic impacts that will accrue to New Zealand as a result of these events. Aggregate economic activity associated with

sports in New Zealand in general was approximately 0.8% of national economic activity in 1999. By way of comparison, Table 5.7 shows the projected economic impacts for several of the internationally oriented sports events hosted in New Zealand that are examined in this analysis.

Table 5.7: Economic Impacts of Selected Major New Zealand Sports Events

Year	Event	Economic Impact (NZ$ million)	Real GDP (production, NZ$ million)	Percent of GDP
1999-2000	America's Cup	639.6 (McDermott Fairgray Group Ltd. and Ernst & Young, 2000)	110,902	0.5767
2001	IRB Sevens	8.6 ("Sevens tournament brings Capital an $8.6m windfall," 2001)	117,165	0.0073
2002-2003	America's Cup	528.6 (Market Economics Ltd., 2003)	132,425	0.3992
2005	British and Irish Lions Rugby Tour	135.2 (Vuletich, 2005)	151,701	0.0891
2006	World Mountain Biking Championships	21.1 (Sports Impact Ltd., 2007)	160,273	0.0132
2007	Netball World Championships	12 (New Zealand Government, 2007)	168,328	0.0071
2008	A1GP New Zealand Round	25 (Curtis, 2009)	181,259	0.0138
	World Bowls Championships	4 (Christchurch City Council, 2008)	181,259	0.0022
	U-17 FIFA Women's World Championships	30 ("Official Draw this Weekend Set to Kick Off FIFA U17 Women's World Cup," 2008)	181,259	0.0166

Source: Nominal GDP: Statistics New Zealand, with percentages calculated by the author.

As a percentage of national GDP, these events, despite their international nature, were no more than 0.6% of nominal GDP in the year in which the event was hosted. Outside the two America's Cup regattas, the next highest percentage was 0.02% of nominal GDP.

One could argue that the initial direct impact of a new event or stadium is most likely to be detected in the immediate time period that the event takes place. In the case of an event, a substantial direct injection of tourist expenditure will be evident in the local economy immediately, either in that month or quarter. Unless it is a large and irregular event, then such an injection of spending may well be difficult to detect when using annual data. The construction of a stadium may well have a series of on-going direct effects in the form of the honeymoon effect, where people initially visit the stadium because it is an attraction in itself, and then attendance of events returns to regular pre-construction levels over time.

The case for indirect effects being detectable in ex-post analyses, however, is considerably weaker than the case for direct effects. Indirect effects of either events or facilities are harder to detect as there is no known time frame within which the indirect effects filter through the local economy. As such, the longer the time frame, the less likely the effects will be detectable. One might reasonably expect the likelihood of detecting a statistically significant change in economic activity to be greater if the focus is on local area economic activity as opposed to national economic activity.

There are several hypotheses to be tested within the following analysis. Firstly, that facility construction is associated with an increase in (i) construction sector employment, and (ii) real GDP for territorial local authority (TLA) host economies. Secondly, that the hosting of internationally-oriented events stimulates employment in (i) the accommodation, cafes and restaurants sector, and (ii) real GDP for host economies. Thirdly, that the realised economic impacts of events are inversely related to the event's proximity to the local area's CBD – that is, the closer an event is hosted to the CBD, the greater the realised economic impact. The following section sees the development of ex-post empirical models to test these hypotheses.

5.4. MODELS AND DATA

It is important to decide on the appropriate structure of such models. Several different methods have been utilised in the literature, from fixed-effects models (Coates and Humphreys, various years) to the adoption of multiple theoretically intuitive location-

specific characteristics (Hudson, 1999). Indeed, Coates and Humphreys devised the most extensive sports-related variable set in the literature alongside a somewhat limited set of local area controls, whereas Hudson (1999) used a limited sports set alongside the most theoretically comprehensive set of location-specific controls utilised in this field of research. Sports-related variables used by Coates and Humphreys include dummy variables for stadium construction, the presence of franchises and franchise entry and exit activity for three of the major league sports for standard metropolitan statistical areas (SMSA's) in the United States. By contrast, Hudson only used a count variable for the number of professional sports franchises in the city. The method adopted in this analysis is a hybrid of the two methods that adopts key variables from separate models estimated within the literature.

The choice of TLA-specific controls within such models is typically limited by data availability. Hudson (1999) used several theoretically important and empirically well-performed variables from the literature in developing a model for employment growth, controlling for market size, labour costs, education levels, energy costs, and tax levels. Hotchkiss, et al. (2003) used population and industry mix variables for a specific year as area-specific controls. Claus and Claus (2002) used a selection of key indicators to construct an index that was used to predict quarterly employment growth in New Zealand. These variables included, among others, retail sales, net migration, interest rate spread between the five-year government bond and the 90-day bank bill rate, the trade weighted index, and business intentions as measured by the Quarterly Survey of Business Opinion (QSBO) (Claus and Claus, 2002).

Because the models developed in this analysis utilise panel data, this requires control variables to be location-specific, which rules out such variables as interest rates and the trade weighted index. Separate models for facility construction and events are developed and explained in the following sections.

5.4.1. Facility Construction Models

Borrowing from the literature, separate panel models for territorial local authority (TLA) construction sector employment growth and TLA real GDP growth are developed. The general form of each of these models is as shown in equations 5.1 and 5.2 below:

$$EMP\_CONST_{it} = \alpha_i x_{it} + \beta_i FCON_{it} + e_{it} \quad (5.1)$$

$$GDP_{it} = \alpha_i x_{it} + \beta_i FCON_{it} + e_{it} \quad (5.2)$$

where:

EMP_CONST_{it} is the level of construction employment for TLA *i* in quarter *t*,

GDP_{it} is the level of real GDP,

x_{it} are location-specific characteristics, and

$FCON_{it}$ are facility construction-specific characteristics.

The α's and β's are parameters to be estimated, and the e_{it} are the error terms.

The x_{it} variables in equations 5.1 and 5.2 include:

$SHARE\_AFF_{it}$, which is the share of TLA employment in the Agriculture, Forestry and Fisheries sector for TLA *i* in quarter *t*,

$SHARE\_MANUF_{it}$, which is the employment share of the manufacturing sector,

$SHARE\_TTS_{it}$, which is the employment share of the trade and transport services sector,

$SHARE\_SERV_{it}$, which is the employment share of the private and public service sector,

NM_{it} is the TLA's net migration,

$LQ\_EMP\_CONST_{it}$, which is the TLA's location quotient of construction employment,

$LD\_RRET\_SALES_{it}$, which is the TLA's logged difference (percentage change) in real retail sales in quarter *t*, and

$TIME$, a time trend.

The $FCON_{it}$ variables used in variations of equations 5.1 and 5.2 include:

$FCON\_TOTAL_t$, which is the sum of facility construction dummy variables across TLA's in quarter *t*,

$STAD_t$, which is the sum of stadium construction dummy variables in quarter *t*,

$ARENA_t$, which is the sum of arena construction dummy variables in quarter *t*,

$MOTOR_t$, which is the sum of motorsport construction dummy variables in quarter *t*,

$VELO_t$, which is the sum of velodrome construction dummy variables in quarter *t*, and individual facility projects for TLA *i* in quarter *t* are also included as separate dummy variables.

Thus, a comprehensive list of dependent and independent variables are utilised in this analysis to control for a variety of TLA-specific characteristics and their influences on the local economy. The definitions and summary statistics of location-specific dependent and independent variables used in equations 5.1 and 5.2 are detailed in Table 5.8. Variables are all taken from the Infometrics regional database, unless specified otherwise.

The location-specific controls in the models include TLA industry mix, which is represented by four industry employment share variables: (i) agriculture, forestry and fisheries (*SHARE_AFF*); (ii) manufacturing (*SHARE_MANUF*); (iii) trade and transport services (*SHARE_TTS*); and (iv) public and private sector services (*SHARE_SERV*), a selection that is consistent with the industry mix variables used by Hotchkiss, et al. (2003). Depending upon the relationship with the dependent variable in question, the signs on the parameter estimates are expected to vary. Net migration (*NM*) controls for changes in TLA demographic characteristics, and one would expect that greater net migration would potentially increase both employment in the construction sector and real GDP. This analysis also includes a location quotient to control for TLA construction sector (*LQ_EMP_CONST*) to control for the concentration of TLA employment in the construction sector across TLA's. The location quotient is measured using the following formula:

$$LQ_{EMP_{CONST}} = \frac{EMP\_CONST_{i,t} / EMP\_TOTAL_{i,t}}{EMP\_CONST_{NZ,t} / EMP\_TOTAL_{NZ,t}} \quad (5.3)$$

If the location quotient equals 1, this means that TLA *i* has the same concentration of employment in the construction sector as the nation. This can be interpreted to mean that the employment in the construction sector in the TLA meets the needs for local demand. If the location quotient is less than 1, this can be interpreted to mean that employment in the construction sector for the TLA is insufficient to meet local demand. Likewise, if the location quotient is greater than 1, this suggests that local employment is more than sufficient to meet demand. The sign on the location quotient coefficient is expected to be positive – the more concentrated the industry, the more likely it is that employment (and GDP) will be created with a stadium project. Finally, the percentage change in retail sales (*LD_RRET_SALES*) is included as a measure of growth in TLA market size, and the sign on this coefficient is expected to be positive – growth in market size is expected to positively impact on construction sector employment and real GDP.

Like many previous studies that have measured the realised outcomes of events and facilities, the goal of this analysis is not to examine the role of key drivers of economic activity; rather, it is to control for as many theoretically important factors as possible, with the focus on whether event-specific variables impact significantly on local economic activity. To this end, the research has its limitations. Potential lack of explanatory power is possible due to omitted variables including population (even though net migration is used

as a proxy), as well as local area construction information such as building permits. As Baade, Baumann and Matheson (2008a) put it:

> "Given the number and variety of controls found in regional growth models and the inconsistency of coefficient size and significance, any critic can claim that a particular regression suffers from omitted-variable bias. However, it is far more challenging to specify the model that remedies the problem" (Baade, Baumann, and Matheson, 2008a, p. 633).

The construction-specific variables used in equations 5.1 and 5.2 are as shown in Table 5.9. Most studies in the literature have simply used either the single dummy variable approach for facility construction (*FCON_TOTAL*) or have categorised the facilities into types (*STAD*, *ARENA*, *MOTOR* and *VELO*). The analysis will initially consider the aggregated facility construction variables, and then each construction effect individually with a dummy variable that takes the value of 1 for each quarter that facility construction occurred for the host TLA.

5.4.2. Event Models

Along the same lines as the models developed for facility construction, separate models for TLA employment in the Accommodation, Cafés and Restaurants sector and TLA real GDP were developed. The general forms of each of these models are as shown below in equations 5.4 and 5.5:

$$EMP\_ACR_{it} = \alpha_i x_{it} + \beta_i EVENT_{it} + e_{it} \quad (5.4)$$

$$GDP_{it} = \alpha_i x_{it} + \beta_i EVENT_{it} + e_{it} \quad (5.5)$$

where:

EMP_ACR_{jit} is the level of employment in the Accommodation, Cafés and Restaurants sector for TLA *i* in quarter *t*,

GDP_{it} is the level of real GDP,

x_{it} are the location- and economy-specific characteristics, and

$EVENT_{it}$ are event-specific variables.

The α's and β's are parameters to be estimated, and the e_{it} are the error terms.

Table 5.8: Location-specific dependent and independent variables (x_{it})

Variable	Description	Infometrics Industry category	Mean	Standard Deviation	Minimum	Maximum
EMP_CONST	Quarterly level of TLA construction sector employment in quarter *t*.	E	5202.380	4701.638	877.000	23257.000
GDP	Quarterly level of TLA real gross domestic product, in millions.	-	1204.623	1414.351	176.000	6684.200
SHARE_AFF	Quarterly share of the TLA employment in the agriculture, forestry and fisheries sector.	A	3.981	4.261	0.081	19.958
SHARE_MANUF	Quarterly share of TLA employment in the manufacturing sector.	C	12.423	3.505	3.418	22.218
SHARE_TTS	Quarterly share of TLA employment in the trade and transport sectors combined.	F, G and I	23.248	3.042	13.641	30.225
SHARE_SERV	Quarterly share of employment in the combined private and public services sector.	J, K L ,M, N O P, and Q	46.300	8.510	28.876	72.834
NM	Quarterly net migration.	-	109.500	591.878	-1380.000	5163.000
LQ_EMP_CONST	Quarterly location quotient of TLA Construction sector employment (author calculation).	-	1.063	0.249	0.497	1.704
LD_RRET_SALES	Quarterly log difference (percentage change) in real TLA retail sales (nominal retail sales adjusted with CPI in each quarter).	-	0.570	11.018	-25.413	32.279

Table 5.9: Facility construction-specific variables ($FCON_{it}$)

Variable	Description	Facility type	Mean	Standard Deviation	Minimum	Maximum
FCON_TOTAL	Sum of all facility construction dummy variables across TLAs in quarter t.	-	0.148	0.355	0	1
STAD	Sum of stadium construction dummy variables across TLAs in quarter t.	-	0.077	0.267	0	1
ARENA	Sum of arena construction dummy variables across TLAs in quarter t.	-	0.053	0.225	0	1
MOTOR	Sum of motorsport construction dummy variables across TLAs in quarter t.	-	0.011	0.103	0	1
VELO	Sum of velodrome construction dummy variables across TLAs in quarter t.	-	0.007	0.081	0	1
OKARA	Okara Park upgrade dummy variable. Takes the value of 1 if construction took place in quarter t, zero otherwise.	Stadium	0.003	0.052	0	1
MSS	Mount Smart Stadium upgrade dummy variable.	Stadium	0.003	0.052	0	1
EP_I	Eden Park upgrade dummy variable (Stand upgrade).	Stadium	0.008	0.089	0	1
EP_II	Eden Park upgrade dummy variable (RWC upgrade).	Stadium	0.007	0.081	0	1

NSEC	North Shore Events Centre upgrade dummy variable.	Arena	0.005	0.073	0	1
TRUSTS	Trusts Stadium construction dummy variable.	Arena	0.007	0.081	0	1
VECTOR	Vector Arena construction dummy variable.	Arena	0.015	0.120	0	1
BAYPARK	Baypark Speedway construction dummy variable.	Motor	0.007	0.081	0	1
WAIKATO	Waikato Stadium upgrade dummy variable.	Stadium	0.008	0.089	0	1
EEC	Energy Events Centre construction dummy variable.	Arena	0.009	0.096	0	1
TMP	Taupo Motorsport Park construction dummy variable.	Motor	0.004	0.063	0	1
MCLEAN	McLean Park upgrade dummy variable.	Stadium	0.005	0.073	0	1
YARROW	Yarrow Stadium upgrade dummy variable.	Stadium	0.004	0.063	0	1
WESTPAC	Westpac Stadium construction dummy variable.	Stadium	0.013	0.115	0	1
SAXTON	Saxton Field Stadium construction dummy variable.	Stadium	0.007	0.081	0	1
JADE	Jade Stadium upgrade dummy variable.	Stadium	0.008	0.089	0	1
AMI	AMI Stadium upgrade dummy variable.	Stadium	0.007	0.081	0	1
W_ARENA	Westpac Arena construction dummy variable.	Arena	0.011	0.103	0	1

OTAGO	Forsyth Barr Stadium construction dummy variable.	Stadium	0.001	0.037	0	1
STAD_SOUTH	Stadium Southland construction dummy variable.	Arena	0.007	0.081	0	1
RUGBY	Rugby Park upgrade dummy variable.	Stadium	0.004	0.063	0	1
ILT_VELO	ILT Velodrome construction dummy variable.	Velodrome	0.007	0.081	0	1

The x_{it} variables in equations 5.4 and5.5 include:

$SHARE\_AFF_{it}$, which is the share of TLA employment in the Agriculture, Forestry and Fisheries sector for TLA *i* in quarter *t*,

$SHARE\_MANUF_{it}$, which is the employment share of the manufacturing sector,

$SHARE\_TTS_{it}$, which is the employment share of the trade and transport services sector,

$SHARE\_SERV_{it}$, which is the employment share of the private and public service sector,

NM_{it}, which is the TLA's net migration,

$LQ\_EMP\_ACR_{it}$, which is the TLA's location quotient of Accommodation, Cafés and Restaurants sector employment, and $TIME_i$, which is a time trend for TLA *i*.[18]

The definitions and summary statistics of location-specific dependent and independent variables used in equations 5.4 and 5.5 are detailed in Table 5.10. Variables are all taken from the Infometrics regional database unless specified otherwise.

The $EVENT_{it}$ variables used in variations of equations 5.4 and 5.5 include:

NWC_99HH_{it}, which denotes the host TLA for the 1999 Netball World Championships in quarter *t*,

$U17WCM\_99HH_{it}$, which denotes the host TLAs for the 1999 Under-17 Men's Football World Championships in quarter *t*,

AC_99HH_{it} , which denotes the host TLA for the 1999-2000 America's Cup in quarter *t*,

AC_02HH_{it}, which denotes the host TLA for the 2002-2003 America's Cup in quarter *t*,

$IRBSEVENSHH_{it}$, which denotes the host TLA for the annual International Rugby Board World Sevens (New Zealand leg) in quarter *t*,

$LIONS\_05HH_{it}$, which denotes the host TLAs for the 2005 British and Irish Lions Rugby Tour in quarter *t*,

WMB_06HH_{it}, which denotes the host TLA for the 2006 World Mountain Biking Championships in quarter *t*,

$A1GPHH_{it}$, which denotes the host TLA for the New Zealand leg of the A1GP Championships in quarter *t*,

NWC_07HH_{it}, which denotes the host TLA for the 2007 Netball World Championships in quarter *t*, and

$U17WCW\_08HH_{it}$, which denotes the host TLAs for the 2008 Under-17 Women's Football World Championships in quarter *t*.

Distance variables are also used when examining the effect of proximity to the TLA's CBD.

[18] The percentage change in real retail sales variable is not included in these models due to likely multicollinearity with the $EVENT_{it}$ variables.

The definitions and summary statistics of event-specific variables used in equations 5.4 and 5.5 are detailed in Table 5.11.

The signs on the x_{it} coefficients are expected to be consistent with those identified in the facility construction models. All of the event variables, with the exception of the distance variables, are host-specific dummy variables. The coefficients on the event variables in model estimation can be interpreted as the effects on the TLAs that hosted these events, and as such (if ex-ante predictions of positive economic impacts are realised) the signs are expected to be positive. The distance variables, as mentioned earlier, are used to examine the nature of distance decay for certain events in host economies. The signs on distance parameters are expected to be negative – that is, the further away from a TLA's central business district an event is, the smaller the economic impact.

Table 5.10: Location-specific dependent and independent variables (x_{it})

Variable	Description	Infometrics Industry category	Mean	Standard Deviation	Minimum	Maximum
EMP_ACR	Quarterly level of TLA construction sector employment in quarter *t*.	H	3981.857	4017.386	947.000	19898.000
GDP	Quarterly level of TLA real gross domestic product, in millions.	-	1161.855	1379.421	176.000	6684.200
SHARE_AFF	Quarterly share of the TLA employment in the agriculture, forestry and fisheries sector.	A	3.809	4.180	0.081	19.958
SHARE_MANUF	Quarterly share of TLA employment in the manufacturing sector.	C	12.173	3.534	3.418	22.218
SHARE_TTS	Quarterly share of TLA employment in the trade and transport sectors combined.	F, G and I	23.188	2.960	13.641	30.225
SHARE_SERV	Quarterly share of employment in the combined private and public services sector.	J, K L ,M, N O P, and Q	46.871	8.534	28.876	72.834
NM	Quarterly net migration.	-	103.499	574.007	-1380.000	5163.000
LD_RRET_SALES	Quarterly log difference (percentage change) in real TLA retail sales (nominal retails sales adjusted with CPI in each quarter).	-	0.284	10.999	-25.413	32.279

Table 5.11: Event-specific variables ($EVENT_{it}$)

Variable(s)	Description	Mean	Standard Deviation	Minimum	Maximum
NWC_99HH	1999 Netball World Championships host TLA dummy variable.	0.003	0.050	0	1
U17WCM_99HH	1999 Under 17 Men's Football World Championships host TLA dummy variable.	0.005	0.071	0	1
AC_99HH	1999-2000 America's Cup host TLA dummy variable.	0.003	0.050	0	1
AC_02HH	2002-2003 America's Cup host TLA dummy variable.	0.003	0.050	0	1
IRBSEVENSHH	International Rugby Board World Sevens host TLA dummy variable.	0.013	0.111	0	1
LIONS_05HH	2005 British and Irish Lions Rugby Tour host TLA dummy variable.	0.023	0.148	0	1
WMB_06HH	2006 World Mountain Biking Championships host TLA dummy variable.	0.001	0.035	0	1
A1GPHH	A1GP host TLA dummy variable.	0.004	0.061	0	1
NWC_07HH	2007 Netball World Championships host TLA dummy variable.	0.001	0.035	0	1
U17WCW_08HH	2008 Under 17 Women's Football World Championships host TLA dummy variable.	0.005	0.071	0	1

5.4.3. Data

For the facility construction models, data for 15 TLAs in New Zealand are utilised, as shown in Table 5.12. The same 15 TLAs, plus Palmerston North, are used for estimating the event effects.

Table 5.12: Territorial Local Authorities Used in Model Estimation

Facility Construction TLAs	Event TLAs
Whangarei	Whangarei
North Shore City	North Shore City
Waitakere	Waitakere
Auckland City	Auckland City
Hamilton City	Hamilton City
Taupo	Taupo
Tauranga City	Tauranga City
Rotorua	Rotorua
Napier City	Napier City
New Plymouth	New Plymouth
Wellington City	Palmerston North
Nelson City	Wellington City
Christchurch	Nelson City
Dunedin City	Christchurch
Invercargill	Dunedin City
	Invercargill

Levels of the dependent variables and several independent variables are utilised in this analysis, so these variables must be tested for the presence of unit roots that are sometimes present in levels of such variables as employment and GDP. The presence of non-stationary variables in a model can potentially lead to spurious regression results. Results of Augmented Dickey Fuller (ADF) panel unit root tests for each of the variables (with individual effects and linear trends) are as shown in Table 5.13, and suggest that the variable specifications chosen are stationary and appropriate for use in these models.

Table 5.13: Augmented Dickey Fuller (ADF) Panel Unit Root Tests

Variable	Statistic (Fisher chi-square)	Prob.	Cross-sections	Obs.
Null: Unit root (assumes individual unit root process)				
EMP_CONST	43.9391	0.048	15	700
EMP_ACR	55.375	0.006	16	747
GDP	45.063	0.063	16	719
SHARE_AFF	51.512	0.016	16	744
SHARE_MANUF	77.459	0.000	16	766
SHARE_TTS	118.159	0.000	16	758
SHARE_SERV	84.821	0.000	16	716
NM	108.581	0.000	16	704
LQ_EMP_CONST	99.369	0.000	15	720
LQ_EMP_ACR	101.238	0.000	16	767
LD_RRET_SALES	117.534	0.000	16	701

Note: p-values for ADF statistics reported in EViews 5.1 are computed assuming an asymptotic Chi-square distribution (Quantitative Micro Software, 2005).

The models in this analysis utilise quarterly data, which separates them from the majority of studies in the literature to date that have utilised annual data. Quarterly data provides the ability to narrow the timeframe between changes in economic activity, thus we should expect greater accuracy in the estimation of realised outcomes and a higher chance of actually detecting the effects of short-term mega-events on the local economy. The sample time period for the data set is from 1997:1 to 2009:2.

