

Deciding on major sports events
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Abstract

Major sports event like the World Cup of football are worldwide spectacles. Cost benefit analyses are used to determine the economic value of these events. In this thesis 18 ex ante and ex post cost benefit analyses are compared. The goal of this meta-evaluation is to get insight in the value of ex ante CBA's on deciding on hosting a major sports event. The focus is on large infrastructural investments because these investments mostly determine whether such a sports event will be financially attractive. The effects on tourism and employment are also researched. These effects are used often as an argument for hosting a major sports event. Costs are generally estimated too low, benefits too high, infrastructural costs too low and effects on employment and tourism are overestimated.

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Chapter 1. Introduction

In December 2010 the FIFA, the International Football Association, appointed the 2018 World Cup to Russia. It was also decided that Qatar would host the 2022 World Cup. The other candidates to host the 2018 World Cup were Spain/Portugal, the United Kingdom and The Netherlands/Belgium. The bid of The Netherlands/Belgium was supported by both national governments and possible host cities.

Several reasons existed for wanting to organize the World Cup. It would improve the quality of (amateur) football in the Netherlands. Organizing this event would also improve the image of the Netherlands internationally. Thereby it could improve social cohesion within the Netherlands, especially when the Dutch team would do well.

Before supporting the bid the Dutch government wanted insight in the possible economic and social effects of such an event. To get this insight the government decided to use the instrument of a social cost benefit analysis.

The outcome of this analysis was strongly debated and led to a second opinion in the form of a new cost benefit analysis. This leads to the main question of this paper:

How can cost benefit analyses be used to decide on major sports events?

To research this question the following partial questions will be discussed.

1. The theory on cost benefit analyses for major sports events.
2. How are these cost benefit analyses performed: A comparison between two analyses performed for the same event.

3. What can we learn from ex ante and ex post analyses: 18 sports events analyzed.

4. What are the recommendations for a cost benefit analysis in deciding on major sports events?

The purpose of the research is to find out whether or not cost benefit analyses are viable methods in researching the social and economic effects for society of such large sporting events. The research will be mostly empirical. It will show the current research process. It will show how differences between reports occur and what the reasons are for different cost benefit analyses and actual outcomes. It will also go into the difference between ex ante and ex post analyses.

First the theory will be discussed. We have to look at the underlying economic theories of performing a cost benefit analysis. Why are cost benefit analyses used for such large events?

The most important part of this thesis will be a comparison between studies. The ministry of Economic Affairs instructed the Foundation of Economic Research (Stichting Economisch Onderzoek) to do a cost benefit analysis for organizing the World Cup (van den Berg et al., 2010). The HollandBelgium Bid instructed four organizations to jointly perform a second opinion. This second opinion had a different and more positive outcome than the first research (Meerwaarde, 2010a). We will compare these studies. What measures and what data are used? And can the differences between be explained?

Secondly, an empirical study will be done on the difference between ex ante and ex post reports for the same events. The focus will be on the World Cup of football and the Olympic Games and will take into account a few other well researched sports events. There are significant differences

between these studies. How can the differences be explained and what can we learn from these differences?

We will be able to determine how to interpret these analyses. We can also show if there is a bias in ex ante studies. We will be able to understand the flaws of the instrument as it is used nowadays. Based on this we can give a recommendation on the use of CBA's for future sports events.

Chapter 2. Cost benefit analysis

2.1. Introduction

Cost benefit analyses are used to give policymakers insight in the economic and societal impact of large investments. A cost benefit analysis takes into account the investments in infrastructure, organization, security, measures to protect the environment, but also the positive fiscal effects, effects on tourism, even on social coherence. This means that a broad definition of economic welfare is used. All the direct and indirect effects have to be monetized to be able to compare them.

In the Netherlands cost benefit analyses are especially conducted for decisions about large infrastructural projects. In 2000 a working group of experts developed a guideline for cost benefit analyses for large infrastructural projects in the Netherlands (OEEI, 2000). Members of the working group were experts of , the Centraal Planbureau, the Netherlands Economic Institute and private consulting firms. The reason to develop this guideline was the debate about the relevancy and the viability of cost benefit analyses and difference in definition and factors to take into account of CBA's in this domain. Cost benefit analyses are nowadays an indispensable instrument in the decision making process in this field.

The need for – reliable – cost benefit analyses are more and more felt in other domains of policy when decisions have to be taken about projects with long lasting economic and societal effects. Examples are mega sports events with complicated policy decisions and long lasting impact on the economy: employment, tourism, amateur and top sport policy, “putting the city/the country on the map”, etc.

The economic impact of mega sports events can be enormous: Andreff (2008) shows that the sports economy is quickly becoming a globalizing economy. From major events to international sales of sports goods, increasing parts of the world are affected by sports. For instance, in France income spent on sports attributes and other expenses to the sports economy, like broadcasting

rights, has grown to 1.77% of the French GDP. Also, the global market for football is valued at € 250 billion. Furthermore, Andreff shows that the ‘industry’ is growing. The globalization of sports seems to be happening.

Promoters of these sports events use cost benefit analyses to highlight the positive effects of the organization of these events. More critical observers point out that almost all sports events do not create the predicted positive outcome in terms of revenues, tourism or city marketing (f.e. Barclay, 2009). Nonetheless, a bid for a mega sporting event such as the World Cup (football) or the Olympics without a CBA is nonexistent. In the Netherlands the government decided to make CBA’s for the bid for the World Cup 2018/2022 and for the 2028 Olympics. The CBA for the Cup led to a public debate about the predicted (positive and negative) outcome and to a second opinion in the form of a new CBA. The cost benefit analysis for the 2028 Olympics has been sent to Parliament on the 10th of November 2011 (Kamerstukken II, 30234 nr. 53)¹.

2.2 Cost Benefit Analyses

Cost benefit analyses are conducted to determine the costs and benefits of certain projects. There are two major reasons for doing these analyses. The first one is to determine whether or not the project is a sound investment. The second one is to weigh this particular project against other possible investments. To research whether or not cost benefit analyses are performed correctly one has to know the theory behind them.

In a cost benefit analysis one weighs the benefits versus the costs. However, this is too simple. One has to take into account the time value of money. A dollar today is worth more than a dollar in a year. This has not only to do with inflation. One also has to think of investment opportunities that one misses when a dollar is received in a year. In a cost benefit analysis it is also important to determine the costs and benefits for different individuals. A highway can be beneficial for a

¹ Found on <https://zoek.officielebekendmakingen.nl/blg-138463.html> on 13th of December 2011

person who travels daily between two cities. However, for a person that lives in an area between the two cities it might not be very beneficial, which may result in a decreasing value of his property. This has to do with the diminished valuation of its environment, because of the new build highway. Hence, one has to take into account the individual costs and benefits of a project. If one accumulates all these costs and benefits one has a simple formula for weighing costs and benefits.

$$(1) \quad NPV = \sum_t^T \sum_j^J \frac{(B_{jt} - C_{jt})}{(1+r)^t}$$

Above, we see a simplified formula for calculating the Net Present Value (