5.5. RESULTS

This section details the results of model estimation for equations 5.1, 5.2, 5.4 and 5.5 detailed above. As the data is in balanced panel form (15 cross sections across 50 quarters for the facility construction models, and 16 cross sections across 50 quarters for the event hosting models), a pooled OLS model was initially estimated for each equation using the gretl econometric software package (Cottrell and Lucchetti, 2009). All estimated models were tested for autocorrelation (Durbin-Watson) and heteroskedasticity (White's test). Panel-specific tests were also undertaken, including tests for joint significance of differing group means for fixed effects, the Breusch-Pagan LM test for random effects, and the Hausman test for which of the fixed- or random-effects specifications is appropriate. The pooled models were estimated with a time trend, and in each case were found to be inferior to panel models with fixed effects (that were subsequently tested with redundant fixed effects tests) with fixed period effects and cross section effects, depending upon the results of the diagnostic tests. In each case, autocorrelation was found to be an issue, so the panel models were estimated as dynamic fixed effects models, with the inclusion of the lagged dependent variable intended to correct for the autocorrelation problem. In order to examine whether autocorrelation was still present, Wooldridge's (2002) test for serial correlation was estimated for each of the dynamic fixed effects models. Essentially, Wooldridge's test enables us to detect whether autocorrelation remains a problem, although the exact nature of autocorrelation is difficult to pin down (Wooldridge, 2002, pp.274-275). Results of these tests determined the final specification of each model estimated using the EViews 5.1 econometric software package (Quantitative Micro Software, 2005).

There are several potential specifications of the final panel models that one could consider, including ordinary least squares (OLS), the least squares dummy variable (LSDV), the generalised methods of moments (GMM) panel model, and the Anderson-Hsiao (AH) model. LSDV models with a lagged dependent variable can produce biased results for panels with small time periods (Judson and Owen, 1999). Despite criticism of the appropriateness of using lagged dependent variables to eliminate autocorrelation in panel models, it remains a popular technique (Keele and Kelly, 2006). GMM methods are predominantly designed for panels with large numbers of cross sections and small time periods (Bond, 2002), rendering them impractical for this analysis. The model specification chosen for this estimation is the dynamic LSDV model – a specification for which bias falls as the number of time periods increases (Judson and Owen, 1999). Details of each estimation procedure are presented in the following sub-sections.

5.5.1. The Effect of Facility Construction on Local Economies

To examine the effects of facility construction on TLA construction sector employment and real GDP, each construction activity was initially incorporated into each model as an aggregated variable (FCON), then as aggregated types of facility (STAD, ARENA, MOTOR, and VELO) and finally as separate facility-specific dummy variables. The results of each of these estimations for Equation (1) are presented in Tables 5.14, 5.15, and 5.16.

In Table 5.14, the pooled OLS estimation revealed the presence of both heteroskedasticity and autocorrelation. Results from the differing group means test and the Breusch-Pagan LM statistic revealed that both the fixed and random effects specifications were preferred to the pooled specification. The model was subsequently re-estimated as a dynamic LSDV model with the inclusion of the lagged dependent variable, EMP_CONST(-1), to correct for autocorrelation. Heteroskedasticity is corrected using White diagonal standard errors, which are heteroskedasticity-robust across cross-sections and time periods (Cameron and Bell, 2009). A cross-section and period fixed effects specification was the final form of the model, which was supported by results from the cross-section redundant fixed effects test. The fixed effects coefficients are not reported in the model estimation table.

The lagged employment coefficient is significant and positive (p-value = 0.000). Coates and Humphreys (2003) noted that the lagged dependent variable could be interpreted as capturing the impact of important and unobservable factors, thus controlling for omitted variable bias. Two of the coefficients for the employment share variables (MANUF and TTS) are negative and significant (p-values ≤ 0.009). SHARE_AFF is positive but not significantly different from zero (p-value = 0.534) and SHARE_SERV is negative and insignificant (p-value = 0.444). The net migration parameter is not significantly different from zero. The location quotient (LQ_EMP_CONST) coefficient is significantly positive (p-value = 0.000), and suggests that greater concentration of employment in the construction sector positively affects employment in the sector. The market size coefficient (LD_RRET_SALES) is marginally insignificant (p-value = 0.103) and suggests that a one percentage point increase in real retail sales will result in the creation of approximately 3 jobs in the construction sector. The coefficient of interest, FCON_TOTAL, is positive, but not significantly different from zero (p-value = 0.888). This is perhaps unsurprising given the variety of facility construction projects in the aggregated variable. Further investigation is warranted to see whether specific facility types have significant impacts. Results for the next stage are shown in Table 5.15.

Table 5.14: Construction Sector Employment Results – Parameter Estimates (FCON)

	Equation 5.1: Pooled OLS 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: EMP_CONST		**Equation 5.1: Panel Least Squares, Cross section and period fixed effects 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: EMP_CONST White diagonal standard errors**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
EMP_CONST(-1)	-	-	0.857	0.000
C	35552.985	0.000	4710.224	0.106
SHARE_AFF	-87604.697	0.000	17.933	0.534
SHARE_MANUF	-26077.314	0.001	-90.350	0.009
SHARE_TTS	-28785.235	0.001	-139.563	0.000
SHARE_SERV	-31269.143	0.000	-27.769	0.444
NM	4.257	0.000	0.046	0.426
LQ_EMP_CONST	-3168.458	0.000	1551.443	0.000
LD_RRET_SALES	-8.120	0.419	3.014	0.103
TIME	7.241	0.483	-	-
FCON_TOTAL	1678.806	0.000	6.771	0.888

	R-squared	0.622	R-squared	0.995
	Adjusted R-squared	0.617	Adjusted R-squared	0.994
	Mean dependent var	5202.380	Mean dependent var	5202.380
	S.D. dependent var	4701.638	S.D. dependent var	4701.638
	F-statistic	124.543	F-statistic	1674.222
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.352	Wooldridge (2002) test (p-value)	0.182 (0.672)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 385.175	0.000	-	-
Joint significance of differing group means	F(14, 666) = 618.082	0.000	-	-
Breusch-Pagan LM test statistic	5236.19	0.000	-	-
Cross-section fixed effects (redundant)	-	-	11.452	0.000
Period fixed effects (redundant)	-	-	0.922	0.620
Cross section/period fixed effects (redundant)	-	-	3.655	0.000
Hausman test (random effects)	51.2695	0.000	N/A	-

Table 5.15: Construction Sector Employment Results – Parameter Estimates (Facility Types)

	Equation 5.1: Pooled OLS 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: EMP_CONST		**Equation 5.1: Panel Least Squares, Cross section and period fixed effects 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: EMP_CONST White diagonal standard errors**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
EMP_CONST(-1)	-	-	0.856	0.000
C	35867.185	0.000	4743.578	0.106
SHARE_AFF	-88127.462	0.000	18.082	0.532
SHARE_MANUF	-26700.587	0.001	-91.718	0.009
SHARE_TTS	-28445.278	0.001	-139.487	0.000
SHARE_SERV	-32130.438	0.000	-28.075	0.442
NM	4.218	0.000	0.043	0.452
LQ_EMP_CONST	-3127.735	0.000	1551.032	0.000
LD_RRET_SALES	-7.465	0.452	3.016	0.101
TIME	9.145	0.372	-	-
STADIUM	2330.795	0.000	-13.603	0.872
ARENA	1895.245	0.000	25.292	0.647
MOTOR	-5.696	0.996	35.819	0.622
VELO	-3141.032	0.016	-0.087	0.999
	R-squared	0.634	R-squared	0.995
	Adjusted R-squared	0.627	Adjusted R-squared	0.994
	Mean dependent var	5202.380	Mean dependent var	5202.380
	S.D. dependent var	4701.638	S.D. dependent var	4701.638
	F-statistic	97.610	F-statistic	1596.366
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.368	Wooldridge (2002) test (p-value)	0.177 (0.677)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 392.578	0.000	-	-
Joint significance of differing group means	F(14, 663) = 607.462	0.000	-	-
Breusch-Pagan LM test statistic	4828.88	0.000	-	-
Cross-section fixed effects (redundant)	-	-	11.380	0.000
Period fixed effects (redundant)	-	-	0.901	0.657
Cross section/period fixed effects (redundant)	-	-	3.633	0.000

Hausman test (random effects)	303.059	0.000	N/A	-

The model selection process for Table 5.14 was replicated for the estimation of Table 5.15. The coefficients for the control variables (industry mix, net migration, employment concentration and growth in market size) were similar to the results in Table 5.14. Separating the facility construction projects into facility types resulted in statistically insignificant coefficients (two negative, and two positive), with none of the project type p-values less than 0.5. There appear to be no significant employment effects in the construction sector associated with specific facility types. The last step is to examine individual projects within a panel context. These results are as shown in Table 5.16.

Table 5.16: Construction Sector Employment Results – Parameter Estimates (Individual Facilities)

	Equation 5.1: Pooled OLS 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: EMP_CONST		**Equation 5.1: Panel Least Squares, Cross section and period fixed effects 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: EMP_CONST White diagonal standard errors**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
EMP_CONST(-1)	-	-	0.800	0.000
C	27951.046	0.000	5649.732	0.053
SHARE_AFF	-74374.602	0.000	18.847	0.481
SHARE_MANUF	-19292.513	0.007	-100.262	0.008
SHARE_TTS	-21083.761	0.008	-142.553	0.000
SHARE_SERV	-24389.529	0.000	-38.053	0.301
NM	3.376	0.000	0.047	0.467
LQ_EMP_CONST	-2208.387	0.001	1566.705	0.000
LD_RRET_SALES	-7.768	0.371	2.853	0.116
TIME	17.386	0.080	-	-
OKARA	-590.744	0.743	-52.718	0.810
MSS	5630.998	0.002	481.534	0.001
EP_I	6822.632	0.000	-95.194	0.624
EP_II	9323.341	0.000	636.722	0.379
NSEC	167.883	0.896	-168.538	0.014
TRUSTS	-1357.640	0.239	86.415	0.070
VECTOR	8108.005	0.000	402.061	0.025
BAYPARK	-228.339	0.842	-27.419	0.810
WAIKATO	374.987	0.721	-170.435	0.036
EEC	-784.736	0.422	-76.431	0.434
TMP	-145.838	0.922	62.929	0.409
MCLEAN	-2456.005	0.055	-285.550	0.196
YARROW	366.397	0.802	-94.427	0.097

WESTPAC	1932.380	0.051	79.645	0.290
SAXTON	-3512.746	0.002	-39.075	0.868
JADE	4147.870	0.000	-326.017	0.014
AMI	8107.356	0.000	-44.594	0.943
W_ARENA	5133.154	0.000	-550.175	0.002
OTAGO	-2383.666	0.345	-665.128	0.014
STAD_SOUTH	-2737.782	0.017	330.091	0.000
RUGBY	-2587.091	0.077	242.645	0.003
ILT_VELO	-3210.882	0.005	39.074	0.599

	R-squared	0.729	R-squared	0.995
	Adjusted R-squared	0.716	Adjusted R-squared	0.994
	Mean dependent var	5202.380	Mean dependent var	5202.380
	S.D. dependent var	4701.638	S.D. dependent var	4701.638
	F-statistic	58.957	F-statistic	1304.816
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.444	Wooldridge (2002) test (p-value)	0.224 (0.640)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 397.634	0.000	-	-
Joint significance of differing group means	F(14, 645) = 650.479	0.000	-	-
Breusch-Pagan LM test statistic	3493.73	0.000	-	-
Cross-section fixed effects (redundant)	-	-	12.645	0.000
Period fixed effects (redundant)	-	-	0.963	0.544
Cross section/period fixed effects (redundant)	-	-	3.951	0.000
Hausman test (random effects)	N/A	-	N/A	-

As for the previous two tables, the final model specification in Table 5.16 is a cross-section and period dynamic fixed effects model. The control coefficients are similar to those found in the earlier estimations. The individual facility project coefficients reveal some interesting information. Bearing in mind that these coefficients are effectively quarterly employment outcomes associated with a particular project, we observe five coefficients (MSS, TRUSTS, VECTOR, STAD_SOUTH and RUGBY) that are significantly positive at the 10% level or better (with increases in employment ranging from 86 jobs to 481 jobs), six significantly negative coefficients (NSEC, WAIKATO, YARROW, JADE, W_ARENA and

OTAGO) with decreases in employment ranging from 94 jobs to 665 jobs, and the remaining eleven coefficients are insignificantly different from zero. The implications of these findings are that the employment effects of facility construction on the construction sector are specific to individual projects, and, perhaps more importantly, are not universally positive. Reasons why we might fail to observe a universally positive effect include the limited supply of workers in the construction sector, particularly for the specialised nature of facility construction. Other construction activity could potentially be reallocated or redistributed to accommodate facility construction. Some facility construction work is often contracted to out-of-town contractors, which can dampen the local employment impacts. It is also possible that facility construction is signalled well in advance of actual construction, causing firms to adjust employment levels in anticipation of future work.

As indicated in the Westpac Stadium case study (Chapter 4), the impact of the Stadium on overall employment was not significantly different from zero. This had potential impacts for economic development. The impact of facility construction on real GDP can provide us with greater insight into the overall impact of facility construction on local economies. The results of the estimation of equation 5.2 for the effect of facility construction on real GDP are presented below in Tables 5.17, 5.18, and 5.19.

Table 5.17: Real GDP results – Parameter Estimates (FCON)

	Equation 5.2: Pooled OLS 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: GDP		**Equation 5.2: Panel Least Squares, Cross section and period fixed effects 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: GDP White diagonal standard errors**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GDP(-1)	-	-	0.418	0.000
GDP(-2)	-	-	0.218	0.014
GDP(-3)	-	-	-0.236	0.005
GDP(-4)	-	-	0.571	0.000
C	781.383	0.629	203.293	0.146
SHARE_AFF	-6888.723	0.013	-3.848	0.070
SHARE_MANUF	-5447.715	0.007	-1.898	0.367
SHARE_TTS	-1765.032	0.434	-5.116	0.035
SHARE_SERV	3816.763	0.024	0.107	0.947
NM	1.398	0.000	0.026	0.008
LD_RRET_SALES	-2.973	0.260	0.580	0.003
TIME	-8.173	0.003	-	-
FCON_TOTAL	597.046	0.000	-3.527	0.484

	R-squared	0.712	R-squared	0.999
	Adjusted R-squared	0.708	Adjusted R-squared	0.999
	Mean dependent var	1204.623	Mean dependent var	1204.623
	S.D. dependent var	1414.351	S.D. dependent var	1414.351
	F-statistic	209.983	F-statistic	17823.270
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.481	Wooldridge (2002) test (p-value)	0.473 (0.497)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 325.133	0.000	-	-
Joint significance of differing group means	F(14, 667) = 1042.6	0.000	-	-
Breusch-Pagan LM test statistic	4162.5	0.000	-	-
Cross-section fixed effects (redundant)	-	-	3.175	0.000
Period fixed effects (redundant)	-	-	4.012	0.000
Cross section/period fixed effects (redundant)	-	-	4.195	0.000
Hausman test (random effects)	82.679	0.000	N/A	-

The final model specification for equation 5.2 in Table 5.17 was a dynamic cross section and period fixed effects model. The time trend from the pooled OLS specification was removed and replaced with period fixed effects. The fixed effects coefficients are not reported in the model results table. Results from the Wooldridge (2002) test for serial correlation indicated that a single lagged dependent variable was not sufficient to remove autocorrelation. Subsequent re-estimation of the model indicated that four lags of real GDP were necessary before autocorrelation was no longer considered an issue.

The impact of the presence of each of the lagged dependent variables (p-values ≤ 0.014), on the control variables is significant. Of the employment share coefficients, SHARE_AFF and SHARE_TTS or net migration coefficients are significantly different from zero at the 10% level or better. Two of the employment share coefficients (SHARE_AFF and SHARE_MANUF) have p-values below 0.1, with the MANUF and SERV coefficients not significantly different from zero. Net migration is significantly positive (p-value = 0.008), indicating that a one person increase in net migration will increase real GDP by $26,000 in each quarter. The log difference of real retail sales coefficient is significantly positive (p-value = 0.003), suggesting that a one percentage point increase in real retail sales will increase real GDP by approximately $580,000. The aggregated facility construction variable, FCON_TOTAL, is negative but statistically insignificant (p-value = 0.484). Further estimation is required to see whether a significant effect arises for construction of particular facility types.

Table 5.18: Real GDP Results – Parameter Estimates (Facility Types)

	Equation 5.2: Pooled OLS 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: GDP		**Equation 2: Panel Least Squares, Cross section and period fixed effects 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: GDP White diagonal standard errors**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GDP(-1)	-	-	0.417	0.000
GDP(-2)			0.218	0.014
GDP(-3)			-0.237	0.005
GDP(-4)			0.572	0.000
C	1017.793	0.527	205.565	0.141
SHARE_AFF	-7254.636	0.009	-3.848	0.072
SHARE_MANUF	-5889.425	0.004	-1.976	0.347
SHARE_TTS	-1824.678	0.414	-5.115	0.036
SHARE_SERV	3465.654	0.040	0.097	0.952

NM	1.383	0.000	0.026	0.008
LD_RRET_SALES	-2.818	0.282	0.583	0.003
TIME	-7.891	0.003	-	-
STADIUM	677.227	0.000	-5.456	0.511
ARENA	769.977	0.000	-1.250	0.875
MOTOR	89.052	0.745	-4.269	0.499
VELO	-395.524	0.247	-1.400	0.817

	R-squared	0.718	R-squared	0.999
	Adjusted R-squared	0.714	Adjusted R-squared	0.999
	Mean dependent var	1204.623	Mean dependent var	1204.623
	S.D. dependent var	1414.351	S.D. dependent var	1414.351
	F-statistic	157.149	F-statistic	17017.640
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.495	Wooldridge (2002) test (p-value)	0.460 (0.503)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 339.679	0.000	-	-
Joint significance of differing group means	F(14, 664) = 1051.83	0.000	-	-
Breusch-Pagan LM test statistic	3911.48	0.000	-	-
Cross-section fixed effects (redundant)	-	-	3.182	0.000
Period fixed effects (redundant)	-	-	3.849	0.000
Cross section/period fixed effects (redundant)	-	-	4.133	0.000
Hausman test (random effects)	147.745	0.000	N/A	-

The coefficients on the control variables in Table 5.18 are similar to those found in Table 5.17. Of particular interest is the effect of different facility type projects, and while all of the four facility type coefficients are negative, all of them are statistically insignificant (p-values ≥ 0.499). The last model estimation in this section sees the impact of individual facility projects on the host economy's real GDP.

Table 5.19: Real GDP Results – Parameter Estimates (Individual Facilities)

	Equation 5.2: Pooled OLS 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: GDP		**Equation 5.2: Panel Least Squares, Cross section and period fixed effects 690 observations 15 cross-sectional units Time-series length = 46 Dependent variable: GDP White diagonal standard errors**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GDP(-1)	-	-	0.317	0.000
GDP(-2)	-	-	0.213	0.008
GDP(-3)	-	-	-0.180	0.006
GDP(-4)	-	-	0.663	0.000
C	324.539	0.817	248.724	0.090
SHARE_AFF	-5806.030	0.016	-4.098	0.081
SHARE_MANUF	-4487.360	0.012	-1.532	0.477
SHARE_TTS	-1002.472	0.607	-6.875	0.007
SHARE_SERV	3944.986	0.007	-1.033	0.526
NM	1.105	0.000	0.026	0.008
LD_RRET_SALES	-2.626	0.236	0.494	0.007
TIME	-5.392	0.033	-	-
OKARA	-211.684	0.646	26.934	0.010
MSS	1982.183	0.000	18.832	0.676
EP_I	2514.746	0.000	-20.577	0.575
EP_II	2851.369	0.000	-173.303	0.001
NSEC	177.564	0.590	-14.406	0.303
TRUSTS	-62.480	0.832	5.768	0.392
VECTOR	2601.995	0.000	-25.515	0.367
BAYPARK	-106.369	0.714	-1.176	0.886
WAIKATO	-401.840	0.131	24.682	0.007
EEC	-45.652	0.854	0.790	0.899
TMP	281.445	0.458	-4.702	0.594
MCLEAN	-537.098	0.100	29.948	0.026
YARROW	173.163	0.642	-28.403	0.068
WESTPAC	619.897	0.014	24.177	0.267
SAXTON	-731.922	0.012	39.052	0.005
JADE	1089.700	0.000	-14.206	0.195
AMI	1428.003	0.000	-72.333	0.000
W_ARENA	1341.632	0.000	-38.168	0.003
OTAGO	-1106.127	0.086	19.073	0.075
STAD_SOUTH	-459.307	0.114	-8.312	0.356
RUGBY	-437.245	0.241	7.720	0.283
ILT_VELO	-455.159	0.116	2.309	0.675

	R-squared	0.804	R-squared	0.999
	Adjusted R-squared	0.795	Adjusted R-squared	0.999
	Mean dependent var	1204.623	Mean dependent var	1204.623
	S.D. dependent var	1414.351	S.D. dependent var	1414.351

	F-statistic	93.415	F-statistic	15794.310
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.598	Wooldridge (2002) test (p-value)	0.025 (0.877)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 319.176	0.000	-	-
Joint significance of differing group means	F(14, 646) = 1264.74	0.000	-	-
Breusch-Pagan LM test statistic	2932.53	0.000		
Cross-section fixed effects (redundant)	-	-	1.631	0.067
Period fixed effects (redundant)	-	-	3.714	0.000
Cross section/period fixed effects (redundant)	-	-	3.398	0.000
Hausman test (random effects)	N/A	N/A	N/A	-

The coefficients on the control variables in Table 5.19 remain consistent with those in the two previous tables. Once again, there are some interesting results when one examines the individual facility construction coefficients. Five projects (OKARA, WAIKATO, MCLEAN, SAXTON and OTAGO) are found to be significantly positive (p-values ≤ 0.1) with increases in GDP ranging from \$19m to \$39m per quarter, while four (EP_II, YARROW, AMI and W_ARENA) were found to be significantly negative, with decreases in GDP ranging from \$38m to \$173m.. All of the other coefficients were statistically insignificant. Of the significant coefficients, the OKARA, OTAGO, EP_II and AMI projects were ongoing when the time series of the panel concluded, and as such these coefficients need to be viewed with a degree of caution. It is clear, nonetheless, that the impacts of aggregate facility construction, types of facility construction, and most individual facility projects on local real GDP are, for most TLA's, not significantly different from zero.

Taken as a whole, the results of these model estimations suggest that during the period of facility construction, the impact of facility projects on employment in the local construction sector is likely to be specific to particular cases. Even while controlling for characteristics of the local economy and the construction sector, in most cases results were not consistently positive or negative for individual facility projects. Exceptions to this were the YARROW and W_ARENA projects – both of which were significantly negative. Grouping particular types of projects together did not stimulate employment in the

construction sector in general. The construction of a stadium would appear to be no more likely to generate construction employment than an arena or a motorsport facility. For the majority of projects, facility construction did not significantly affect local real GDP during the period of construction. Of course, it is possible that facility construction may have stimulated further development and thus impacted accordingly on construction employment and GDP in a later period (that is, there were lagged effects beyond those considered in the model estimations in this section). This is not considered in this analysis, but could be considered as a topic for future research.

5.5.2. The Effect of International Events on Local Economies

The analysis of the realised effects of hosting internationally oriented events on local economies begins with the estimation and analysis of the impact on employment in the Accommodation, Cafes and Restaurants sector (equation 5.4). One might reasonably expect that the most likely place for direct economic impacts to occur through the hosting of events of this nature will be in this sector during the period of the event. Likewise, we examine closely the impact of these events on real GDP (equation 5.5) to determine whether the spending associated with these events is detectable during the period in which the event takes place. The parameter estimates for each of these equations are as shown in Tables 5.20 and 5.21.

Table 5.20: Accommodation, Cafés and Restaurants Employment Results – Parameter Estimates (Events)

	Equation 5.4: Pooled OLS 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: EMP_ACR		**Equation 5.4: Panel Least Squares, Cross-section and period fixed effects 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: EMP_ACR**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
EMP_ACR(-1)	-	-	0.876	0.000
C	-25231.503	0.000	-1286.275	0.170
SHARE_AFF	-107.700	0.224	8.487	0.371
SHARE_MANUF	402.493	0.000	13.366	0.314
SHARE_TTS	139.884	0.082	21.718	0.200
SHARE_SERV	335.473	0.000	4.802	0.616
NM	4.040	0.000	-0.045	0.332
LQ_EMP_ACR	4391.694	0.000	774.551	0.000
TIME	12.306	0.170	-	-
NWC_99HH	6354.216	0.001	-10.921	0.935
U17WCM_99HH	-1298.029	0.319	25.206	0.691
AC_99HH	5674.084	0.001	104.067	0.497
AC_02HH	-6996.783	0.000	277.855	0.204

IRBSEVENSHH	891.383	0.281	-105.879	0.003
LIONS_05HH	1097.926	0.060	124.629	0.128
WMB_06HH	-1062.838	0.662	23.309	0.664
A1GPHH	1243.429	0.386	270.563	0.001
NWC_07HH	-492.546	0.839	-178.086	0.021
WBC_08HH	6782.312	0.005	128.095	0.056
U17WCW_08HH	1507.664	0.219	-210.233	0.177

	R-squared	0.646	R-squared	0.998
	Adjusted R-squared	0.638	Adjusted R-squared	0.998
	Mean dependent var	3981.857	Mean dependent var	3981.857
	S.D. dependent var	4017.386	S.D. dependent var	4017.386
	F-statistic	72.813	F-statistic	4436.528
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.429	Wooldridge (2002) test (p-value)	0.302 (0.263)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 426.012	0.000	-	-
Joint significance of differing group means	F(15, 702) = 1457.72	0.000	-	-
Breusch-Pagan LM test statistic	6636.96	0.000	-	-
Cross-section fixed effects (redundant)	-	-	7.438	0.000
Period fixed effects (redundant)	-	-	4.306	0.000
Cross section/period fixed effects (redundant)	-	-	4.871	0.000
Hausman test (random effects)	N/A	-	N/A	-

Diagnostic tests of the pooled OLS estimation in Table 5.20, as was the case for the earlier models, revealed the presence of heteroskedasticity and autocorrelation. The model was subsequently re-estimated as a dynamic LSDV model with the inclusion of a lagged (one period) dependent variable to correct for autocorrelation and with White diagonal standard errors. Results from a subsequent Wooldridge (2002) test indicated that the autocorrelation was corrected within the model with the addition of the lagged dependent variable. A dynamic cross-section and period fixed effects specification was thus the final form of the model, which was supported by results from the redundant fixed effects tests. The fixed effects coefficients are not reported in the parameter results table above.

The coefficients for each of the employment share variables are all positive and not significantly different from zero (p-value ≥ 0.2). Likewise, the net migration parameter is not significantly different from zero (p-value = 0.332). The location quotient coefficient is

significantly positive (p-value = 0.000), and suggests that sector-specific employment concentration positively affects sector employment. An average TLA with a location quotient value of 1 will employ approximately 775 FTE's per quarter in the Accommodation, Cafes and Restaurants sector, everything else constant. A greater concentration measure will increase FTE's accordingly.

Of the event-specific variables, only four of the 11 coefficients are found to be significantly different from zero – IRBSEVENSHH, which is negative (p-value = 0.003); A1GPHH, which is positive (p-value = 0.001); NWC_07HH, which is negative (p-value = 0.021); and WBC_08HH, which is positive (p-value = 0.056). The IRB Sevens result is the effect of the Sevens tournament on the Wellington TLA. A possible explanation for the negative coefficient might be that the stadium effectively internalises regular activity that occurs during the Sevens – that is, more food and drink is sold inside the stadium than outside, which may potentially lead to decreased employment within the Wellington TLA. It could also reflect crowding out of regular activity during that quarter. The A1GP is the effect on the Taupo TLA, which typically thrives on tourism given its central North Island location and the timing of the event during the summer months. The negative coefficient for the 2008 Netball World Championships on Auckland may well reflect the fact that the event was only hosted in New Zealand at the last minute after the original host, Fiji, was unable to host the event due to political instability. The positive coefficient for the 2008 World Bowls Championships hosted in Christchurch indicated that there was an increase in sector employment during the quarter in which the Championships were hosted of approximately 128 jobs. Given the small expected economic impact in Table 5.7, this result is somewhat unexpected. Likewise, the lack of significance for the large events (both America's Cup regattas and the Lions Tour – although the Lions effect is marginally insignificant with a p-value of 0.128) is somewhat surprising. We now examine the impact on local GDP in Table 5.21.

Table 5.21: GDP Results – Parameter Estimates (Events)

	Equation 5.5: Pooled OLS 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: GDP		**Equation 5.5: Panel Least Squares, Cross section and period fixed effects 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: GDP**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GDP(-1)	-	-	0.394	0.000
GDP(-2)	-	-	0.229	0.018
GDP(-3)	-	-	-0.218	0.012
GDP(-4)	-	-	0.570	0.000
C	-1142.849	0.498	269.804	0.047
SHARE_AFF	-28.786	0.319	-4.194	0.044
SHARE_MANUF	-2.198	0.916	-2.695	0.180
SHARE_TTS	-5.093	0.829	-6.278	0.006
SHARE_SERV	53.658	0.002	-0.690	0.659
NM	1.560	0.000	0.027	0.013
TIME	-5.153	0.065	-	-
NWC_99HH	1626.226	0.008	55.651	0.000
U17WCM_99HH	-332.401	0.441	11.677	0.515
AC_99HH	2185.312	0.000	50.690	0.255
AC_02HH	-2633.169	0.000	31.101	0.661
IRBSEVENSHH	561.464	0.041	-6.373	0.701
LIONS_05HH	326.913	0.091	25.558	0.012
WMB_06HH	-209.934	0.794	-9.639	0.179
A1GPHH	575.125	0.226	35.387	0.021
NWC_07HH	311.905	0.699	-26.828	0.018
WBC_08HH	1447.650	0.072	-10.896	0.320
U17WCW_08HH	554.283	0.173	9.864	0.661

	R-squared	0.670	R-squared	0.999
	Adjusted R-squared	0.662	Adjusted R-squared	0.999
	Mean dependent var	1161.855	Mean dependent var	1161.855
	S.D. dependent var	1379.421	S.D. dependent var	1379.421
	F-statistic	85.869	F-statistic	16818.370
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.538	Wooldridge (2002) test (p-value)	0.148 (0.703)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 336.731	0.000	-	-
Joint significance of differing group means	F(15, 703) = 1219.81	0.000	-	-
Breusch-Pagan LM test statistic	5078.33	0.000	-	-
Cross-section fixed effects (redundant)	-	-	3.282	0.000
Period fixed effects (redundant)	-	-	5.968	0.000

Cross section/period fixed effects (redundant)	-	-	6.015	0.000
Hausman test (random effects)	N/A	-	N/A	-

As was the case for GDP models in the construction section of this chapter, the presence of heteroskedasticity and autocorrelation in the pooled OLS estimation for equation 5.5 in Table 5.21 necessitated a re-estimation of the model as a dynamic LSDV model with White diagonal standard errors. Results from Wooldridge (2002) tests for serial correlation indicated that that four lags of real GDP were necessary before autocorrelation was corrected for within the model. A dynamic cross-section and period fixed effects specification was the final form of the model, which was supported by results from the redundant fixed effects tests. The period fixed effects coefficients are not reported.

The employment share coefficients are all negative, with two of them (AFF and TTS) significant (p-value $\leq$ 0.044). Net migration is significantly positive (p-value = 0.013), indicating that a one person increase in net migration will increase real GDP by $27,000 in each quarter.

Four of the 11 event-related coefficients were significantly different from zero, and included NWC_99HH, which is positive (p-value = 0.000); LIONS_05HH, which is positive (p-value = 0.012); A1GPHH, which is positive (p-value = 0.021); and NWC_07HH, which is negative (p-value = 0.018). The A1GP and 2007 Netball World Championships have results that are consistent with the corresponding findings for employment in the Accommodation, Cafés and Restaurants sector in Table 5.20. The A1GP event was associated with a positive impact of over $35 million, and the 2007 Netball World Championships was associated with a negative impact of approximately $27 million. The 1999 Netball World Championships was associated with a significant positive impact on local GDP of approximately $56 million in the quarter in which the event was hosted, despite an insignificant impact on employment in the Accommodation, Cafés and Restaurants sector. The 2005 Lions Tour was expected to generate $135.2 million to the New Zealand economy, $43.2 million to the Auckland region and $7.5 million to the Dunedin economy (Vuletich, 2005). Results from the real GDP analysis suggested that the Lions Tour was associated with a significant positive impact of almost $26 million in the quarter for the average host TLA.

As identified in Table 5.20, of particular interest is the lack of significance of the two America's Cup regatta coefficients in both of the Accommodation, Cafés and Restaurants sector employment and real GDP models. The 1999-2000 America's Cup was forecast to have an overall (direct, indirect and induced) impact of in excess of $473 million on the Auckland region, "…and will have had a significant impact on the region's growth rate for the year ending June 2000" (McDermott Fairgray Group Ltd. and Ernst & Young, 2000, p. iii). While it is unrealistic to expect this entire impact to occur during the event period (impacts are likely to have occurred prior to, during and possibly after the event itself), one would nonetheless reasonably expect a sizeable portion of this impact to occur during the event. Results from this model suggest that the quarterly impact of the 1999-2000 America's Cup regatta on the Auckland City TLA was an insignificant increase in real GDP of approximately $50.69 million, for an overall (insignificant) impact of approximately $100 million over two quarters. Likewise, the 2002-2003 regatta was estimated to contribute $450 million to the Auckland region (Market Economics Ltd., 2003). Results from this analysis suggest that the impact on the Auckland City TLA's real GDP was statistically insignificant increase of approximately $62 million over the two quarters. Likewise, coefficients for two of the three events with multiple hosts – the 1999 U17 Men's World Football Championships and the 2008 U17 Women's World Football Championships – were also statistically insignificant.

Taken as a whole, results from this section indicate that despite economic impact studies projecting substantial economic impacts, in the majority of cases (seven of eleven, or fourteen of twenty two instances across the two models) the realised economic impacts are not significantly different from zero. Economic impact studies should thus be viewed with caution. Of the eight significant coefficients across the two models, the employment impacts in the Accommodation, Cafés and Restaurants sector and the impacts on GDP for were complementary for only two events (both positive for A1GP and both negative for NWC_07). Of the statistically significant event coefficients across the two models, five of eight were positively signed. As mentioned earlier, it is possible that part of the overall impacts of events could well occur outside the event period. Findings of largely insignificant realised impacts during the event period would suggest that potential pre- and post-event impacts are likely to be inconsequential. These results are hardly compelling evidence that the hosting of events are effective economic stimuli for local economies.

Another interpretation of these results is that the income and employment gains and losses could have been redistributed from other TLA's rather than generated in the host TLA (Coates, 2007). This could potentially explain the unusual nature of the larger events in these models, as well as the unusual coefficients found for the World Bowls Championships. Such an outcome is plausible when one considers the findings of Johnston and Switzer (2002) for the 1999-2000 America's Cup regatta. It may be useful for future research to consider the impact of these events on the host regions in future research to see whether the impacts in host TLA's were offset by impacts in other TLA's in the region.

5.5.3. Events, Facilities and Local Economies: Does Location Matter?

An aspect of event hosting that has been largely ignored in previous empirical studies has been the effect of facility and event location on the economic outcomes of events. It stands to reason that the economic effects of facilities and events are likely to be affected by their proximity to the central business district (CBD) and key complementary amenities such as restaurants/bars/cafes, accommodation, public transport, etc. It is thus hypothesised that there is a distance decay effect for the economic outcomes of such events, that is, the further away from key amenities an event is, the lower the realised economic impact will be. One way to test for such a distance decay effect is to use the base model from the previous section, and instead of using host dummy variables, a measure of distance can be used in its place. The equation to be estimated will take the form of equations 5.6 and 5.7 below.

$$EMP\_ACR_{it} = \alpha_i x_{it} + \beta_i DIST_{jit} + e_{it} \quad (5.6)$$

$$GDP_{it} = \alpha_i x_{it} + \beta_i DIST_{jit} + e_{it} \quad (5.7)$$

where the dependent variables and x_{it} variables are as defined for equations 5.4 and 5.5, and the $DIST_{jit}$ variables are the proximity of the facility in which the event is hosted to the central business district (CBD) for event *j* in host economy *i* in quarter *t*.

Each separate event is likely to have different characteristics that may confound the effects of such a variable when aggregated, so this analysis examines the proximity effect for the three events for which there were multiple host TLA's – the 1999 U17 Men's World Football Championships, the 2005 British and Irish Lions Rugby Tour, and the 2008 U17 Women's World Football Championships – on the employment in the Accommodation, Cafés and Restaurants sector and real GDP growth for the host TLA's. The *X_DIST* variable, the approximate distance between the facility hosting event *X* and the CBD, was measured

in kilometres “as the crow flies” using Google Maps. Results of the inclusion of these distance variables in equations 5.6 and 5.7 are reported in Tables 5.22 and 5.23 respectively.

Table 5.22: Accommodation, Cafés and Restaurants Employment Results – Parameter Estimates (Distance Decay)

	Equation 5.6: Pooled OLS 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: EMP_ACR		**Equation 5.6: Panel Least Squares, Cross-section & period fixed effects 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: EMP_ACR**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
EMP_ACR(-1)	-	-	0.867	0.000
C	-26209.960	0.000	-1226.307	0.181
SHARE_AFF	-116.234	0.198	5.405	0.568
SHARE_MANUF	421.738	0.000	12.071	0.358
SHARE_TTS	143.100	0.082	24.191	0.152
SHARE_SERV	345.834	0.000	4.252	0.643
NM	3.777	0.000	-0.025	0.551
LQ_EMP_H	4581.702	0.000	744.192	0.000
TIME	14.022	0.121	-	-
U17WCM_99HH_DIST	100.699	0.510	2.116	0.733
LIONS_05HH_DIST	877.554	0.003	113.266	0.089
U17WCW_08HH_DIST	174.539	0.258	-3.985	0.655

	R-squared	0.626	R-squared	0.998
	Adjusted R-squared	0.621	Adjusted R-squared	0.998
	Mean dependent var	3981.857	Mean dependent var	3981.857
	S.D. dependent var	4017.386	S.D. dependent var	4017.386
	F-statistic	121.531	F-statistic	4954.550
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.307	Wooldridge (2002) test (p-value)	1.408 (0.245)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 427.812	0.000	-	-
Joint significance of differing group means	F(15, 709) = 1533.08	0.000	-	-
Breusch-Pagan LM test statistic	7419.02	0.000	-	-
Cross-section fixed effects (redundant)	-	-	7.927	0.000
Period fixed effects (redundant)	-	-	4.356	0.000
Cross section/period fixed effects (redundant)	-	-	5.115	0.000
Hausman test (random effects)	49.375	0.000	N/A	-

Table 5.23: GDP results – Parameter Estimates (Distance Decay)

	Equation 5.7: Pooled OLS 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: GDP		**Equation 5.7: Panel Least Squares, Cross section and period fixed effects 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: GDP**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GDP(-1)	-	-	0.402	0.000
GDP(-2)	-	-	0.225	0.009
GDP(-3)	-	-	-0.238	0.005
GDP(-4)	-	-	0.580	0.000
C	-1021.162	0.553	241.402	0.073
SHARE_AFF	-31.955	0.279	-3.944	0.059
SHARE_MANUF	-3.208	0.879	-2.104	0.292
SHARE_TTS	-9.525	0.695	-5.597	0.017
SHARE_SERV	54.062	0.003	-0.439	0.772
NM	1.464	0.000	0.029	0.003
TIME	-4.990	0.077	-	-
U17WCM_99HH_DIST	32.755	0.518	3.820	0.059
LIONS_05HH_DIST	292.530	0.003	17.591	0.011
U17WCW_08HH_DIST	62.497	0.222	-0.732	0.628

	R-squared	0.651	R-squared	0.999
	Adjusted R-squared	0.646	Adjusted R-squared	0.999
	Mean dependent var	1161.855	Mean dependent var	1161.855
	S.D. dependent var	1379.421	S.D. dependent var	1379.421
	F-statistic	150.317	F-statistic	18736.970
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.403	Wooldridge (2002) test (p-value)	0.084 (0,774)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 347.898	0.000	-	-
Joint significance of differing group means	F(15, 711) = 1267.3	0.000	-	-
Breusch-Pagan LM test statistic	LM = 5761.36	0.000	-	-
Cross-section fixed effects (redundant)	-	-	3.759	0.000
Period fixed effects (redundant)	-	-	6.144	0.000
Cross section/period fixed effects (redundant)	-	-	6.296	0.000
Hausman test (random effects)	H = 86.445	0.000	N/A	-

For both employment in the Accommodation, Cafés and Restaurants sector (equation 5.6 in Table 5.22) and real GDP (equation 5.7 in Table 5.23), the final specification was a

cross-section and period fixed effects dynamic LSDV estimator with White diagonal standard errors. As was the case in earlier models, for the employment model, there was a single lagged dependent variable, whereas for the GDP model there were four lagged variables included to control for autocorrelation. The coefficients on the control variables for Tables 5.22 and 5.23 are similar to those in Tables 5.20 to 5.21. Three of the distance coefficients across Tables 5.22 and 5.23 are significantly different from zero – the Lions Tour in the employment model (positive with p-value = 0.089), the 1999 U17 Mens World Championships (positive with p-value = 0.059), and the Lions Tour in the GDP model (positive with p-value = 0.011). A positive coefficient goes against expectations, as it implies that events in facilities sited closer to the CBD have smaller economic impact. Are such events hosted in downtown facilities detrimental to host economies? It is worth considering the nature of facilities in New Zealand to gain a potential understanding of this result. Many facilities were built around the turn of the 20th century and many of these facilities remain situated in their original sites. Development is likely to have occurred around older facilities rather than facilities being part of urban development, as tends to be the case with modern facilities. Given that the purpose of this analysis is to produce findings to inform future decision-making regarding facilities and events, an alternative to the simple distance variable is necessary to further test the proximity hypothesis. It stands to reason that the effect of an event's proximity to the TLA's CBD is not only a function of distance but is also dependent on the size of the event. To proxy for event size, the capacity of the host facility (*X_CAP* = facility X's capacity) is also included in the model, as well as an interaction term between distance and capacity (*X_DIST*CAP* = event X's distance times facility capacity). The results for each of these amended models are presented in Tables 5.24 and 5.25 below.

Table 5.24: Accommodation, Cafés and Restaurants Employment Results – Parameter Estimates (Amended Distance Decay)

	Equation 5.6: Pooled OLS 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: EMP_ACR		**Equation 5.6: Panel Least Squares, Cross-section & period fixed effects 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: EMP_ACR**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
EMP_ACR(-1)	-	-	0.865	0.000
C	-24282.437	0.000	-1152.511	0.216
SHARE_AFF	-133.636	0.135	5.958	0.529
SHARE_MANUF	397.835	0.000	13.687	0.296
SHARE_TTS	119.765	0.143	21.691	0.200
SHARE_SERV	327.706	0.000	3.737	0.690
NM	3.732	0.000	-0.015	0.718
LQ_EMP_H	4469.087	0.000	741.074	0.000
TIME	12.656	0.157	-	-
U17WCM_99HH_DIST	2082.572	0.018	73.738	0.000
U17WCM_99HH_CAP	-0.084	0.309	-0.002	0.326
U17WCM_99DIST*CAP	-0.078	0.036	-0.003	0.000
LIONS_05HH_DIST	-5898.551	0.006	-209.015	0.333
LIONS_05HH_CAP	0.125	0.198	-0.004	0.556
LIONS_05DIST*CAP	0.136	0.000	0.010	0.087
U17WCW_08HH_DIST	1652.866	0.054	10.493	0.705
U17WCW_08HH_CAP	0.018	0.784	-0.014	0.029
U17WCW_08DIST*CAP	-0.065	0.079	0.001	0.624

	R-squared	0.639	R-squared	0.998
	Adjusted R-squared	0.631	Adjusted R-squared	0.998
	Mean dependent var	3981.857	Mean dependent var	3981.857
	S.D. dependent var	4017.386	S.D. dependent var	4017.386
	F-statistic	79.434	F-statistic	4685.978
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.348	Wooldridge (2002) test (p-value)	1.660 (0.207)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 429.332	0.000	-	-
Joint significance of differing group means	F(15, 703) = 1491.6	0.000	-	-
Breusch-Pagan LM test statistic	LM = 6942.98	0.000	-	-
Cross-section fixed effects (redundant)	-	-	7.809	0.000
Period fixed effects (redundant)	-	-	4.447	0.000
Cross section/period fixed effects (redundant)	-	-	5.160	0.000

Hausman test (random effects)	N/A	-	N/A	-

Table 5.25: GDP Results – Parameter Estimates (Amended Distance Decay)

	Equation 5.7: Pooled OLS 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: GDP		**Equation 5.7: Panel Least Squares, Cross-section & period fixed effects 736 observations 16 cross-sectional units Time-series length = 46 Dependent variable: GDP**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*
GDP(-1)	-	-	0.405	0.000
GDP(-2)	-	-	0.229	0.007
GDP(-3)	-	-	-0.248	0.004
GDP(-4)	-	-	0.580	0.000
C	-585.180	0.731	242.110	0.075
SHARE_AFF	-38.306	0.190	-3.973	0.057
SHARE_MANUF	-7.476	0.720	-2.259	0.260
SHARE_TTS	-15.628	0.516	-5.489	0.019
SHARE_SERV	49.662	0.005	-0.408	0.791
NM	1.443	0.000	0.030	0.003
TIME	-5.169	0.064	-	-
U17WCM_99HH_DIST	530.200	0.069	21.717	0.000
U17WCM_99HH_CAP	-0.026	0.339	-0.001	0.350
U17WCM_99DIST*CAP	-0.019	0.120	-0.001	0.000
LIONS_05HH_DIST	-2096.542	0.003	-37.226	0.211
LIONS_05HH_CAP	0.033	0.310	0.001	0.719
LIONS_05DIST*CAP	0.053	0.000	0.001	0.009
U17WCW_08HH_DIST	333.167	0.240	-1.323	0.782
U17WCW_08HH_CAP	0.010	0.637	0.001	0.188
U17WCW_08DIST*CAP	-0.013	0.306	0.000	0.709

	R-squared	0.663	R-squared	0.999
	Adjusted R-squared	0.656	Adjusted R-squared	0.999
	Mean dependent var	1161.855	Mean dependent var	1161.855
	S.D. dependent var	1379.421	S.D. dependent var	1379.421
	F-statistic	101.111	F-statistic	17431.830
	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Durbin-Watson stat	0.436	Wooldridge (2002) test (p-value)	0.002 (0.965)

Test	**Test statistic**	**P-value**	**F-Test statistic**	**P-value**
White's test for heteroskedasticity	LM = 346.209	0.000	-	-
Joint significance of differing group means	F(15, 706) = 1236.59	0.000	-	-
Breusch-Pagan LM test statistic	LM = 5447.72	0.000	-	-
Cross-section fixed effects (redundant)	-	-	3.836	0.000
Period fixed effects (redundant)	-	-	6.232	0.000

Cross section/period fixed effects (redundant)	-	-	6.408	0.000
Hausman test (random effects)	N/A	N/A	N/A	-

The control coefficients in Tables 5.24 and 5.25 do not differ markedly from the results obtained in Tables 5.22 and 5.23. The signs of the location coefficients in both Tables 5.24 and 5.25 are positive for the 1999 U17 Men's World Football Championships (significant in both tables with p-value = 0.000), mixed for the 2008 Women's World Football Championships (both insignificant, however with p-value ≥ 0.7) and negative for the 2005 Lions Tour (insignificant in both tables with p-value ≥ 0.211). The interaction coefficients in Table 5.24 are negative and significant (p-value = 0.000) for the 1999 tournament, positive and significant (p-value = 0.087) for the Lions Tour, and insignificant for the 2008 tournament (p-value = 0.624). For GDP in Table 5.25, the interaction coefficients are negative and significant for the 1999 tournament (p-value = 0.000), and the Lions Tour (p-value = 0.009), and insignificant for the 2008 tournament (p-value = 0.003). Utilising the interaction coefficients in Table 5.25, effective distance coefficients can be derived as functions of facility capacity. These coefficients, along with critical facility capacities for each event are derived in Table 5.26.

Table 5.26: Effective Distance Parameter Estimates and Critical Capacities

Model	**Event**	**Effective Distance Coefficient**	**Critical Facility Capacity (positive economic impact)**
EMP_ACR	U17WCM_99	73.738-0.003(U17WCM_99HH_CAP)	CAP < 24,579
	LIONS_05	-209.015+0.01(LIONS_05HH_CAP)	CAP >20,901
	U17WCW_08	10.493+0.001(U17WCW_08HH_CAP)	N/A
GDP	U17WCM_99	21.717-0.001(U17WCM_99HH_CAP)	CAP < 21,717
	LIONS_05	-37.226+0.001(LIONS_05HH_CAP)	CAP > 37,226
	U17WCW_08	-1.323-0.001(U17WCW_08HH_CAP)	N/A

For economic impacts to be a positive function of distance, the facility capacity must be as specified in Table 5.26. It is interesting to note that for the Lions Tour, games played at facilities with capacities below the critical capacity had a negative distance coefficient – that is, economic impacts were greater for such facilities located closer to the CBD. Alternatively, for both the 1999 and 2008 U17 tournaments, stadia with capacities below the critical capacity had a positive distance coefficient – that is, economic impacts were lower in facilities closer to the CBD.

If we consider the Lions Tour, all bar one facility were below the critical capacities, meaning that the effective distance coefficients for both the employment model and the GDP model were negative for most of the host TLAs – i.e. a larger facility (with 37,000 seats or less) situated closer to the CBD generated greater economic impact than those located further away from the CBD. A similar result was found for the 1999 U17 Men's World Football Championships. Two of the four capacities were smaller than the critical capacities, meaning that on average the distance coefficients were positive, whereas the other two were greater than the critical capacities, meaning that distance coefficients were negative.

The implications for an "optimal" facility location (that is, the location that maximises economic impact) from these results suggest that they are dependent on the nature of the event itself. For the Lions Tour, a larger facility appeared to be better located closer to the CBD to maximise economic impact, whereas for the smaller 1999 U17 Men's World Football Championships, the implications weren't quite so clear. The analysis of these three events is hardly the basis for broad generalisations, but it does raise some interesting implications for not only event promoters but also for local and regional councils regarding the possible impact of a facility.

The argument presented above would be more compelling if actual attendances were used rather than facility capacity, as it is rare that facilities are utilised to capacity. This information was unavailable and thus could not be included in this analysis. In the case of infrequent special events such as a Lions Tour or a Rugby World Cup, for instance, capacities may well be reached. The presence of distance-related effects has particularly important implications not only for sporting bodies and organising committees regarding the choice of host cities for major events, but also for local and regional governments regarding the (re)location of municipally funded sporting facilities. The evidence presented in the earlier sections of this chapter would suggest that other considerations (whether to fund a facility in the first place, in particular) may be more important to policymakers than the final location of the facility.

5.6. CONCLUSIONS

This chapter has estimated the ex-post realised effects of facility construction and event hosting in a panel of New Zealand territorial local authorities (TLAs). Models for sector-specific employment and real GDP are estimate to test three hypotheses regarding the ex-

post economic outcomes of facility construction and event hosting. Firstly, facility construction in general had little to no effect on employment in the construction sector or real GDP for most TLA's. There was no evidence that the construction of particular facility projects (for example, stadiums or arenas) were any more effective at creating employment in the construction sector or increasing GDP than others. This finding enables us to seriously question studies that claim that new jobs will be created from facility construction. The most likely outcome, on the basis of this analysis, would be that existing jobs are merely maintained, and there is no impact on GDP, hardly a compelling rationale for government involvement in facility construction.

Secondly, the majority of internationally oriented events hosted in New Zealand TLAs considered in this analysis were not associated with greater employment in the Accommodation, Cafés and Restaurant sector or increases in real GDP. Of the four events that were found to have significant impacts on employment and real GDP (out of the eleven included in the analysis), one had consistently significant positive outcomes and the other had consistently significant negative outcomes. Most of the larger events, including the America's Cup regattas, and the U17 World Football Championships in 1999 (Men's) and 2008 (Women's) did not significantly impact either employment or real GDP of the host economies. There is certainly no convincing evidence that hosting such events has significant economic impacts across the board, despite economic impact studies that project outcomes to the contrary.

The third finding that this analysis made was in relation to the distance effects of the economic impact of events. It was hypothesised that realised economic impact was inversely related to the proximity of the event to the TLA's central business district (CBD). Results showed that the relationship between economic impact and facility location is complex, related to the event itself, and certainly warrants further investigation.

Overall, the realised economic impacts for facility construction and the hosting of internationally oriented events are not persuasive as far as justifying government involvement in such projects. The return on an investment in a facility or event-hosting project in tangible economic terms (that is, sector-specific employment and GDP) is certainly not overwhelmingly positive – rather it appears to be dependent upon the context in which the project is undertaken. If tangible economic outcomes (i.e. increases in employment and/or GDP) are the sole intention of these projects, the results from this analysis suggest that they have failed to deliver on these grounds for most of the host

TLA's. As it is, events are not only justified on economic grounds, but on wider socio-economic and sporting grounds. Results from this analysis suggests that tangible economic benefits are generally not forthcoming as a result of either facility construction or hosting international events, and thus government spending should not be justified on the basis of an argument for tangible economic impacts.

Why, then, do governments persist in financing such projects? A potential explanation to this question is developed in the following chapter.

6

THE SUBSIDISATION OF EVENTS AND FACILITIES: A GAME THEORY APPROACH

6.1. INTRODUCTION

In light of the findings of this research to this point, it is worth considering why local, regional and central governments continue to subsidise sports events and facilities when the projected tangible outcomes in many instances do not eventuate. The following analysis in this chapter is not an examination of economic justification for government involvement as such, but rather it offers a potential justification for observed economic behaviour.

The process through which cities subsidise mega-events, sports franchises and facilities has an important dimension that is often unaddressed in the debate surrounding public sector involvement in such projects. Decisions to subsidise franchises or events are rarely made in isolation; rather, cities are frequently in competition with others to attract or even retain the activity in question. Cities often find themselves subsidising local sports franchises or events in response to competition from other cities keen to capture the potential benefits associated with a franchise or event. The role of strategy is thus a particularly important consideration in any such decision, and the outcomes of such strategic behaviour have important implications for society's welfare.

This chapter develops a two-city game theory model in which cities compete to host events to maximise the benefits associated with an event. This analysis explicitly considers the impact of subsidies offered by cities to host events within such a framework and examines the impact of subsidies on outcomes to society. Thresholds for subsidisation are identified in two scenarios: when the cities are equal in size, and when the cities are of different sizes.

This analysis is motivated by the experience of several New Zealand cities when presented with the opportunity to host the New Zealand round of the Australian V8 Supercar racing series during 2004 and 2005. Auckland and Wellington both turned down the race before Hamilton agreed to host the race. The analysis develops as follows. The background to the analysis is discussed in Section 6.2, and relevant literature is briefly reviewed in Section 6.3. The theoretical model is introduced in Section 6.4 and thresholds for event subsidisation are derived with the aid of simple numerical examples in Section 6.5. The analysis is concluded in Section 6.6.

6.2. BACKGROUND

The competition between cities for the right to host the New Zealand round of the V8 Super Car series in New Zealand began with the proposal in 2004 by the governing body of V8 motorsport in Australasia, Australian Vee Eight Supercar Company Pty. Ltd (AVESCO), to move the race from the purpose-built Pukekohe racetrack to an inner-city circuit race, initially proposed for Auckland. The Pukekohe track was to be redeveloped as an equine facility in conjunction with the Auckland Racing Club in 2007, making the long-term feasibility of a Pukekohe-hosted V8 race doubtful (Donaldson, 2005). Debate raged over the suitability of such a race in downtown Auckland. The race was projected to have a "net economic benefit" of $34 million per year, for a cumulative impact of $245 million with 869 person-years of employment generated for the city's economy (Parr, 2004). Three independent commissioners declined the resource consent application, ending Auckland's chances of hosting the race, citing likely traffic problems, noise problems and prolonged periods of disruption as major reasons (Pickmere, 2004).

AVESCO's focus then turned to Wellington, which had previous experience in hosting a city-circuit street car race. Wellington had hosted the Nissan Mobil 500 touring car race, which took place in the 1980s and early 1990s. Submissions from the public consultation process showed that 76 percent of respondents supported the race and 55 percent of Wellington City residents supported the race (Jacobson, 2005). The Local Government Forum believed that the case for the Wellington City Council subsidising a street race was weak, with few public benefits arising from the event itself in that people could be made to pay for access, and residual benefits were likely to have been offset by associated negative effects such as noise, disruption to travel, and access restrictions to workplaces, shops, and apartments within the race zone (Local Government Forum, April 2005). The Local Government Forum group's submission cited a report written by economic consultants McDermott Miller in 2005 that estimated annual new spending attributable to the V8 race

of $22.9 million, with resulting value added of $15.7 million per year (Local Government Forum, 2005). The Wellington City Council was to pay $6.2 million in capital spending and $3.95 million per year, at a cost to individual ratepayers of $4 per year on average (Laugesen, 2005). Part of the proposed race track on Jervois Quay fell outside district plan limits, requiring resource consent to be obtained. The Wellington City Council voted against the proposal to host the V8's from 2007, citing the time involved, cost of and uncertainty in obtaining resource consent (Johnson, 2005).

Around 90,000 spectators attended the three days of V8 racing at Pukekohe in April, 2005, making it one of the biggest sporting events of the year in New Zealand (Brown, 2005). AVESCO announced in July 2005 that the V8's would return to Pukekohe in 2006 and 2007, although continuing to express concerns about the standard of the facility (Brown and Lang, 2005). The proposed nearby Hampton Downs Motorsport Park was expected to be a contender to host the race from 2008 (Brown and Lang, 2005).

In February 2006, after a series of confidential negotiations with V8 Supercars Australia (renamed from AVESCO), the Hamilton City Council voted unanimously to back a race sited in the Frankton district of Hamilton City, and was subsequently awarded the race for seven years from 2008 (Gill, 2006). Ticket sales indicated that over 172,000 people attended the 2008 event over the three days in which it was held (Hamilton City Council, 2008). Nonetheless, some bars and restaurants were left out-of-pocket when expectations of substantial visitor numbers to the city's CBD failed to eventuate (Akoorie, 2008). An economic impact analysis prepared by consultants Horwath HTL after the first race in April 2008 estimated new spending generated by the race to be around $28 million, with value added estimated to be $20.6 million (Horwath HTL, 2008). In 2009, attendance fell to 122,000 spectators (Pepperell, 2010), and fell further in 2010 to "around 100,000" (Ihaka, 2010). The marked decline in attendance resulted in V8 Supercars Australia taking over the promotion and management roles for the event in May 2010, with original promoters Caleta Streetrace Management citing the recession as a contributing factor for being unable to continue its association with the race (Ihaka, 2010).

6.3. LITERATURE REVIEW

The issue of competing for activities is a largely unexplored area in the literature. A particularly relevant study to this analysis was the study by Petchey and Shapiro (2002), who developed a model in which states competed to attract mobile capital using a variety of taxation policies. Combinations of tax incentives, subsidies and infrastructure provision

have been used in the past to attract mobile capital, of which major events are a prominent example (Petchey and Shapiro, 2002).

Australian cities and states are an interesting example of this competitive behaviour. Australian cities have competed vigorously for tourist dollars, with the hosting of sports events being an important component of development strategies (Horne, 2007). In 2003, Australian state and territory governments provided a combined AU$101.5 million in assistance towards event hosting, with Victoria (AU$56 million) spending four times as much as the next highest spending states Queensland and South Australia (AU$12 million each) (Downie, 2006).

There have often been difficulties in Australia with assessing the claims made by proponents of successful deals between companies and governments, due largely to the lack of transparency involved in such processes (Banks, 2002). In September 2003, six of the eight major states and territories signed the Interstate Investment Cooperation Agreement (IICA) (The Office of the Treasurer, 2003). The agreement was designed to eliminate bidding wars between states for investment and major events, facilitated by the sharing of information with a view to discouraging firms seeking to play states off against each other (The Office of the Treasurer, 2003). The only major states not to sign the agreement were the Northern Territory and Queensland. The agreement was renewed in 2006 and extended until 2011 (The Office of the Treasurer, 2006), with Queensland the sole major state not to commit to the extended agreement.

It is worth considering just how governments stand to benefit when they attract events. Ex-ante projections of economic impacts attributable to a particular sports event are important contributing factors. The creation of additional jobs, indirect benefits linked to the income multiplier, the event as a business attraction, the event as a focus for media attention as well as the psychological benefits associated with an event have all been promoted as key economic benefits of sporting events (Lavoie, 2000). Much of the literature has countered the claims of economic benefits associated with sporting events. Indeed, as Siegfried and Zimbalist (2000) summarised:

> "Few fields of empirical economic research offer virtual unanimity of findings. Yet, independent work on the economic impact of stadiums and arenas has uniformly found that there is no statistically significant positive correlation between sports facility construction and economic development" (Siegfried and Zimbalist, 2000, p. 98).

Nevertheless, studies that highlight substantial economic impacts associated with events continue to proliferate and have become prominent features in the event attraction process. These studies are often used to justify public sector involvement in such projects. This is an appropriate point, therefore, to introduce a theoretical model of competition between cities for the economic benefits associated with sports events.

6.4 THEORETICAL MODEL

Consider two cities, *x* and *y*, each of which faces the choice of whether or not to host a sporting event. The event, *E*, is identical irrespective of its location, and whether it is hosted by one city or both cities. There are costs associated with attracting an event, as well as the associated economic benefits. City officials are assumed to maximise the net benefits to the local community when making the hosting decision.

The benefits accruing to a local community are a function of the event being hosted locally, the event being hosted in the other city and the local city's market potential. Market potential is a function of local population and the availability and quality of recreational and entertainment substitutes. Ticket price at an event is assumed to be set to maximise revenues. Thus, *x*'s benefit function is:

$$B_x = B_x(E_x, E_{y,} A_x) \tag{6.1}$$

where E_x and E_y represent the presence of the event in city *x* and *y*, and A_x is city *x*'s market potential. Benefits are assumed to be positive for E_x and A_x. Benefits are assumed to be lower in city *x* if the event is hosted in the neighbouring city, E_y.

We can decompose benefits into tangible and intangible benefits as follows:

$$B_x = TB_x(E_x, E_y, A_x) + IB_x(E_x, A_x) \tag{6.2}$$

where *TB* represents tangible benefits, which are positively dependent on the presence of an event in the city, negatively dependent on the presence of an event in the other city, and positively dependent upon the city's market potential. *IB* represents intangible benefits, which are positively dependent upon the event being hosted in the city and also positively dependent on the city's market potential.

The costs of hosting an event include construction, infrastructure and operational costs of an appropriate facility, which we assume are constant across all cities. An alternative is to hypothesise that the costs of hosting an event are positively dependent upon the market potential of the city. A city with a greater market potential may well incur higher event costs as a result of a larger population base through such costs as security, facility capacity, etc. This assumption will in turn affect the thresholds detailed in the analyses that follow. Larger cities, when competing for events with smaller cities, potentially have more to lose (or less to gain) in absolute terms than a smaller city, as the departure of spectators from the large city has a greater adverse impact than the departure of spectators from the smaller city.[19] If the event generates intangible costs (for example, congestion, noise pollution, anti-social behaviour, etc) then the resulting impact on net benefits will be negative rather than positive. It is assumed that city *x*'s marginal cost of hosting an event is constant at C_x, and likewise for city *y*. If city *x* pays a subsidy S_x to host an event, it will be incorporated into the city's cost function as shown below. If city *x* does not pay a subsidy when hosting an event, then the cost reduces to C_x.

$$C_x = C_x(E_x, A_x) + S_x(E_x) \tag{6.3}$$

For simplicity, it is assumed that the only cost involved in the hosting of the event is the subsidy, meaning that C_x reduces to S_x.

The choice of hosting an event is not an independent decision to be made in isolation, because one city's decision will influence the outcome in the other city. We assume that local government officials act to independently maximise net benefits, forming Nash strategies regarding whether or not to host an event. The net benefit functions are thus:

$$NB_x = TB_x(E_x, E_y, A_x) + IB_x(E_x, A_x) - [C_x(A_x, E_x) + S_x(E_x)] \tag{6.4}$$

$$NB_y = TB_y(E_y, E_x, A_y) + IB_y(E_y, A_y) - [C_y(A_y)E_y + S_y(E_y)] \tag{6.5}$$

[19] Likewise, the influx of spectators from a larger city to an event hosted by the smaller city benefits the smaller city more than the influx of spectators from a smaller city to an event hosted by the larger city benefits the larger city.

If each city treats the other city's decision regarding hosting or not as fixed, we can solve for the respective probabilities that an event will be hosted in a particular Nash equilibrium.

The payoff matrix for this game is thus:

Figure 6.1: Net Benefits of Event Hosting

		City *y*	
		Host	Not Host
City *x*	Host	*x:* $IB_x - S_x$, *y:* $IB_y - S_y$	*x:* $TB_y + IB_x - S_x$, *y:* $-TB_y$
	Not Host	*x:* $-TB_x$, *y:* $TB_x + IB_y - S_y$	*x*: 0, *y*: 0

The possibilities for a Nash equilibrium includes (i) an event being hosted in both cities, (ii) an event being hosted in only one city, and (iii) no events being hosted. If one city hosts an event and the other doesn't, then tangible benefits will increase in the host city and decline in the non-host city, as spectators in the non-host city will take their spending to the host city. If both cities host events, the effect on tangible benefits is likely to be small or zero, as spectators are likely to be indifferent between an event hosted in their city and an event hosted in the other city. To the extent that E_x and E_y generate intangible (public good) benefits (for example, civic pride, community solidarity, etc) for their local communities, then cities that host events will experience greater net benefits than if they didn't host events, as well as the possibility of increased spending from visiting spectators to the city which may result in further tangible economic benefits, which is of course dependent on what the other city does. It is assumed that events only generate intangible public good benefits, not costs, and thus will increase the host city's benefits. If neither city chooses to host events, the cities will experience no public good benefits and spending will be at regular levels, which translates into zero net benefits for a non-host city compared to the host city.

If city *y* hosts an event with probability φ and does not host with probability $1 - \varphi$, then one can solve for φ at the Nash equilibrium by solving city *x*'s indifference condition. Nash equilibrium is found where no player can do better for themselves by unilaterally changing their strategy. In this context, we can solve for φ where city *x* is indifferent between hosting and not hosting the event. The value for φ is thus:

$$\varphi = \frac{TB_y + IB_x - S_x}{TB_y - TB_x} \quad (6.6)$$

Likewise, if city *x* hosts with probability ω and does not host with probability 1 – ω, then solving city *y*'s indifference condition will give us:

$$\omega = \frac{TB_x + IB_y - S_y}{TB_x - TB_y} \quad (6.7)$$

The nature of φ and ω depends on the levels of tangible and intangible benefits, as well as the subsidy paid to host the event. The section that follows considers the case with two variations of this game – where the cities are of equal size (that is, their market potential is identical), and where there is a large city versus a small city (that is, market potentials in each city differ) – to examine the implications of subsidies in these contexts.

6.5. Establishing Thresholds for Subsidisation

The role of public subsidies in determining the Nash equilibrium in the model above is of particular interest. The purpose of this analysis is to examine the circumstances whereby certain cities would (or would not) pay subsidies to host an event, in light of the other city's decision. As noted in much of the literature, the monopoly power of many important sporting events typically result in demands by the sport itself for local government assistance with such costs as facility construction and infrastructure costs, operational costs, relocation costs, etc. Thus, many sports bodies effectively auction the privilege of hosting certain events to cities by demanding concessions from host cities. For simplicity, we assume that the concession demanded is that of a subsidy.[20] The sporting body in charge of the event faces three possible outcomes – (i) both cities host an event, (ii) only one city will host an event, or (iii) no city will host an event. The sporting body would ideally seek a subsidy that maximises the sporting body's revenue, and this will only occur if at least one city decides to host the event. A sporting body that insisted on a level of subsidy that resulted in neither city wanting to host the event would be irrational. Of course, the results of such a subsidy on host economies will depend on the decisions made by the cities as outlined above, and in particular how the subsidy affects each city's net

[20] The labelling of the concession as a subsidy shouldn't be interpreted solely as a cash payment to the event promoters, rather as an event-related cost that can take many forms, including cash payments, but also such things as favourable lease terms, and/or assistance with construction costs, among others, or combinations of these costs.

benefits. In the following analysis, two alternative scenarios are presented in numerical form: (i) city *x* and city *y* are identical (that is, $A_x = A_y$); and (ii) city *x* is larger than city *y* ($A_x > A_y$). The role of the subsidy in each of these scenarios is examined, and the implication for the cities in question is considered.

6.5.1. Identical Cities

When considering the choice of whether to host an event or not, an important consideration is the size of the subsidy, either explicit or implicit. This analysis contributes to this consideration. There may be a rational explanation as to why cities are often perceived as over-subsidising sports events and facilities. A common argument in the literature that explains the absence of realised impacts from events is that impacts from events are effectively transfers from one city to another and that, overall, the benefits to one community are balanced by losses in other communities – that is, event hosting is a zero-sum game. This outcome requires several assumptions to be made, the most important of these being discussed later in the chapter. If these assumptions are relaxed, then the resulting policy implications of event subsidisation and event hosting in general make for interesting reading.

In a critique of the economic impact-based rationale used by proponents of the V8 Supercars race in Wellington, Lally (2005) developed a simple example to illustrate why local councils should not subsidise events. This example is reproduced below, with the author's comments added in italics within parentheses.

> "Suppose that there are two Councils in New Zealand (*Let's call them Auckland and Wellington)* and each subsidises a car race. Without the subsidy, the car races will not proceed. If the Auckland race proceeds [*without a Wellington race*], a number of Wellingtonians will visit Auckland and their spending will benefit Auckland by $10m [*meaning that the resulting effect on Wellington is a loss of $10m in tangible benefits*]. If the Wellington race proceeds [*without an Auckland race*], a number of Aucklanders will visit Wellington and their spending will benefit Wellington by $10m [*with the resulting effect on Auckland being a loss of $10m in tangible benefits. Up to this point, we can think of this example as a zero sum game*]. Each council is persuaded to pay a $6m subsidy to the race promoter. However, if neither race proceeds, most of this spending of $20m will still occur, except that it will occur in the home city of the spender rather than in the city visited. Suppose 80% of it occurs anyway

[*which implies that there is a negative net benefit associated with not hosting the event of 20% of the city's tangible benefits*]. In this case, the benefits to each city from both races proceeding rather than not proceeding is only $2m each [*that is, $10m – $8m*], which is less than the subsidy of $6m paid by each council. Accordingly, the subsidies should not be paid by either council" (Lally, 2005, p. 5).

This example can be applied to the framework developed in this analysis. For simplicity, we assume that each city has tangible benefits of $10m, no intangible benefits and no costs in addition to the subsidy in the presence of an event. To begin with there is no subsidy, thus we can attribute the following payoffs to each quadrant:

- If both cities host an event, each city retains their $10m in tangible benefits (that is, their net gains are zero).
- If only one event is hosted, then the host city attracts the entire $20m of tangible benefits (that is, the host retains its $10m in spending and attracts the $10m in spending from the non-host city) resulting in a net benefit to the host of $10m. The non-host city loses $10m in spending when spectators spend at the event outside the city, thus the non-host city's net benefits are –$10m.
- If no events are hosted, then both cities retain $8m in tangible benefits, thus both cities experience a net loss of $2m in the absence of an event when compared to hosting an event.[21]

We can show these net benefit payoffs in a payoff matrix as shown below. It is assumed that both cities and events are identical in every respect, and the marginal benefits for each additional event are constant (and not diminishing) – that is, tangible benefits remain the same whether one or two events are hosted.

Figure 6.2: Net Benefits without a Subsidy (Lally's Example)

		City A	
		Hosted	Not Hosted
City W	Hosted	W: 0, A: 0	W: 10, A: -10
	Not Hosted	W: -10, A: 10	W: -2, A: -2

In Figure 6.2 above, each city has a dominant strategy – to host the event. It is also clear that the resulting Nash equilibrium outcome is best from society's perspective.

[21] This implies that event-related spending is merely re-allocated to other sectors of the city's economy rather than lost altogether.

If we now add in the subsidy of $6m to host the event, the resulting payoff matrix is presented in Figure 6.3.

Figure 6.3: Net Benefits with a $6m Subsidy (Lally's Example)

		City A	
		Host	Not Host
City W	Host	W: -6, A: -6	W: 4, A: -10
	Not Host	W: -10, A: 4	W: -2, A: -2

We can see that when the subsidy is incorporated into the payoffs, each city again has a dominant strategy, to host the event (and therefore pay the subsidy). The introduction of the subsidy creates a Prisoner's Dilemma outcome, where the resulting Nash equilibrium is sub-optimal for both cities.[22] With a subsidy of $6m, the best outcome for society as a whole is for neither city to host. The competition for the tangible benefits, however, means that each city's individual incentives transcend the interests of the group as a whole. As a result, the Nash equilibrium is not socially optimal. Thus, despite Lally's arguments, the analysis of the payoff matrix shows that it actually makes sense for cities to pay the subsidy and host the event.

This is not to say, however, that paying subsidies and hosting events is always the dominant strategy for cities in such a game. Consider the case of an $11m subsidy to host the event, which results in payoff matrices as shown in Figure 6.4 below.

Figure 6.4: Net Benefits with an $11m Subsidy (Lally's Example)

		City A	
		Host	Not Host
City W	Host	W: -11, A: -11	W: -1, A: -10
	Not Host	W: -10, A: -1	W: -2, A: -2

Here, we can see that the outcome of the game will be different. Two Nash equilibriums exist, and occur where one city hosts and the other city doesn't host. This is despite the fact that every potential payoff in the matrix results in a net loss to each city.

[22] Bear in mind that a subsidy will only create a Prisoner's Dilemma if it lies within a certain range of values. As we shall see later on, the size of the subsidy can potentially lead to several potential outcomes in such a game.

If the subsidy increases to $13m, then the payoff matrix will adjust as follows:

Figure 6.5: Net Benefits with a $13m Subsidy (Lally's Example)

		City A	
		Host	Not Host
City W	Host	W: -13, A: -13	W: -3, A: -10
	Not Host	W: -10, A: -3	W: -2, A: -2

With a subsidy of $13m, both cities now have a dominant strategy – not to host. The Nash equilibrium will occur where neither city will host, which is the socially optimal outcome.

From the example, and using a modified version of the framework developed in Section 6.4, we can identify thresholds for subsidy values and how these affect the outcomes of the game.

Recall that in this example, $A_w = A_a$ (where subscripts *w* and *a* denotes Wellington and Auckland respectively), that $TB_w = TB_a$, and there are no intangible benefits, that is, $IB_w = IB_a = 0$. This example differs from the preceding framework with the loss in net benefits that accrue when both cities do not host the event. We thus incorporate this feature into the framework as δ, which represents the fraction of tangible benefits that are lost when neither cities host the event. For simplicity it is assumed that δ is the same for both cities. The resulting probabilities of hosting events are modified accordingly, and are presented below:

$$\varphi(a) = \frac{TB_a + IB_w - S_w + \delta TB_w}{TB_a - (1-\delta)TB_w} \tag{6.8}$$

$$\omega(w) = \frac{TB_w + IB_a - S_a + \delta TB_a}{TB_w - (1-\delta)TB_a} \tag{6.9}$$

where $\varphi(a)$ is the probability of Auckland hosting the event, and $\omega(w)$ is the probability of Wellington hosting an event, where subscripts *a* and *w* denote Auckland and Wellington values respectively. If δ is zero (that is, that all tangible benefits are retained in the

absence of an event), then the probabilities reduce to equations 6.6 and 6.7. In this case, intangible benefits are zero, hence the probabilities reduce to:

$$\varphi(a) = \frac{TB_a - S_w + \delta TB_w}{TB_a - (1-\delta)TB_w} \tag{6.10}$$

and

$$\omega(w) = \frac{TB_w - S_a + \delta TB_a}{TB_w - (1-\delta)TB_a} \tag{6.11}$$

When the subsidies take the following values, we observe the following outcomes:

If $S_w < TB_a$, $\varphi(a) = 1$ (6.12)

If $TB_a < S_w < NB_w$, $\varphi(a) < 1$ (6.13)

If $S_w > NB_w$, $\varphi(a) = 0$ (6.14)

Likewise,

If $S_a < TB_a$, $\omega(w) = 1$ (6.15)

If $TB_a < S_a < NB_a$, $\omega(w) < 1$ (6.16)

If $S_a > NB_a$, $\omega(w) = 0$ (6.17)

These results make intuitive sense. In the absence of a subsidy (and in the presence of tangible benefits from events), both cities will host events, and the resulting Nash equilibrium will be socially optimal. If the subsidy is less than the tangible benefits accruing to each city, hosting remains a dominant strategy as net benefits will exceed the costs of the event. Once the subsidy exceeds the loss of tangible benefits associated with neither city hosting events, however, the Nash equilibrium where both cities host events will no longer be socially optimal. If the subsidy exceeds the tangible benefits that a city can obtain by hosting the event (i.e. through attracting tangible benefits from the other city) but is less than the city's net benefits, then the city may or may not host, depending on what the other city does. In this scenario, there will be a mixed-strategy equilibrium, where each city hosts an event with a probability of less than one. Once the subsidy

exceeds the net benefits of hosting, the city will not pay the subsidy and thus will not host the event. The resulting Nash equilibrium is where neither city hosts, and is a socially optimal outcome.[23]

It is clear from this example that the size of net benefits is important.[24] As already discussed, the relative market potential of the two cities directly influences the size of these benefits. One must also take into consideration the costs associated with hosting the event, which may be greater in some cities due to such factors as a lack of suitable facilities or infrastructure.

We now adjust this scenario slightly and consider the realistic possibility that one city is "larger" than the other – in other words, that one city has a larger market potential than the other. The implication of subsidies in such a scenario is developed further in the following section.

6.5.2. Large City versus Small City

Let's now assume that Auckland (city A) has twice the market potential of Wellington (city W), and the tangible benefits in Auckland and Wellington are now $20m and $10m respectively. Again, we assume that there are no event-related costs in addition to a subsidy. In the absence of a subsidy, the new payoffs will be as follows:

- If both cities host an event, then city A will retain its $20m in tangible benefits and city W will retain its $10m in benefits (that is, their net gains are zero).
- If city A hosts an event and city W doesn't, then city A experiences a net benefit of $10m and city W experiences a net loss of $10m.

---

[23] The absence of event-related costs in addition to the subsidy in this analysis doesn't alter the thresholds derived in equations (20) to (25). If costs were present, the thresholds will be unchanged, while net benefits would fall. Since both cities in the V8 scenario outlined in Section 6.2 were considering street races, the operational costs are likely to be similar. If one city was considering using an established racing track, however, then it would be reasonable to expect costs to be different.

[24] A variation of this example is the possibility that hosting an event is a zero-sum game. Indeed, if the net benefits of hosting an event are merely transferred from non-host areas to host areas, as many researchers have argued, then the hosting of an event is effectively, by definition, a zero-sum game. A zero-sum game requires the outcomes of (a) both cities hosting events, and (b) neither city hosting events to be identical. That is, there will be no net transfer of benefits between cities, and the presence of two events will generate no additional benefits in the city compared to the case where no events were hosted. A zero-sum game does not eventuate in the presence of a subsidy.

- If city W hosts an event and city A doesn't, then city W receives net benefits of $20m and city A suffers a net loss of $20m.
- If no events are hosted, then both cities retain 80% of their tangible benefits, thus city A experiences a net loss of $4m and city W experiences a net loss of $2m.

We can construct the payoff matrix to reflect the net benefits in the absence of a subsidy as shown in Figure 6.6 below:

Figure 6.6: Net benefits without a Subsidy (Large (A) vs Small (W) city)

		City A	
		Host	Not Host
City W	Host	W: 0, A: 0	W: 20, A: -20
	Not Host	W: -10, A: 10	W: -2, A: -4

As we can see, both cities again have a dominant strategy, to host the event, and the resulting Nash equilibrium is where both cities host events, which is a socially optimal outcome.

It is useful, at this point, to remember that a subsidy of up to $4m in city A and up to $2m in city W would result in a socially optimal outcome where both cities would host events. Once the subsidy exceeds these values, then the equilibrium becomes socially sub-optimal. Let's now consider the effect of a subsidy of $8m for hosting the event. The payoff matrix adjusts as shown below.

Figure 6.7: Net Benefits with an $8m Subsidy (Large [A] vs Small [W] City)

		City A	
		Host	Not Host
City W	Host	W: -8, A: -8	W: 12, A: -20
	Not Host	W: -10, A: 2	W: -2, A: -4

An $8m subsidy will not change the initial outcome, that both cities will host an event. If the subsidy is increased to $15m, the payoff matrix adjusts as shown in Figure 6.8.

Figure 6.8: Net Benefits with a $15m Subsidy (Large [A] vs Small [W] City)

		City A	
		Host	Not Host
City W	Host	W: -15, A: -15	W: 5, A: -20
	Not Host	W: -10, A: -5	W: -2, A: -4

The outcome in the presence of a $15m subsidy will be a mixed strategy Nash equilibrium, with no equilibrium in pure strategies. If the subsidy is further increased to $25m, the resulting payoff matrix is as shown in Figure 6.9.

Figure 6.9: Net Benefits with a $25m Subsidy (Large [A] vs Small [W] City)

		City A	
		Host	Not Host
City W	Host	W: -25, A: -25	W: -5, A: -20
	Not Host	W: -10, A: -15	W: -2, A: -4

A $25m subsidy will result in neither city hosting events, and the resulting Nash equilibrium will be socially optimal.

While the values for the subsidies analysed in the example illustrate how the equilibrium changes depending upon the size of the subsidy, they don't reveal the thresholds for which the subsidy influences the Nash equilibrium outcome. As we shall see, the thresholds are more complex here than in the preceding case.

Recall that in this example, $A_w < A_a$, therefore $TB_w < TB_a$, and also that $IB_w = IB_a = 0$. We assume that $S_w = S_a = S$ for simplicity.

When the subsidies take the following values, we observe the following outcomes:

If $0 < S < TB_w$, then $\varphi(a) = 1, \omega(w) = 1$ (6.18)

If $TB_w < S < NB_a$, then $\varphi(a) = 1, \omega(w) < 1$ (6.19)

If $NB_a < S < TB_a$, then $\varphi(a) < 1, \omega(w) < 1$ (6.20)

If $TB_a < S < NB_w$, then $\varphi(a) = 0, \omega(w) < 1$ (6.21)

If $S > NB_w$, then $\varphi(a) = 0, \omega(w) = 0$ (6.22)

That is, if the subsidy is less than city W's tangible benefit (in other words, the tangible benefit that city A will receive), then the dominant strategy for each city is to host the event. If the subsidy is greater than city W's tangible benefits but less than city A's maximum net benefits (that is, W's tangible benefits minus the loss associated with not hosting the event), then hosting remains city A's dominant strategy, while city W no longer has a dominant strategy, so the Nash equilibrium will occur where city A hosts and city W does not host. When the subsidy is between city A's maximum net benefits and city A's tangible benefit (that is, the tangible benefit that city W will receive) then neither city has a dominant strategy, and the Nash equilibrium will be a mixed strategy equilibrium. When the subsidy is greater than city A's tangible benefit but less than city W's maximum net benefits, not hosting becomes the dominant strategy for city A. While city W does not have a dominant strategy, as city A will not host, city W is best to host (and pay the subsidy). Finally, if the subsidy exceeds city W's maximum net benefits, then not hosting becomes the dominant strategy for both cities, and thus no events will be hosted.

Depending upon the size of the subsidy, there are a variety of potential outcomes in this scenario. Two findings stand out. Upon analysing the thresholds discussed above, it is obvious that because the smaller city (W) stands to benefit by more than the larger city (A), the smaller city will ultimately be prepared to pay the greatest subsidy for hosting the event (as seen in equation 6.21). When one examines the outcome of a subsidy of $21 million, city W accrues all of the net benefits of the event from city A ($20 million) but the size of the subsidy results in a net loss of $1 million. This is still a better result for city W than a net loss of $2 million without the event, so the equilibrium outcome will occur where city W will host the event and city A will not host. We also identify a lower band within which the subsidy will result in the larger city (A) hosting the event and the smaller city (W) not hosting the event (as seen in equation 6.19).

The large versus small city variation of the game provides a potential theoretical explanation for the observed outcomes of large cities failing to host events and smaller cities paying seemingly excessive amounts to host the same events. Such examples are not limited to the V8 Super Car race in New Zealand, with Hamilton choosing to host the event after Auckland and Wellington declined. Perhaps one of the most internationally prominent examples is the case of NFL football in Los Angeles, USA. In 1996, Los Angeles lost both the Rams and the Raiders franchises (to St. Louis and Oakland respectively), and to this day remains without an NFL franchise. Los Angeles is arguably the largest media

market in the United States, and many have questioned why NFL football has not returned to the city. A possible theoretical explanation for this and similar phenomena would be to look at the problem from a game-theoretic perspective.

The reason that this predicted outcome doesn't always eventuate is largely due to the monopoly power of the sporting body in question (Zimbalist, 2003). In the major leagues of the United States, the granting of new or relocated franchises must be approved by a majority of franchise owners. In the case of international mega-events such as the Olympic Games or the FIFA World Cup Finals, the host selection process is also an inherently political process, with the potential for questionable behaviour to influence the host selection outcomes. Indeed, there have been several instances in recent times where such behaviour has been more visible, including the 2002 Salt Lake City Winter Olympics, and the awarding of the 2006 FIFA World Cup Finals to Germany (Baade and Matheson, 2004).

This framework could also be used to explain how much a city might be prepared to pay for a particular event. The ability and accuracy of this framework to predict the willingness to pay by a city to host an event is reliant on the accurate measurement of tangible benefits, intangible benefits and costs. Throughout this analysis, we have assumed that these benefits are accurately measured. If, however, they are not accurate, then the potential for cities "overpaying" for events is much greater.

6.5. CONCLUSIONS

The sporting landscape consists of many scenarios where cities have appeared to "overpay" for events. Framing competition for events in a game theory context and considering the alternative scenarios has shown that, in certain situations and depending upon the size of the subsidy, the incentives facing an individual city or community can override the incentives of society as a whole. The case of the hosting of the New Zealand round of the V8 Super Cars series was a situation where both Auckland and Wellington declined to host the event, while the smaller city of Hamilton eventually won the rights to host the race.

If an individual cost-benefit analysis of an event produced outcomes like those in Figure 6.4, where net benefits with a subsidy were negative in all instances, the event project would unquestionably be rejected. When hosting events is viewed as a competition for economic benefits, however, economic theory can provide a rational explanation for the

outcome in which Hamilton would host the race. One could utilise the framework developed in this situation where Hamilton is one city and the rest of New Zealand is the other "city". The same incentives (depending upon the size of the subsidy) apply to any prospective host of the V8s – that hosting and subsidising the race can in some situations be a dominant strategy and thus events may be hosted despite associated negative net economic benefits and a resulting outcome that is socially inefficient.

An alternative explanation for why Auckland and Wellington effectively rejected the V8s while Hamilton was prepared to host the race can be found in the large city versus small city scenario. As the two largest cities in New Zealand, the cost required to host the races became too large as they stood to lose more than they gained in the form of tangible economic benefits from outside the locality, thus not hosting the event became a dominant strategy for both Auckland and Wellington. Given Hamilton's success in winning the event, the cost of the Super Cars race may well have been within the range where the smaller city would find hosting the event to be an optimal strategy when the large city chooses not to host. Decisions in both Auckland and Wellington cited the resource consent costs associated with the race as being prohibitive to the feasibility of the event. Hamilton had no such qualms, quite possibly because it stood to gain more than the larger cities stood to lose.

The lesson to take from this analysis is that public sector decisions of whether to subsidise an event or not should not be considered as isolated decisions, as the outcome of hosting an event involving the payment of a subsidy is very much dependent on what other cities do when faced with the same alternatives.

While subsidising sports events can be beneficial to one and/or both cities within a game theory model, paying large subsidies to host events can be potentially disadvantageous to society while still being a dominant strategy when compared to the alternative of not hosting sports events, leading to a socially inefficient outcome. The accurate measurement of the tangible, intangible and net benefits accruing to the host city is thus critically important to the outcome of the framework developed in this chapter. If one agrees with the majority of independent research, which suggests that the economic impact of sports events could be zero or even negative, then the size of the subsidy required to bring about the socially efficient outcome will be smaller than if one subscribes to the view that sports teams generate substantial economic impacts. The implication of the increasing size of subsidies paid to finance stadium construction in the United States recently (Crompton, et

al., 2003; Zimbalist and Long, 2006) is that there are substantial net benefits associated with stadiums and events. The measurement of these net economic benefits is an essential determinant of the level of subsidy that results in a socially desirable outcome.

7

INTANGIBLE BENEFITS AND THEIR ROLE IN LOCAL GOVERNMENT FUNDING OF SPORTS FACILITIES: A CASE STUDY OF WANGANUI RUGBY

7.1. INTRODUCTION

The examination of ex-post economic impacts of facilities and events in this research has called into question the accuracy of studies that have projected significant impacts such as job creation and increased economic activity, and argued that such studies should not be used as justification for public sector involvement in such projects. The focus in more recent research within the literature has been on the nature and role of intangible benefits associated with facilities and events to justify government involvement in stadium construction.

As discussed earlier, the economically justifiable rationale behind local government financing of sporting facilities is that stadiums and events generate economic benefits to local economies (which are not necessarily the same thing as economic impacts). Economic benefits can accrue from event attendance (consumer surplus), from spending of non-locals at events (producer surplus), as well as possible spillover benefits (public goods) enjoyed by both attendees and non-attendees.

The Wanganui Rugby Football Union moved provincial representative rugby fixtures from their traditional home ground of Spriggens Park to the Cooks Gardens facility in 1996 after the main grandstand at Spriggens Park was destroyed by fire. The Cooks Gardens stadium was upgraded in 1996 with a new (main) Northern grandstand, among other upgrades. The upgrade of the Northern stand was funded with substantial local government assistance.

The measurement of consumer surplus typically involves the estimation of consumer demand. The development of a model of attendance that incorporates economic and sports-related factors is the first step in this analysis, with the second step being the estimation of consumer surplus benefits of attendance from the most appropriate functional form of the demand model. The estimated consumer surplus benefits are to be compared to the cost of the Wanganui District Council's $260,000 contribution towards the upgrade of the multiple-purpose Cooks Gardens facility. If these benefits exceed the cost, then there is economic justification for the council's contribution.

This analysis proceeds in the following manner. A brief history of rugby in Wanganui, including the role of facilities is presented in Section 7.2, and the history of the structure of competition of provincial rugby in New Zealand is outlined in Section 7.3. Relevant literature specific to this analysis is briefly reviewed in Section 7.4. The development of the empirical model and discussion of the data takes place in Section 7.5, and the results are discussed in Section 7.6. From the empirical analysis, estimates of consumer surplus are derived and discussed in Section 7.7. The chapter is concluded in Section 7.8.

7. 2. RUGBY IN WANGANUI: A BRIEF HISTORY

The history of rugby in Wanganui began in 1872 with the first game played in the area, two years after rugby was introduced in New Zealand. The Wanganui Rugby Football Union was established in 1888 to improve the administration of the game in the area (Johnston, 1988). The history of representative games in Wanganui began that year with a game against the touring British team, the result being a draw with both teams scoring one try (Johnston, 1988). Wanganui played their 1000th representative game in May of 1996, a 26-all draw with traditional rivals Taranaki in Wanganui.

For a detailed history of Wanganui rugby, see Johnston (1988). The Wanganui union has produced 17 All Blacks (New Zealand representatives) throughout its history, with the most recent being midfield back Bill Osborne (1975-82) and halfback Andrew Donald (1981-1984).

Wanganui played their home games at Spriggens Park until 1996, a venue regarded by the prominent New Zealand rugby journalist Sir Terry McLean as "…a wet weather field without peer in the entire country" (Garland, 1997, p. 46). In 1995, the main grandstand at Spriggens Park was destroyed by fire. The damage to the stand cost the Wanganui Rugby Football Union, as the owners of the facility, in excess of $60,000. The Union was faced

with a choice – to pay for the upgrade and continue to play at Spriggens Park, or to move representative fixtures to the other major facility in Wanganui, Cooks Gardens. The upgrade would have had a significant financial impact on the union, so it was decided that the Union would sell the ground to the Wanganui District Council, while retaining ownership of some of the buildings within the facility. The Union rented Spriggens Park off the Council for club rugby purposes, and moved the representative fixtures to Cooks Gardens in 1996.

Cooks Gardens is a well-established multiple-purpose sporting facility in the city that also hosted sporting events such as athletics and cycling. Its combined replacement value in 2009 was $11.6 million, with the Stadium worth $7.865 million and the Velodrome worth $3.735 million (Wanganui District Council, 2009, p. 1837). When the Union moved to Cooks Gardens, the facility was not well-suited for rugby, a point made in the Union's 1996 Annual Report. In 1996, major development took place at Cooks Gardens, including the construction of a new cycling velodrome to replace the cycling track that encompassed the playing field, an artificial (synthetic) athletic track, and a new main northern grandstand that provided in excess of 2,300 new seats. The facility was further upgraded in 2004 with over 1,100 new seats in two new grandstands, including the southern stand which housed the offices of the Rugby Union and changing facilities (Wanganui District Council, 2009). The facility at present has an official capacity of 15,000.

7.3. A BRIEF HISTORY OF THE NATIONAL PROVINCIAL CHAMPIONSHIP

Prior to 1976, regular home and away matches were organised between provincial unions that generated rivalry and normally attracted good crowds (Garland, 1997). The major annual event on the Wanganui rugby fixtures list were the games against neighbouring Taranaki – in New Plymouth on Anzac Day and the return clash in Wanganui on Queen's Birthday. With the exception of the rivalries developed through these types of games, Ranfurly Shield clashes and international matches, it was noted that, in general "…when playing an opposition more at their own level of ability it often seemed that [teams] were going through the motions" (Garland, 1997, p. 3).

The combination of the need to bring meaning to these types of games, the escalating costs of administration in the mid-1970s and the effect of the cancellation of the 1973 South African tour to New Zealand on the wealth of the New Zealand Rugby Football Union resulted in the formation of a two-tiered inter-provincial rugby competition in New Zealand in 1976 (Garland, 1997). Romanos (2002) noted that the formal proposal for the

NPC was made by Wanganui delegates Buddy Stevenson and Paul Mitchell. Part of the reason for the choice of the Wanganui delegates was the fact that the All Black coach at the time, J.J. Stewart, was from Wanganui, and Wanganui's nominee on the NZRFU executive, Bob Stuart, was a former All Black captain (Romanos, 2002).

The proposed format of the NPC was a First Division that consisted of 11 teams, and a Second Division for the remaining fifteen unions that was separated into North and South Island divisions, with the initial aim of fostering and protecting the interests of South Island rugby. This structure was modified in 1985, when the Second Division was combined, and a separate Third Division was created. For its initial year, the Third Division was split into North and South divisions. From 1986-2006, the format of the NPC was three separate divisions based entirely on playing strength. In 1992, the present playoff structure was implemented, whereby the top four teams in each division played in two semi-finals and the winners met in a final to decide the division champion. Winners of Division Three were automatically promoted to Division Two at the expense of the last-placed Division Two union.

7.4. LITERATURE REVIEW

An excellent survey of the literature of demand for sport was conducted by Borland and Macdonald (2003), who examined 57 studies of sports including soccer, the four United States (U.S.) major league sports (baseball, basketball, football (gridiron) and ice hockey), rugby league, Australian rules football and cricket. Five general categories of determinants of demand were identified as being prominent across the studies, namely (i) consumer preferences, (ii) economic characteristics, (iii) quality of viewing, (iv) characteristics of the sporting contest, and (v) supply capacity (Borland and Macdonald, 2003).

Demand for rugby union – unlike the four U.S. major league sports, as well as soccer, cricket and rugby league – is largely unexplored territory in the literature. Jones, Schofield and Giles (2000) noted in their study of demand for British Rugby League that the absence of a study of demand for rugby reflected

> "…the amateurish (deliberately?) reporting of attendance and financial data for this heretofore 'amateur' game. Presumably this will change with the professionalization of the game" (Jones, Schofield, and Giles, 2000, p. 1877).

Two previous studies have concentrated on the modelling of rugby attendance in New Zealand – Owen and Weatherston (2004a, 2004b). Owen and Weatherston's (2004a)

study provided a unique insight into the key determinants of Super 12 rugby attendance in New Zealand. These were found to be habit (lagged attendance), traditional rivalries, quality of rugby, the weather (rain on the day of the match), and the stage of the season that the match was played. Very little evidence was found to support the hypothesis that individual match uncertainty of outcome influenced attendance (Owen and Weatherston, 2004a). Similar results were found for attendances at NPC First Division games (Owen and Weatherston, 2004b). In both studies, economic variables were found to be important determinants of attendance.

A recent extension to empirical demand studies has been the estimation of consumption benefits generated by sports teams through the calculation of consumer surplus. This has been prompted by the increasing tendency of local governments (predominantly in the U.S.) to publicly fund sports facilities largely on the grounds of projections of substantial economic impacts accruing from such projects.

Two studies have attempted to measure the consumption benefits, or consumer surplus, of sport to a city. Irani (1997) estimated a Marshallian demand curve for Major League Baseball games in the U.S., and calculated net consumer surplus from the estimated demand curve. Alexander, et al., (2000) attempted to avoid issues with estimating demand by adopting a theoretical approach and estimated consumer surplus using assumed elasticities.

Irani (1997) estimated annual net benefits to cities hosting Major League baseball franchises from -$19.1 million to $32.8 million, and advocated that consumer surplus values be included as a measure of consumer welfare in any decision of whether or not to subsidise a franchise. Alexander, et al., (2000) found that for most U.S. major league franchises, consumers surplus values from attending games were insufficient to justify building facilities at 100% public expense on benefit-cost grounds (Alexander, et al., 2000).

More recent studies have examined the value of public goods, or non-use values, generated by stadiums and teams and have found similar results to the earlier studies; while public good benefits were found to exist, they were insufficient to justify the extent of the public subsidisation of teams and facilities experienced in the United States (Groothuis, et al., 2004; Johnson, et al., 2001; Johnson, et al., 2007; Johnson and Whitehead, 2000).

An examination of the consumer surplus benefits generated by sporting events provides important information that can be used in a benefit-cost analysis of government involvement in facility construction. A complete benefit-cost analysis would account for both use and non-use benefits of a facility (Hyman, 2005). Knowledge of the value of use benefits (in this case, the consumer surplus benefits) and the project costs can, nevertheless, provide an indication of the size of public good or non-use values necessary to justify complete subsidisation of a sporting facility in the absence of producer surplus benefits.

In this study, consumer surplus values are calculated and discussed in Section 7.7. Before these values can be considered, an empirical model needs to be formulated to evaluate the importance of several key determinants of attendance. This model is developed in the next section.

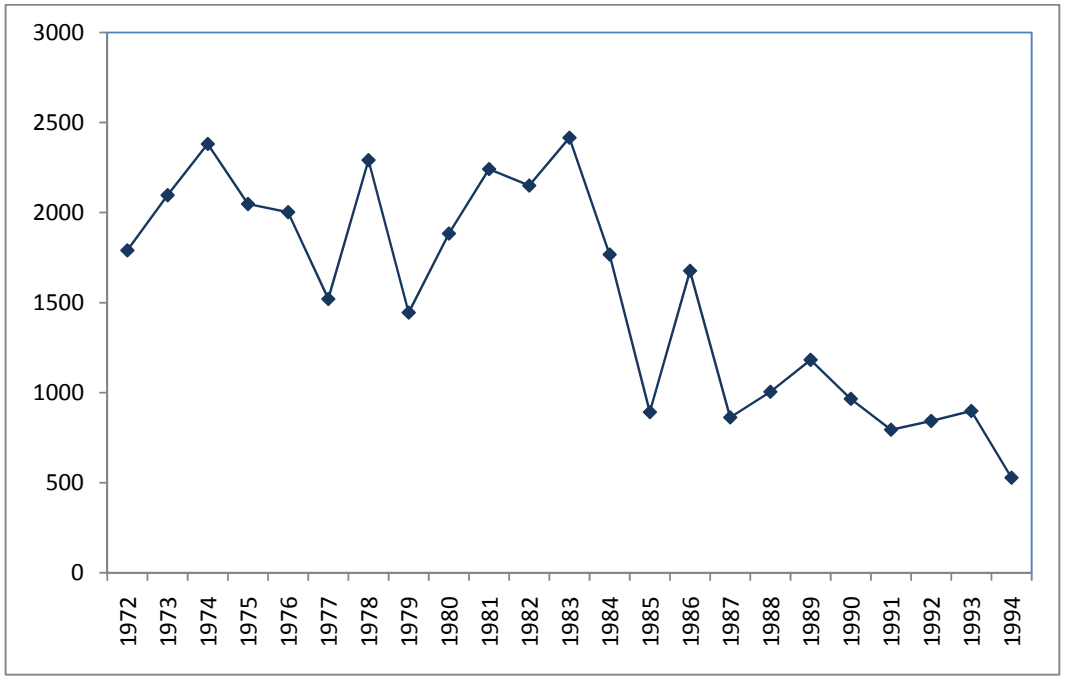
7.5. MODEL AND DATA

The model developed for this study is derived from consumer theory and draws from a well-established field of literature. The model structure factors in the general determinants of demand as suggested by Borland and Macdonald (2003). The basic model is shown in equation 7.1.

$$ATT_{it} = \alpha_i X_{it}^{E} + \beta_i X_{it}^{CP} + \delta_{it} X_{it}^{CSC} + e_{it} \qquad (7.1)$$

The dependent variable is ATT_{it}, the attendance at Wanganui home game *i* at time *t*. Average attendance for the period under examination is presented in Figure 7.1 below. There is clearly a negative trend in attendance throughout the period, although there have been several fluctuations.

Figure 7.1: Average Attendance at Games in Wanganui, 1972-1994



Source: Wanganui Rugby Football Union Annual Reports, various years.

The independent variables are divided into several groups. Firstly, a vector of economic variables, X_{it}^{E}, which include real average attendance price (*REAL_PRICE*), the distance from the visiting team's home city to Wanganui (*DIST_HRS*), monthly registered unemployment (*WMRU*) and the presence of a substitute good, Sky Television (*SKY*).

The real average attendance price is calculated as total gate revenue divided by total game attendance, converted into 1999 dollars with consumer price index (CPI) figures. No information regarding season ticket holders was available, so this measure of ticket price is the best available measure of entry price. Past research has indicated that it is reasonable to expect the coefficient of real price to be negative and inelastic. The distance variable is calculated by taking the distance of a one way trip in hours from Wanganui to the city or town in which visiting unions played their home games.[25] The distance effect is expected to be negative, in that the further away the opposition is from Wanganui, the lower the attendance would be.

[25] This specification is different from the distance variable used in Chapter 5, because a preliminary estimation of the price variable within the model combined both ticket price and an estimate of the opportunity cost of time. The two effects were separated so as to be consistent with past literature in this area.

The monthly registered unemployment figures for the Wanganui district (*WMRU*) is included to control for local macroeconomic influences in the absence of per-capita income measures. Borland and Macdonald (2003) suggested that attending sports may well be an outlet for the unemployed, and that attendance could theoretically be positively related to measures of unemployment.

Economists almost always acknowledge the role of substitutes as being crucial to any decision made by consumers and producers. In this instance, to incorporate a substitute for attending games of rugby in Wanganui, a dummy variable indicating the presence of Sky Television in New Zealand (*SKY*) is factored into the model. Sky Television introduced pay-per-view television to New Zealand in 1990, and, as a result, people had an alternative to watching rugby in Wanganui. While Wanganui rugby games were not televised, Sky enabled an increased variety of sport to be beamed into New Zealand homes, including local and international sport. Thus, one might anticipate that the presence of Sky would result in lower attendances at rugby matches in Wanganui.

The second vector of variables, X_{it}^{CP}, represents consumer preferences, and includes lagged attendance ($ATT_{i-1,t}$) as a measure of habit persistence or team loyalty.[26] Failure to consider the effect of habit on attendance can potentially result in autocorrelation (Borland and Macdonald, 2003).[27] One would expect lagged attendance to be positively related to current attendance.

The third group of variables, X_{it}^{CSC}, represents characteristics of the sporting contest and quality of viewing, and includes dummy variables representing the annual Queen's Birthday fixtures between Wanganui and Taranaki (*TARA*), the level of NPC games played (*DIV2NI*, *DIV2*, *DIV3*), international-level opposition (*INT_T1*), playoff games (*DIV3SF*, *DIV3F*), promotion (*PROMPY*) and relegation (*RELPY*) variables, as well as dummy variables for each stage of the NPC's history (*PRENPC*, *NPC1*, *NPC2*, *NPC3*, and *NPC4*).

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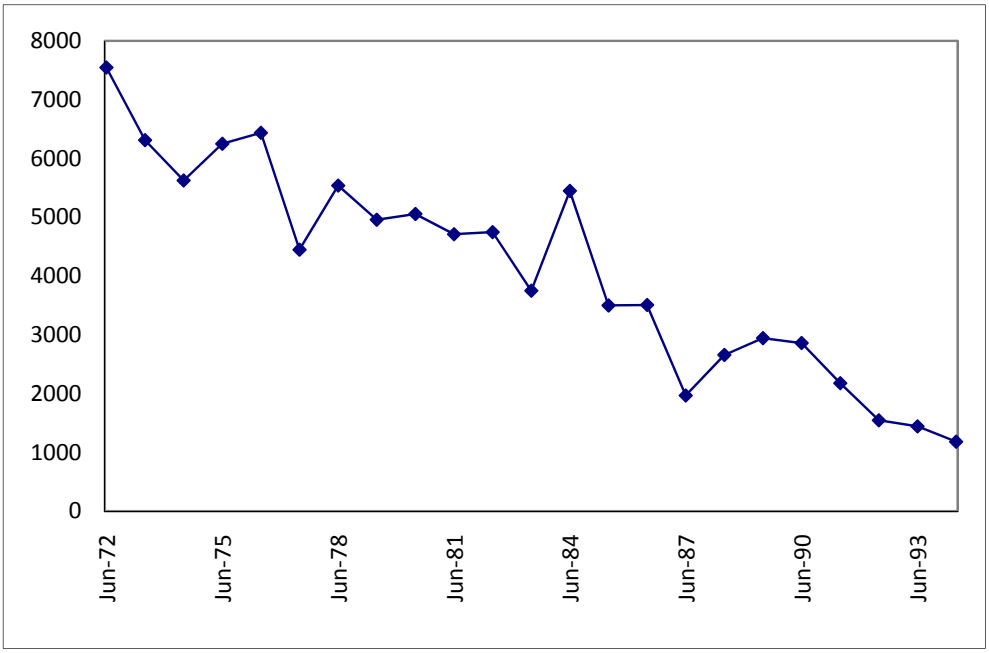
[26] Given that *i* is the game in year *t*, the appropriate nomenclature of lagged attendance in this model is Attendance in the *i*-1th game in year *t*.

[27] In each specification of the final model in this analysis, tests were conducted for the presence of autocorrelation without the lagged attendance variable. Tests indicated that autocorrelation was present, so the lagged attendance variable was included in each model specification.

As mentioned earlier, the annual fixtures against Taranaki are a constant feature across the sample period, and have been the most popularly attended games in the past, especially since the Taranaki game is played on a public holiday (Queen's Birthday). The attendance at these fixtures can be seen in Figure 7.2. To this end, the dummy variable *TARA* is assigned to this fixture each year. It follows a similar trend to that shown in Figure 7.1.

Figure 7.2: Attendance at Wanganui vs Taranaki (Queen's Birthday) Games



Source: Wanganui Rugby Football Union Annual Reports, various years.

The effect of the level of games played in the NPC has also been considered, and the impacts on attendance are hypothesised to differ between divisions. On one hand, second division rugby (*DIV2NI, DIV2*) is a higher standard than third division rugby (*DIV3*), so higher interest could be generated due to the higher level of play. On the other hand, Wanganui have consistently performed well in Division 3 (being promoted from the division twice in the sample period as well as consistently making the playoff stages), as opposed to being one of the poorer performed Division 2 teams (relegated to Division Three twice and never making the second division playoffs). To that end, variables to capture the effects of promotion to (*PROMPY*) and relegation from Division 2 (*RELPY*) in the previous year have also been included to capture any effect of performance in the previous season that might have affected attendance in the present season. Wanganui has also hosted semifinals of Division 3 (*DIV3SF*) and a Division 3 final (*DIV3F*), and the effects are captured with dummy variables for these games.

Wanganui played several international teams across the sample period (*INT_T1*) and these included games against South Africa, Australia the British Isles, Fiji, Western Samoa and Tonga, so one would expect interest in these games to generate substantial increases in attendance relative to games against domestic opposition.

Dummy variables are also included to capture the impact of the introduction and change of format or structure of the NPC on attendance (*PRENPC*, *NPC1*, *NPC2*, *NPC3* and *NPC4*), where *PRENPC* denoted pre-NPC games, and each of the *NPC* variables are associated with the respective structural changes in the National Provincial Championship as outlined earlier in Section 7.3. One would expect that games played in a competition format as opposed to "friendlies" would generate higher attendance if spectators favoured games between sides of relatively even strength. Likewise, the introduction of semifinals and finals meant that four places became available within each division, possibly generating greater spectator interest with the presence of a more inclusive playoff race.

A time trend (*TIME*) is also included in the model due to the nature of the dependent attendance variable, as well as a within-season game trend (*GAME*). The purpose of these variables is to control for both season-to-season as well as within-season time trends. The time of the week that each game was played is also controlled for with a dummy variable (*MWK*), which equals 1 if the game was played on a week day, and zero if the game was played in the weekend (most games were played on the weekends).

The general form of the model to be estimated is as shown in equation 7.2 below.

$$\begin{aligned} ATT_{it} &= \alpha_0 + \alpha_1 REAL\_PRICE_{it} + \alpha_2 DIST\_HRS_{it} + \alpha_3 WMRU_{it} + \beta_1 ATT_{i,t-1} \\ &+ \delta_1 TARA_{it} + \delta_2 DIV2NI_{it} + \delta_3 DIV2_{it} + \delta_4 DIV3_{it} + \delta_5 INT\_T1_{it} + \delta_6 DIV3SF_{it} \\ &+ \delta_7 DIV3F_{it} + \delta_8 PROMPY_t + \delta_9 RELPY_t + \delta_{10} PRENPC_t + \delta_{11} NPC1_t + \delta_{12} NPC3_t \\ &+ \delta_{13} NPC4_t + \delta_{14} SKY_t + \delta_{15} TIME_t + \delta_{16} GAME_t + \delta_{17} MWK_t + e_{it} \end{aligned} \tag{7.2}$$

Of the NPC format variables, *NPC2* is dropped from the model to avoid the identification problem. Determination of the suitability of each of the variables and the implications for model selection are discussed in the next section.

7.5.1. Data

The data set consists of 194 individual Wanganui home game observations throughout the time period 1972-1994. The author was fortunate to be given access to historical Wanganui rugby financial data which is commercially sensitive. The reporting of game-by-game financial information and attendances in Annual Reports for each of the 22 years is rare. As such, this was a unique opportunity to examine the nature of attendance and consumer surplus benefits for a lower-level provincial union. The data series stopped in 1994 because the information was no longer reported from 1995 onwards. The variables, definitions, data sources, and summary statistics are as shown in Table 7.1.

Jones, et al. (2000) emphasised the need for diagnostic testing of econometric models used in demand studies, especially given the time series nature of data used in many studies. A key assumption made by many researchers to validate the use of ordinary least squares regression techniques using time series data is the assumption that the time series data are stationary – that is, the mean and variance are constant over time, and the covariance between two values in the series depends only upon the length of time separating the values (Hill, Griffiths, and Judge, 2000). One must be careful to ensure that data are stationary, as there is potential for a regression between two non-stationary variables to produce spurious results. This model utilises several time-series variables, and as such, it is appropriate here to test the stationarity properties of these variables. The tests adopted in this study are Augmented Dickey-Fuller unit root tests, and the results are as shown in Table 7.2.

Table 7.1: Variables, Definitions, Source and Summary Statistics

Variable	Definition	Data Source	Mean	Standard Deviation	Minimum	Maximum
ATT	Attendance	Wanganui Rugby Football Union (WRFU) Annual Reports 1972-1994	1546.789	1786.981	81	12135
REAL_PRICE	Real average price[28]	WRFU Annual Reports 1972-1994 (ticket price)	5.737	1.302	3.281	12.624
DIST_HRS		AA Driving Times and Distance Calculator http://aatravel.co.nz/main/tdcalculator.php (distance from Wanganui in hours).	4.264	3.747	1.083	18.833
WMRU	Wanganui registered unemployed (monthly), including vacation workers	INFOS Time Series (UMPM.S91L), Statistics New Zealand	1925.191	1622.365	32	5016
TARA	Annual match vs Taranaki	WRFU Annual Reports	0.139	0.347	0	1
INT_T1	International opposition (country)	WRFU Annual Reports	0.046	0.211	0	1
PRENPC	Prior to NPC establishment		0.175	0.381	0	1
NPC1	First NPC format	(Garland 1997)	0.381	0.487	0	1

[28] *REAL_PRICE* is adjusted to real values using CPI data from the Reserve Bank of New Zealand's website (www.rbnz.govt.nz) with a base year of 1999.

NPC2	Second NPC format	(Garland 1997)	0.052	0.222	0	1
NPC3	Third NPC format	(Garland 1997)	0.253	0.436	0	1
NPC4	Fourth NPC format	(Garland 1997)	0.139	0.347	0	1
DIV2NI	Div. 2 NPC (North Island) games	WRFU Annual Reports	0.160	0.367	0	1
DIV2	Div. 2 NPC games	WRFU Annual Reports	0.088	0.283	0	1
DIV3	Div. 3 NPC games	WRFU Annual Reports	0.093	0.291	0	1
DIV3SF	Div. 3 semi-final	WRFU Annual Reports	0.010	0.101	0	1
DIV3F	Div. 3 final	WRFU Annual Reports	0.005	0.072	0	1
PROMPY	Promotion to Div.2 in previous year	(Knight, 2001)	0.036	0.187	0	1
RELPY	Relegated to Div.3 in previous year	(Knight 2001)	0.072	0.259	0	1
SKY	Sky television available		0.227	0.420	0	1
MWK	Game played on a weekday (Monday-Friday)	WRFU Annual Reports	0.490	0.501	0	1

Table 7.2: Unit Root Tests of Time-Series Variables

Variable	H_0: Constant, Trend Test Statistic	p-value
ATT	-13.567	0.000
REAL_PRICE	-4.800	0.001
DIST_HRS	-11.456	0.000
WMRU	-2.300	0.432
D_WMRU	-12.968	0.000

Note: p-values reported are MacKinnon (1996) one-sided values (MacKinnon, 1996; Quantitative Micro Software, 2005).

The results of the unit root tests indicate that the null hypothesis of a unit root can be rejected for *ATT*, *REAL_PRICE* and *DIST_HRS*. For *WMRU*, however, there was insufficient evidence to reject the null hypothesis of a unit root. As a result, *WMRU* was re-specified in first differences (*D_WMRU*), and the resulting tests indicated that the presence of a unit root was rejected, and thus the first-differenced variable rather than the level variable will be utilised in the preceding estimated models. It is worthwhile mentioning here that there are issues with the nature of the time series in not just this study but in many studies of attendance, in that the spacing of games are not regular. For instance, the time between games may be a week, a month or even six months between the end of one season and the beginning of the next season. For this reason, one must tread cautiously with the use of standard tests which assume evenly-spaced time intervals between observations. This study utilises standard tests, but recognises the limitations of their use in this type of analysis.

Following the selection of variables is the model selection process. Four functional forms of equation 7.2 are estimated, namely the linear, lin-log, semi-log (log-lin) and double log (log-log) specifications. In the linear specification all variables are in their original form. In the lin-log specification, attendance and lagged attendance are linear, while real price, distance, and change in unemployment are all in natural log form. The semi-log specification has logged attendance, while the other non-dummy independent variables are in their linear forms, and the double log specification has the attendance, lagged attendance, real price, distance and change in unemployment variables in their natural log form.

7.6. RESULTS

Initial estimation of each functional form of the full model in equation 7.2 across the full sample of 193 observations revealed a coefficient result that was contrary to expectations.[29] The price coefficient was found to be positive but insignificant. Some studies within the literature have found a similar positive (but significant) effect for rugby league in the UK (Baimbridge, Cameron, and Dawson, 1995, 1996). Closer inspection of the data set revealed that international-level and "other domestic" games had higher real ticket prices and also substantially higher attendances than regular domestic games in many cases. The sample was adjusted to omit matches against international opposition and "other domestic" opposition (which included games against New Zealand Maori and New Zealand Colts, among others) resulting in an adjusted sample size of 169 observations. The yearly time trend was also removed from the model as there are multicollinearity issues with the PRENPC and NPC format dummy variables. The subsequent estimation of each of the functional forms of equation 7.2 using the adjusted sample produced price coefficients that were negative and significant, and thus consistent with a-priori expectations. Each model was initially tested for heteroskedasticity (White's test) and this was found to be present in all models. The estimated coefficients are thus based on OLS estimation of each functional form using White's heteroskedasticity-consistent covariance matrix as implemented in the E-Views 5.1 econometric software package. The results of these models are presented in Table 7.3.

[29] Including 193 observations in the sample size meant that lagged attendance in the first game of each season (with the exception of the first game in the sample) was the attendance in the last game of the previous year. Removal of the first game in each year will limit the number of games against Taranaki in the data set, as the Queen's Birthday game was usually the season opener. If the team had a good year, or a bad year, the attendance at the last game of the season could well reflect possible attitudes towards the team in the first game of the following season. Although this effect is captured somewhat by the promotion and relegation variables, they are not the same effects.

Table 7.3: Model Estimation: Attendance

	Model 7.1 (Linear): Dependent Variable: ATT Method: Least Squares Included observations: 169 after adjustments (White Heteroskedasticity-Consistent Standard Errors & Covariance)		**Model 7.2 (Lin-Log): Dependent Variable: ATT Method: Least Squares Included observations: 169 after adjustments (White Heteroskedasticity-Consistent Standard Errors & Covariance)**		**Model 7.3 (Semi-Log): Dependent Variable: LOG_ATT Method: Least Squares Included observations: 169 after adjustments (White Heteroskedasticity-Consistent Standard Errors & Covariance)**		**Model 7.4 (Log-Log): Dependent Variable: LOG_ATT Method: Lt Squares Included observations: 169 after adjustments (White Heteroskedasticity-Consistent Standard Errors & Covariance)**	
Variable	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
C	2359.232	0.000	3209.482	0.000	7.077	0.000	7.646	0.000
ATT(-1)	-0.007	0.746	-0.008	0.689	-	-	-	-
LOG_ATT(-1)	-	-	-	-	0.050	0.272	0.048	0.306
REAL_PRICE	-143.693	0.016	-	-	-0.089	0.079	-	-
LOG_REAL_PRICE	-	-	-879.703	0.012	-	-	-0.540	0.079
DIST_HRS	-39.293	0.005	-	-	-0.048	0.001	-	-
LOG_DIST_HRS	-	-	-263.911	0.000	-	-	-0.278	0.000
D_WMRU	-0.019	0.953	-	-	0.000	0.689	-	-
LD_WMRU	-	-	45.933	0.831	-	-	-0.037	0.806
TARA	2274.950	0.000	2253.618	0.000	1.258	0.000	1.246	0.000
PRENPC	124.931	0.528	59.853	0.771	0.472	0.026	0.428	0.058
NPC1	819.406	0.000	777.581	0.000	0.744	0.000	0.713	0.000
NPC3	-190.465	0.187	-238.353	0.098	0.096	0.609	0.060	0.761
NPC4	-708.463	0.012	-742.101	0.009	-0.330	0.301	-0.352	0.287
DIV2NI	-869.880	0.000	-827.059	0.000	-0.630	0.000	-0.584	0.000
DIV2	254.832	0.099	268.475	0.081	0.017	0.923	0.017	0.924
DIV3	653.971	0.000	743.757	0.000	0.425	0.008	0.499	0.001
DIV3SF	1481.390	0.000	1600.660	0.000	1.573	0.000	1.659	0.000
DIV3F	3333.122	0.000	3272.162	0.000	2.545	0.000	2.497	0.000
PROMPY	97.657	0.553	154.744	0.377	0.394	0.041	0.445	0.028

RELPY	-271.427	0.085	-282.220	0.054	-0.098	0.454	-0.108	0.376
SKY	-231.252	0.186	-271.565	0.128	-0.385	0.071	-0.414	0.059
GAME	-91.819	0.000	-88.725	0.000	-0.063	0.004	-0.063	0.006
MWK	-145.744	0.151	-104.870	0.290	0.009	0.925	0.041	0.646
D2	3728.369	0.000	3634.638	0.000	-	-	-	-
D12	2781.982	0.000	2749.573	0.000	-	-	-	-
D17	1841.836	0.000	1763.827	0.000	-	-	-	-
D25	2581.937	0.000	2575.164	0.000	-	-	-	-
D37	2283.361	0.000	2248.686	0.000	-	-	-	-
D52	2554.748	0.000	2408.552	0.000	-	-	-	-
D76	2166.717	0.000	2233.545	0.000	1.569	0.000	1.639	0.000
D78	-	-	-	-	-2.210	0.000	-2.094	0.000
D118	-1918.357	0.000	-1954.701	0.000	-	-	-	-
D134	-2147.103	0.000	-2141.853	0.000	-	-	-	-

	R-squared	0.898	R-squared	0.902	R-squared	0.851	R-squared	0.864
	Adjusted R-squared	0.877	Adjusted R-squared	0.882	Adjusted R-squared	0.851	Adjusted R-squared	0.864
	Log likelihood	-1275.095	Log likelihood	-1271.837	Log likelihood	-1306.948	Log likelihood	-1299.489
	Mean dependent var	1350.237	Mean dependent var	1350.237	Mean dependent var	6.801	Mean dependent var	6.801
	S.D. dependent var	1435.214	S.D. dependent var	1435.214	S.D. dependent var	0.924	S.D. dependent var	0.924
	Akaike info criterion	15.433	Akaike info criterion	15.395	Akaike info criterion	15.479	Akaike info criterion	15.390
	Schwarz criterion	15.970	Schwarz criterion	15.932	Schwarz criterion	15.497	Schwarz criterion	15.409
	F-statistic	43.893	F-statistic	45.815	F-statistic	23.404	F-statistic	24.100

	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000	Prob(F-statistic)	0.000
	Breusch-Godfrey LM test (F)	1.205	Breusch-Godfrey LM test (F)	1.112	Breusch-Godfrey LM test (F)	0.415	Breusch-Godfrey LM test (F)	0.763
	p-value	0.274	p-value	0.293	p-value	0.813	p-value	0.384

Test	**Test statistic**	**P-value**	**Test statistic**	**P-value**	**Test statistic**	**P-value**	**Test statistic**	**P-value**
Jarque-Bera Test (Normality)	3.303	0.192	3.768	0.152	0.907	0.343	0.706	0.703
Ramsey RESET Test (1) (F)	77.379	0.000	85.091	0.000	1.115	0.293	1.233	0.269
Ramsey RESET Test (2) (F)	43.743	0.000	48.233	0.000	1.732	0.180	1.754	0.177
Ramsey RESET Test (3) (F)	29.073	0.000	32.050	0.000	1.272	0.286	1.224	0.303

Initial estimation of these models indicated that the errors of the estimation were non-normal (Jarque-Bera normality tests). These models were thus re-estimated with dummy variables included to factor outliers "out" of model estimation (Brooks, 2008)[30]. The results presented in Table 7.3 include the dummy variables as estimated for each model. The results for the variables of interest (and the subsequent consumer surplus calculations) did not differ greatly to results obtained with non-normality.

The clear consensus from the recreational demand literature is that the appropriate functional form of the demand equation must be chosen carefully. Not only should the "best" model conform to economic theory, but it should be superior in as many aspects as possible to alternative functional forms. Kling (1989) advocated the use of goodness-of-fit tests to select the appropriate functional form to generate more reliable measures of consumer surplus. Adamowicz, et al. (1989) suggested that the selection of the appropriate model should be based on the F-statistic and the level of significance of the travel cost (price) coefficient. A more recent suggestion was that model selection be based on empirical tests including the log-likelihood and Schwartz and Akaike criterion values (Lansdell and Gangadharan, 2003).

Models 7.1 and 7.2 have a linear dependent variable, while Models 7.3 and 7.4 have a logged dependent variable, which means that the R-squared, Schwartz and Akaike criterion test statistics need to be adjusted for Models 7.3 and 7.4 to make them comparable with the test statistics for Models 7.1 and 7.2. This is achieved by following the method utilised by Lansdell and Gangadharan (2003), where the fitted values of logged attendance were estimated, the antilog values of estimated logged attendance were calculated, and then the antilog estimated attendance was regressed against attendance. The resulting R-squared, Schwartz and Akaike test statistics will be consistent with those calculated in Models 7.1 and 7.2, and thus are reported in Table 7.3. The diagnostic test results in Table 7.3 were scanned to determine the preferred model. The adjusted R-squared and the log-likelihood value results favour Model 7.2, while the Akaike and Schwartz information criteria favour Model 7.3. Jarque-Bera tests for normality favours

[30] Residual plots for model estimations were examined to identify outliers. The largest outlier was factored out via a dummy variable, and then non-normality tests were re-run. Further outliers were identified and dummy variables included until satisfactory results for normality tests were obtained (that is, that the null hypothesis of normality was not rejected). Parameter estimates for the necessary dummies for each model are included in Table 7.3.

Model 7.4, and the Ramsey RESET tests, however, favour Model 7.3 and 7.4 over Models 7.1 and 7.2.

It is worth briefly commenting on the nature of the coefficient signs across each of the functional forms. Lagged attendance was positive and significant in Models 7.3 and 7.4, indicating habit persistence, but statistically insignificant in Models 7.1 and 7.2. The real price coefficient was negative and significant in all models. It should be noted that the p-values for the price coefficient are 0.016 and 0.012 for the linear and lin-log models respectively, while the corresponding p-values for the semi-log and log-log models are both 0.079. The estimated price elasticities of attendance for each model are as shown below in Table 7.4.

Table 7.4: Estimated Price Elasticities of Demand[31]

	Model 7.1 (Linear)	**Model 7.2 (Lin-Log)**	**Model 7.3 (Semi-Log)**	**Model 7.4 (Log-Log)**
Price coefficient	-143.693 (0.016)	-879.703 (0.012)	-0.089 (0.079)	-0.540 (0.079)
Elasticity	-0.596	-0.651	-0.500	-0.540

Note: p-values are reported in parentheses below the price coefficients.

Each of the functional forms produced an elasticity between –0.5 and -0.65. The signs, significance and elasticities (price-inelastic demand) are consistent with the findings of most studies within the literature, including two Australian-based studies (Alchin and Tranby, 1995; Borland and Lye, 1992).

A negative and inelastic price coefficient indicates profit maximising behaviour, a well-established result within the literature (Fort, 2004). Such a result appears at first glance to be inconsistent with profit-maximising behaviour – one might reasonably expect ticket prices to be set on the elastic portion of the demand curve (Boyd and Boyd, 1998; Downward, Dawson, and Dejonghe, 2009). Explanations given for why such a result may not be inconsistent with profit-maximising behaviour include consideration of the home ground advantage effect alongside ticket prices (Boyd and Boyd, 1998), and other sources of revenue, including television revenue (Fort, 2004).

[31] These elasticities were calculated at mean values of REAL_PRICE and ATT. The formulas used to calculate the elasticities were: $\beta(REAL\_PRICE)/ATT$ (linear); β/ATT (lin-log); $\beta(REAL\_PRICE)$ (semi-log); and β (log-log).

The distance coefficient was negative and significant at the 1% level or better in all four models, a result that is consistent with other studies that have examined the distance effect (Baimbridge, et al., 1995, 1996; Carmichael, Millington, and Simmons, 1999). The inclusion of a measure of distance can also be interpreted as further evidence of a price effect in the sense that there are costs incurred with travel to and from the games. The change in unemployment coefficient was insignificant for all four models.

The coefficient for the Queen's Birthday fixture with Taranaki was positive and significant (p-values < 0.000) for all four models. As mentioned earlier, games prior to the introduction of the NPC were 'friendlies' in nature. The *PRENPC* coefficient was positive and significant for Models 7.3 and 7.4 (p-values ≤ 0.058), but insignificant in Models 7.1 and 7.2.. The *NPC1* coefficients were all greater than the *PRENPC* coefficients and also statistically significant in all four models (p-values = 0.000). *NPC3* was only significant and negative) in Model 2 (p-value = 0.098), and *NPC4* was negative and significant in Model 7.1 (p-value = 0.012) and Model 7.2 (p-value = 0.009), but insignificant in Models 7.3 and 7.4. These results provide some evidence that the introduction of the NPC had positive impacts on match attendance, but also that these impacts were transitory in nature. Bearing in mind that the PRENPC. NPC1, NPC3 and NPC4 dummy variables effectively encompass the sample period, these can also be interpreted as reflecting the observed decline in overall attendance over time.

As far as the competition matches played within each division are concerned, the *DIV2NI* coefficient was negative and significant in all four models (p-values = 0.000), *DIV2* was significant and positive for Model 7.1 (p-value = 0.099) and Model 7.2 (p-value = 0.081) but insignificant for Models 7.3 and 7.4. The *DIV3* coefficient was positive and significant and greater than the DIV2 coefficients for all four models (p-value ≤ 0.008). This relationship is surprising when one might reasonably expect there to be a greater attendance effect for the higher standard of rugby. The smaller effect for *DIV2* could be due to Wanganui's competitiveness in the second division. As a second division union during the sample period, Wanganui had a home win percentage that was just above 50%. As a third division union, Wanganui's home win percentage was 89%. Rather than a positive relationship between standard of rugby and attendance, it would appear likely that fans attended in greater numbers to see games in which Wanganui had a better chance of winning, that is, in Division Three. Such a result has interesting ramifications for

the "uncertainty of outcome" hypothesis – it seems that a positive relationship between likelihood of winning and attendance is supported by the evidence in Wanganui.

Both the Division 3 semi-final and final coefficients were found to be positive and significant in all four models (p-value ≤ 0.000). When Wanganui won promotion to Division Two in the previous year, the coefficient was positive and significant in Model 7.3 (p-value = 0.041) and Model 7.4 (p-value = 0.028), but insignificant in Models 7.1 and 7.2. When Wanganui was relegated to Division Three, the coefficient was negative and significant in Model 7.1 (p-value = 0.085) and Model 7.2 (p-value = 0.054), but insignificant in Models 7.3 and 7.4.

The coefficient on the substitute variable, *SKY*, was negative for all four models but only significant for Model 7.3 (p-value = 0.071) and Model 7.4 (p-value = 0.059). The within-season *GAME* trend coefficient was significantly negative for all four models (p-value ≤ 0.006), indicating that attendance fell the further the season went on. The effect on attendance for a game staged midweek was not significant for any of the four models.

It is perhaps pertinent at this juncture to examine potential linkages between this study and both of the Owen and Weatherston (2004) studies. Key similarities include the findings that tradition (annual fixtures) and habit (lagged attendances) were important determinants of attendance. While there is no question that professionalism has had dramatic impacts on rugby attendance in New Zealand, the importance of tradition and habit, as well as uncontrollable factors such as rainfall[32] and team performances in determining attendance, suggest that administrators faced similar challenges in both the amateur and professional eras.

A natural question at this point is how these findings are relevant for the role of local government in the facility construction issue that motivates this analysis. It is important to note the consistent findings of price-inelastic demand, the negative distance impact, the popularity of the annual fixture against Taranaki, and the impacts of certain divisional games. Each of these factors will influence demand and therefore the values of consumer surplus. It is to the calculation of these values that this analysis now turns.

[32] Weather details for each game were not available for inclusion in the Wanganui models.

7.7. MEASUREMENT OF CONSUMER SURPLUS AS ECONOMIC BENEFITS

Consumer surplus estimates provide measures of user benefits from attending representative rugby in Wanganui. For each of the estimated models, we can derive consumer surplus values. Previous research within the analysis of recreational demand has demonstrated that the measurement of consumer surplus is sensitive to the functional form of the demand equation (Kling, 1989; Ziemer, Musser, and Hill, 1980), as well as the absolute size of the price parameter (Adamowicz, Fletcher, and Graham-Tomasi, 1989; Graham-Tomasi, Adamowicz, and Fletcher, 1990) and omitted variables (Bockstael and Strand, 1987). Indeed, Ziemer, et al. (1980) found that the consumer surplus value estimated from a linear demand function was four times the surplus value of a quadratic demand function and almost three times that of a semi-log demand function.

Consumer surplus can be calculated from each of the estimated models. The formulas used for these calculations were taken from Adamowicz, et al. (1989) and are as shown in equations 7.3 to 7.7 below.

Linear:

$$CS_{linear} = \frac{ATT^2}{-2\alpha_1} \tag{7.3}$$

Lin-Log:

$$CS_{lin-\log} = \max(REAL\_PRICE) \times (\max(ATT) - \alpha_1) - (REAL\_PRICE \times (ATT - \alpha_1)) \tag{7.4}$$

Semi-Log:

$$CS_{semi-\log} = \frac{ATT}{-\alpha_1} \tag{7.5}$$

Log-Log:

$$CS_{\log-\log} = \frac{1}{\alpha_1 + 1} \times [(\max(REAL\_PRICE) \times (\max(ATT)) - (REAL\_PRICE \times ATT)] \quad (\text{if } \alpha_1 > -1) \tag{7.6}$$

$$CS_{\log-\log} = \frac{-(REAL\_PRICE \times ATT)}{\alpha_1 + 1} \quad (\text{if } \alpha_1 < -1) \tag{7.7}$$

where α_1 is the *REAL_PRICE* coefficient.

For the linear and semi-log calculations, mean attendance for the season in question was used to calculate per game consumer surplus. For the lin-log and log-log calculations, the maximum price and attendance as well as the average real price and attendance per game in the season in question are used to arrive at per game estimates of consumer surplus. These per game measures were multiplied by the number of games to give a total consumer surplus value per season in 1999 dollars in Table 7.5.

Table 7.5: Estimates of Consumer Surplus Benefits Generated by Wanganui Representative Rugby (in 1999 dollars)

Season	Model 7.1 (Linear) ($)	Model 7.2 (Lin-Log) ($)	Model 7.3 (Semi-Log) ($)	Model 7.4 (Log-Log) ($)
1991 (per game)	8,779.18	12,443.83	8,899.20	24,409.22
(season)	87,791.84	124,438.30	88,991.98	244,092.20
1992 (per game)	9,881.83	4,347.01	9,442.28	8,390.43
(season)	59,290.97	26,082.05	56,653.69	50,342.58
1993 (per game)	11,231.49	14,913.22	10,065.66	30,250.14
(season)	123,546.30	164,045.40	110,722.30	332,751.50
1994 (per game)	3,877.63	85,22.21	5,914.35	14,325.12
(season)	42,653.90	93,744.28	65,057.82	157,576.30
Average (per game)	8,442.53	10,056.57	8,580.37	19,343.73
(per season)	78,320.76	102,077.50	80,356.44	196,190.60

Consumer surplus values for the four most recent seasons of attendance in the sample are presented in Table 7.5 – the 1991, 1992, 1993 and 1994 seasons – and the average per-game and per-season estimates. Consumer surplus estimates from all four models are presented by way of comparison. The log-log model generates the greatest value of consumer surplus of the four models, approximately twice the nearest measure, while the linear model generates the lowest consumer surplus values. The overall average per-game consumer surplus across the four models is $11,605.80, while the average season consumer surplus is $114,236.30.

Average consumer surplus values across the four models are used for the remainder of the analysis. Although the attendance per game is trending downwards across the sample (as indicated by the PRENPC, NPC1, NPC3 and NPC4 coefficients in each of the models), the consumer surplus values have fluctuated within these seasons, and hence the average for the last four years will be a smoothed approximation of consumer surplus beyond 1994. Previous research into the honeymoon effect of new stadia suggests that the increase in attendance experienced as a result of a new facility will be transitory and will eventually return to attendance levels experienced before the new facility. The average consumer surplus for the 1991-1994 seasons can thus be considered as a conservative approximation of these benefits.

Caution is advised when interpreting consumer surplus values. The presence (and effectiveness) of alternative pricing mechanisms, including price discrimination and two-part tariff pricing among others effectively limits the suitability of consumer surplus to justify public involvement on efficiency grounds (Groothuis, et al., 2004). Successful pricing arrangements typically result in spectators paying prices closer to their reservation price, thereby lowering consumer surplus.[33] Because the models include a component of travel cost that is not part of the calculation of the consumer surplus benefits (although the presence of distance in the model has influenced the real price coefficient), the estimated values further understate the true consumer surplus values.

Average consumer surplus per season across all four models was approximately $114,200 in 1999 dollars. To put this value in perspective, consider the fact that the Wanganui District Council, as of 2005, funded the entire Cooks Gardens complex to the tune of approximately $200,000 annually, of which the Stadium is one part (Cooks board fights back, 2005). In 2009, the Council's operating costs for Cooks Gardens were $274,000 (Wanganui District Council, 2009), or approximately $213,000 in 1999 dollars. The Council has noted that the major ground users (athletics, rugby and cycling) met the marginal costs of their events but made no contribution to maintenance costs (Wanganui District Council, 2009). Rugby's average consumer surplus values alone do not justify $213,000 per year in local government funding; although the average of log-log estimates of consumer surplus from 1991 to 1994 from Model 7.4 suggest that it could possibly come close. Adding the consumer surplus benefits generated by other events hosted at the facility, including athletics, cycling and concerts, among others to the consumer surplus generated by rugby in Wanganui would provide a more complete value of the consumption benefits of the facility to locals.

The main northern stand at Cooks Gardens was built at a cost of $1.2 million (Cooks board fights back, 2005) in 1996, of which $260,000 ($264,000 in 1999 dollars) was loaned to the Cooks Gardens Trust Board by the Wanganui District Council (Wanganui District Council, 2009). Converting the average consumer surplus values into a present value can also provide useful information to assist future government funding decisions. Such

[33] Unfortunately, season ticket information for Wanganui rugby was only available at an aggregate season level, and thus was not able to be incorporated as a part of the game-by-game analysis adopted in this study. Attendances in this study were for walk-up paid attendance, and did not include season ticket holders. To this end, the calculated consumer surplus value effectively understates true consumer surplus.

decisions should be based on cost-benefit comparisons rather than solely on economic impact considerations. The consumer surplus estimates generated within this analysis can be considered as estimates of annual benefits to users of the facility. In the absence of non-use benefits accruing to local residents, these consumer surplus estimates can thus be directly compared to project costs to assess the economic viability of local government funding. The estimated net present values presented below in Table 7.6 below are based on the four year average values of consumer surplus across all four models.

Table 7.6: Present Values of Consumer Surplus Benefits Generated by Wanganui Representative Rugby (Average Season Estimates, in 1999 dollars)

	Time (years)	
Discount Rate (%)	**20**	**30**
2	$1,867,924	$2,558,494
4	1,552,506	1,975,375
6	1,310,279	1,572,418
10	972,562	1,076,895
15	715,039	750,075
20	556,285	568,771

The net present value of consumption benefits generated by representative rugby to Wanganui spectators is dependent upon the discount rate and the length of time that the annual benefits are expected to be generated. Assuming a discount rate of 10% and a time period of 20 years, the present value of average consumer surplus is approximately $972,000 in 1999 dollars, and for 30 years is approximately $1.078 million. In the absence of non-use values, these values represent the maximum amounts that local government could justifiably contribute to a rugby-only facility on consumer surplus grounds.

As mentioned earlier, this value is effectively a lower limit and may well understate the true value of private benefits of rugby in Wanganui. Many locals are likely to incur travel costs to some extent, and locals are also likely to represent a sizeable fraction of the overall attendance, neither of which is factored into these calculations. Unfortunately, the level of data used in this analysis does not enable us to separate the attendance of Wanganui residents from out-of-town visitors. These estimates are thus overstated in the

sense that they include non-local attendance in the calculations. Local attendees may have also received non-use benefits. No attempt is made in this study to estimate non-use benefits, and it would be difficult to approximate these benefits given the limited research on these types of benefits in similar contexts to date.

Nevertheless, it is interesting to note that the present value of the estimated consumer surplus benefits for Wanganui rugby in 1994 (20 years, at a discount rate of 10%) was approximately 80% of the total construction value of the Northern stand, and over 3.5 times greater than the District Council's contribution to the facility upgrade. Thus, even without any information on the non-use (public good) benefits, producer surplus benefits (economic impacts) or consumer surplus benefits from other activities at Cooks Gardens, the Council's contribution would appear to be justified. In an epilogue to the story, the $260,000 loan was written off by the Wanganui District Council in 2009 (Maslin, 2009). The present value estimates of consumer surplus for rugby alone suggest that the Council could have justifiably funded approximately 80% of the stand project. On the basis of the present value estimates of consumer surplus for rugby derived in this analysis, writing off the loan was economically justified.

The general limitations of consumer surplus and its calculation in this analysis notwithstanding, the calculation of consumer surplus in this research provides the basis for economically justifiable grounds upon which to base the Council's funding decision for the Cooks Gardens facility in Wanganui. Representative rugby is one of a multitude of users of the Cooks Gardens facility. It would not be unreasonable to assume that other events such as athletics and concerts would also generate consumer surplus benefits to local residents which should also be included in the evaluation of a multiple-purpose facility such as Cooks Gardens. The sum total of consumer surplus benefits could potentially justify considerable local government involvement in the funding of the multiple-purpose Cooks Gardens facility in this analysis.

The full extent of local government involvement in the financing of sports facilities should depend on the outcome of a complete benefit-cost analysis which would ideally include all use and non-use values of the facility. Given that such studies are often expensive to conduct, a cheaper alternative would be an analysis that at the very least includes estimates of consumer surplus benefits. The inclusion of consumer surplus benefits from a facility or event and recognition of the potential shortcomings of their measurement in addition to an accurate economic impact analysis will, in this author's opinion, provide

greater economic justification for local government involvement than an economic impact analysis alone.

7.8. CONCLUSIONS

This analysis developed a model of attendance that encapsulated economic variables, consumer preferences and characteristics of the sporting contest for representative rugby in Wanganui. Several alternative model specifications were estimated, and the results of model specification tests suggested that the log-log model was the most suitable functional form.

Significant findings from the model estimation included price-inelastic demand, the popularity of the annual fixtures with Taranaki, and the impact of the introduction of the National Provincial Championship. Initial NPC games were popular with spectators. Over time, however, NPC games in Wanganui became less popular. Attendance was greater at lower level (Division Three) games than for higher level (Division Two) games, suggesting that people preferred to watch games in which the home team had a better chance of winning rather than the prospect of a more even contest.

The primary motivation for this analysis was to consider the consumer surplus benefits generated by representative rugby in Wanganui and to determine whether or not the Wanganui District Council's involvement in the upgrade of the Cooks Gardens facility was economically justifiable. Estimates suggested that average consumer surplus between 1991 and 1994 was approximately $114,000. The average consumer surplus value was converted into a present value (assuming a 10% discount rate and 20 years of annual consumer surplus benefits) to give a present value of the consumer surplus benefits of representative rugby in Wanganui of approximately $972,000. This value suggested the extent to which local government could be economically justified in funding a facility to house representative rugby in Wanganui, given the absence of non-use benefits. As such, these values effectively understated the true value of rugby to Wanganui. In the absence of spillover economic benefits such as public goods generated from events hosted at the stadium and the presence of the stadium itself, the decision of the Wanganui District Council to extend (and subsequently write off) a $260,000 loan towards the construction of the main northern stand at the Cooks Gardens facility was economically justified.

Similar research could be undertaken for other provincial unions in New Zealand to ascertain the role that local government could play in stadium upgrades and construction

with the upcoming Rugby World Cup in 2011. The measurement of consumer surplus is an important and necessary step in providing economic justification for the involvement of local government in sports facility projects. Of equal importance is the measurement of the value of spillover benefits and costs generated by sports events and sports facilities. Combining these benefits will enable the appropriate level of government involvement in financing sports facilities. While recognising the limitations of consumer surplus as a measure of benefit both in this study and in general, careful consideration of consumer surplus benefits should, at the very least, be a fundamental aspect of any facility or event evaluation if local government assistance is sought.

8

CONCLUSION

8.1. INTRODUCTION

This chapter concludes the research. Section 8.2 summarises the major findings and the policy implications of each of the chapters, and describes how the individual components contributes towards a collective understanding of the nature of facility construction in a New Zealand context. The limitations of the research are outlined in Section 8.3, and the contributions of the research are outlined in Section 8.4. The chapter concludes with suggestions for further research in Section 8.5.

8.2. MAJOR FINDINGS AND POLICY IMPLICATIONS OF THE RESEARCH

The principal objective of this research was to critically evaluate the arguments that have been considered for the economic justification for government involvement in facilities and events, and why, in the face of compelling evidence from the literature that tangible economic projections do not materialise, governments continued to subsidise these projects. Through the use of two empirical time-series case studies, a theoretical analysis and an empirical panel data analysis, the research has addressed this objective, and offered answers to the research questions identified in the introduction to the thesis.

8.2.1. Major Findings of the Research

Firstly, the case study of the Westpac Stadium's impact on the Wellington region was considered in Chapter 4. There was a conflict between the consensus in the established literature and the results of a commissioned ex-post economic impact study that suggested that the economic impacts from the Stadium exceeded initial expectation. An ex-post empirical analysis of the Stadium's impact on employment in the Wellington region suggested that the region's experience was, in fact, consistent with the typical overseas experience. There were no impacts on overall employment in the Wellington region during either the facility construction stage or during the first five years of the Stadium's

operation. The implication of these findings alongside the ex-post economic impact report was that jobs created in event-related sectors may well have come at the expense of other jobs elsewhere in the region. If this was the case, the impact of the facility was redistributive, not stimulatory. Given that local and regional government funding was contributed to Stadium construction on the basis of the generation of economic benefits, the results of this analysis suggest that the period of construction and the first five years of the facility's operations did not appear to generate the impacts that were anticipated.

The realised tangible economic impacts of facility construction and the hosting of events on New Zealand territorial local authorities (TLAs) were examined in Chapter 5. Results of the estimation of ex-post panel models developed for construction sector employment and real GDP indicated that with some exceptions that were identified from the separation of the 22 facility projects into facility-specific dummy variables, there was a general absence of construction sector employment and real GDP impacts for most host TLAs during the period of facility construction. Neither the inclusion of an aggregated construction variable nor facility type-specific variables in the estimated models revealed any statistically significant impacts on the construction sector and on real GDP. This suggests that rather than creating employment and increasing GDP, facility construction projects in general merely retained employment while GDP was unchanged.

The impact of the hosting of 11 internationally-oriented events on host TLA employment in the Accommodation, Cafés and Restaurants sector and real GDP was also examined in Chapter 5. Only one event was found to significantly increase employment in the event-related sector and real GDP, and one was associated with significant decreases in event-related employment and real GDP, while the remaining events were generally statistically insignificant. Of particular interest was the lack of significant results for the events with the largest projected economic impacts, including the 1999-2000 and 2003-2003 America's Cup regattas. Internationally-oriented events in general are thus no certainty to generate positive economic impacts during the period in which they are hosted.

A related question examined in Chapter 5 was whether the location of the facility affected the realised economic outcomes of events. The impacts of three multi-host events were examined to answer this question. Utilising the framework developed for the event hosting outcomes developed earlier in the chapter, a simple measure of distance from the facility to the host TLA's central business district (CBD) indicated that for two of the three events, there was a statistically significant positive association between the proximity of

the host facility to the central business district of the locality and the realised impact on real GDP. A modified distance function was hypothesised by interacting distance with facility capacity. Results from the modified distance function revealed that results were found to be specific for particular events. There was some evidence to support the hypothesis that a facility located closer to the CBD would generate a greater economic impact than one located further from the CBD in the form of the results from the 2005 Lions Tour.

Given the general findings of much of the literature and the results from Chapters 4 and 5, an explanation was sought in Chapter 6 as to why governments continued to subsidise facilities and events in the light of an absence of evidence that impacts were realised in host economies. With the hosting developments of the New Zealand round of the V8 Supercar series as the backdrop, a game theory model of competition between two cities for the rights to host an event was developed. Two scenarios were considered, the first of which was when the two cities were of identical size and the second of which was a large versus small city setting. Thresholds were developed for the subsidisation of events in each scenario with the aid of simple numerical examples.

In general, it was found that if the event was expected to generate positive net benefits (the combination of tangible and intangible benefits), then in the absence of a subsidy, both cities would choose to host the event, and the Nash equilibrium outcome of the game was socially efficient. With the introduction of a subsidy, however, there were several possible outcomes depending on the level of the subsidy, including a Prisoner's Dilemma outcome, where hosting the event was a dominant strategy for both cities and the resulting Nash equilibrium was such that the cities would be better off collectively if neither of them were to host the event. In the large versus small city setting, the small city was found to pay the highest subsidy if the event was only to be hosted in one city, as it has more to gain and less to lose than the larger city.

The final question that the research considered was whether the intangible benefits of a facility project were an appropriate economic justification for government involvement in such projects. The case of the Cooks Gardens facility upgrade in Wanganui in the mid-1990s, the role of the Wanganui District Council in the upgrade, and the benefits accruing from rugby attendance in Wanganui were examined in Chapter 7. Consumer surplus benefits were derived from a model of attendance for Wanganui representative rugby games from 1972-1994. Annual estimates of consumer surplus benefits between 1991 and

1994 were found to be approximately $114,000 per year. While this value was less than half of the operating cost of the facility in 2009 ($274,000), the presence of benefits nonetheless suggests that some local government involvement is economically justified. Only when consumer surpluses from all other activities in the Cooks Gardens facility are known can a decision be made as to whether the level of council involvement is justified.

The present value of annual consumer surplus benefits was calculated (for a 20 year period and a discount rate of 10%) and was found to substantially exceed the cost of the $260,000 Wanganui District Council loan towards the construction of the upgraded facility. The decision to loan Council funds (and write off the loan in 2009) was thus an economically justified decision.

8.2.2. The Sequential Development of Sports Facilities: How the Research Informs the Framework

The results of the individual analytical sections of this research inform the conceptual framework in a number of ways. The context in which facilities are built is essential to understanding not only the catalyst for change, but also the construction stage and to a lesser extent, the event stage. The Wellington case study highlighted the catalysts for change (economic and physical deterioration) and also highlighted the role of government in this process. The context is critical in the Wellington case, for several reasons, not the least of which was the fact that the facility was a replacement for an existing facility, and that it was the first such major facility built in a new location. Due to its replacement nature, the economic effects of the stadium in the construction stage and the event stage would be minimal if there was a continuation of the existing events. If the facility was brand new, one would expect there to be a larger effect on local economies through the attraction of new events that are truly incremental. In the construction phase, there were no effects on employment and wage growth in the Wellington region. The multi-purpose nature of the Westpac Stadium, as evidenced by the events that utilised the facility during its first five years of operation, was evident, but the effects of facility operation on employment during the construction period and the first five years of operation were found to be statistically insignificant.

The research was extended in the panel analysis of facility construction and event hosting. In most instances, neither facility construction nor event hosting significantly affected host economies. These results suggest that with some individual exceptions, the case for facility development should not rest on the expectation of experiencing aggregate economic

impacts in the construction stage and event stage through either facility construction or the hosting of an internationally-oriented event. In a few instances, they may, although the analysis was unable to offer systematic reasons for why certain events were more or less successful. Suggestions that tangible economic effects provide justification for government involvement in facility developments in general are not supported by the empirical evidence provided in this research. The results suggest that there has to be another factor in this decision.

The game theory analysis of Chapter 6, which considered a potential explanation for the results obtained in this research and those from the majority of the wider literature, provides us with a possible way forward. The game theory model for the competition between cities and the impact of subsidies stressed the importance of accurate measurement of tangible benefits (that is, new spending attributable to a facility or event) and intangible benefits (including consumer surplus values) to local economies, and how these benefits play a critical part in determining the final outcomes of such competition. Results from Chapters 4 and 5 suggest that the tangible outcomes of events are in the majority of cases not significantly different from zero. The absence of tangible benefits means intangible benefits (including consumer surplus values) assume greater importance in the overall evaluation of a facility or event project. The accurate measurement of benefits accruing to host economies from events has important implications not only for the Nash equilibrium outcome of event hosting in a competitive context, but for the legacy stage of the framework.

Consumer surplus benefits of rugby in Wanganui were estimated in Chapter 7 and the measures, despite their limitations, suggested that the local government funding of the upgrade of the Cooks Gardens facility was economically justifiable in the absence of tangible economic impacts. This case derives its results from the practice of researchers in (i) the demand for sports, and (ii) recreation demand, and thus adds credibility and depth to the analysis. While this analysis was not intended to be a representative case in terms of values that could be applied for rugby across the country, it has demonstrated a process through which the calculation of the benefits can be obtained. The implication of this analysis in a wider sense is that the presence of consumer surplus benefits associated with the facility or event can provide economically justifiable grounds for government involvement in events and facility projects. A careful approximation of consumer surplus benefits should be included alongside the potential producer surplus gains as estimated by an accurate economic impact study, and can be compared to the cost of government

involvement in such a project. The analysis of Chapter 7 informed the conceptual framework through the fact that ongoing consumption benefits of events hosted at a facility provided important economic justifications for government involvement, and thus should be important components of the development and evaluation of sports facilities. From a local government perspective, the relevant benefits are thus those that accrue to local consumers and producers. This implies a longer-term focus in the legacy stage on events that are found to benefit locals through consumption rather than the attraction of larger-scale events that are intended to attract transitory outside spending into the local area that may not benefit local producers at all.

8.2.3. Policy Implications

Overall, this research has several major implications for policy, some of which have already been mentioned. Accurate measurement of tangible and intangible outcomes of facilities and their events is crucial to the outcomes of events for host areas, and for the economic justification of the role of government in these projects. When tangible economic outcomes are negligible (an outcome that this research has demonstrated that is consistent with the wider literature in this area), intangible outcomes become critically important. It would appear that, based on the empirical analyses conducted in this research, the economic justification for government involvement in facility development and the hosting of internationally-oriented events lies not in the promise of economic stimulus (as measured in this research by employment in the construction or event-related (Accommodation, Cafés and Restaurants) sectors and real GDP) but in the benefits associated with events and facilities that accrue to the local community. Previous research has suggested that while the estimated value of consumption benefits may not justify complete funding of facility construction projects by local governments, they do nonetheless provide economic justification for some public sector role in the provision of such projects.

The question of which events should be targeted by local government is a logical one in light of the findings of the research. Large scale internationally oriented events do not appear to significantly impact positively on host economies. Events that are locally oriented may be no less successful as economic stimuli given that they would be largely part of regular economic activity; they also have the additional benefit of benefitting local consumers as well. An internationally-oriented event may attract spending from outside the country, but would appear just as likely to crowd out spending from other international tourism as well as domestic tourism (resulting in no economic impact),

making local producers no better off and potentially disenchanting local consumers. Of course, the prestige and major nature of events may well bring about intangible benefits to locals. If this is the case, local and regional governments should thus focus on these intangible benefits rather than the lure of potentially significant economic impacts that may not materialise. If the prestige and public good benefits of an event fail to make the project economically feasible, then perhaps the project is not economically justifiable.

Findings from this research suggest that those applying for government funding for events should not base their application on the presence of economic impacts, but rather on the presence of economic benefits that accrue to locals. While internationally-oriented events can benefit locals by association (media exposure, for example), these are often difficult (and costly) to measure. The likelihood of estimated economic impacts being realised would also appear to be low, if results from this research are of any indication. Clearly more research needs to be undertaken on estimating the benefits, both use and non-use, of events and facilities across New Zealand. To this end, recording of attendance and financial data by event is essential. With the competition for the leisure spending dollar only intensifying over time, more pressure will be put on government to support a greater range of events. An economically justifiable case for an event should emphasise how it will benefit locals, with any projected economic impact being considered an associated possible outcome rather than the major economic contribution.

This research also identifies implications for long term facility development and use. A facility that focuses on maximising the long-term benefits of local users of the facility rather than depending upon the short term effects of internationally-oriented events would appear to have stronger economic justification for government involvement. It may well be that local consumption benefits can justify communities being involved in hosting short-term major events like the Rugby World Cup, but the results from this analysis along with many others in the literature suggest that ex-ante projections of tangible economic impacts are unlikely to be realised in the form of increases in employment or real GDP.

8.3. CONTRIBUTIONS OF THE RESEARCH

This research makes several original contributions to the literature. The development of a conceptual model within which facility development can be analysed is an original contribution. Each individual analytical component of the research provides useful and informative insights into the facility development process and provides informative and practical policy advice.

The Westpac Stadium case study contributes to the field by examining the key contributing factors behind the construction of the new facility and by examining the key features of the new facility. It is the first such ex-post case study of a facility construction project in a New Zealand context.

The panel analysis of facility construction and event analysis also makes a number of important contributions to the literature. It is the first analysis to separate the impacts of individual facility projects in the evaluation of the economic outcomes of facility construction. It is the first such study to examine the realised impact of multiple internationally-oriented events on the event-related sector employment alongside the impacts on real GDP. It is also the first analysis to explicitly consider the impact of the proximity of a facility to the local area's central business district on the realised economic impacts of internationally-oriented events. The data sets constructed for both Chapters 4 and 5 are new – no such empirical studies in this field have been conducted in a New Zealand context to the best of the author's knowledge.

The game theory analysis developed in Chapter 6 is the first study to consider the competition for events within such a framework, thus providing new insights into a complex issue. It is the first such study in this field to explicitly derive the thresholds for which subsidisation is likely to occur and the outcomes in each scenario.

While there have been demand studies conducted for rugby in New Zealand, Chapter 7 is the first such study to attempt to quantify consumption benefits from a demand study for a sport in a New Zealand context. This analysis combines characteristics of recreational demand research and demand studies for sport to produce estimates of consumer surplus. Where previous studies have concentrated on demand for professional rugby in the major centres, this chapter utilises a unique pre-professional data set of attendance for rugby in the provincial city of Wanganui and thus provides a unique perspective into the importance of the country's national game to a small city.

8.4. LIMITATIONS OF THE RESEARCH

The research also has its limitations. The Wellington case study chapter, while informative, is not representative of the common experience in New Zealand. To date, it is one of only two facilities built as replacements for existing facilities in new locations in New Zealand. Wellington is also the capital city of New Zealand, and so its experience

cannot be expected to be indicative of what other smaller cities may experience given a similar situation. The analysis also doesn't explicitly take into account the nature of events hosted by the Westpac Stadium – inclusion of these may well add an extra layer of explanation presently missing from the empirical analysis. It may also have been helpful to include observations for the neighbouring areas to see whether the business that went out of the city impacted positively on these local areas. As it is, the Wellington region is a large area, so the effect of the Stadium may well be difficult to detect in such a large area. It is worthwhile also noting the issue of the break in some of the time series data within the data set. While measures have been taken to correct for this, the presence of the break in the series can potentially affect the results of model estimation.

The panel study chapter, which examines several of the salient features identified in the Wellington case study in a larger context, also has some limitations. One can argue that the selection of TLAs in the analysis is biased by only including those areas with changes in the sports environment. In such a case, one could well view the resulting parameter estimates as being optimistic in nature. For both Chapters 4 and 5, the selection of appropriate control variables is limited due to data availability. The models in Chapter 5 have benefited from access to a database not available at the time of the analysis of Chapter 4. Even so, the use of a lagged dependent variable to control for autocorrelation detected in the panel models is an approach that has been criticised in the literature, particularly as it often renders potentially important explanatory variables insignificant in model estimation. Any empirical model is open to the criticism of omitted variable bias, but thorough analysis and testing of model structure has resulted in the most appropriate models being estimated given the available data.

The simple nature of the framework developed in Chapter 6 may well leave it open to criticism of the use of potentially unrealistic assumptions, such as the assumption of constant costs of event hosting in each city, and the costs being reduced to the subsidy, to arrive at the Nash equilibrium. It is by no means the only explanation for outcomes observed throughout the literature, and it is not intended to be presented in that light, but it is a framework that can explain why the results of facility construction, operation or event hosting in ex-post economic studies within the literature have been zero or even negative.

The measurement of consumer surplus benefits in the evaluation of the upgrade of the Cooks Gardens facility in Wanganui is clearly limited by the estimation of benefits for only

one sporting activity, albeit one of the major users of the facility. The benefits associated with more or even all of the activities would provide a better indication as to the economically justifiable contribution of local government to the overall cost of the facility upgrade. The major reason for the narrow focus is the availability of a unique but restricted time series data set in the context of New Zealand sport. Ideally the data set would encompass both the pre-upgrade and post-upgrade periods, but the information was simply not available for the post-upgrade period. Three limitations of the consumption benefits are identified within the chapter. Firstly, the estimates are limited to the use benefits and do not include non-use benefits, in which case the estimated benefits are a lower bound approximation of overall consumption benefits. Secondly, consumer surplus can be captured by event organisers who use a range of alternative pricing structures including family passes, season tickets, priority seating and the like, in which case the estimates derived in Chapter 7 can be considered a high approximation of the lower bound of benefits. Finally, the estimates of consumer surplus vary markedly between alternative functional forms of the demand model. While Model 4 (the log-log model) was found to be the preferred model from the model specification and selection tests, it also generated the highest consumer surplus values. A conservative approach was taken with the average of the consumer surplus values for the four models being used to approximate the consumer surplus values.

8.5. Suggestions for Future Research

There are several potential areas of future research to extend the analysis within this thesis, some of which have already been mentioned elsewhere in the research. The Wellington analysis could be extended to a more disaggregated level (that is, territorial local authority level), where the impact of the Westpac Stadium could be determined not only on the local Wellington economy but also on the surrounding local areas. This would make for a useful comparison with the regional analysis conducted in this study.

One may well examine in further detail the effects of facility construction on a wider cross-section of employment measures to assess the nature of substitution that may occur when such a project takes place. Likewise, the analysis of events can potentially be extended into a wider cross-section of employment measures, and potentially even to the adoption of an event study methodology along the lines of the Lertwachara and Cochran (2007) study and those studies used in finance to evaluate the effect of changes in stock news on their values. It would be informative to test whether facility construction and events impacts on the composition of employment rather than the level of employment.

The nature of regular events hosted over time by facilities was not considered in either the Wellington case study or the panel study. With more facility-specific data over time, examining the effect of events in different stadia could well add considerable value to this area of research, particularly for the location of facilities relative to the central business district.

Finally, a useful spinoff of this research would be the examination of the effect of local government involvement in facility construction and event hosting on ratepayers over time. Knowing what the impact on ratepayers is as a result of local government funds being directed towards sports-related projects may well shed some light as to the distributional effects of such policies, and better inform the costs of such projects.

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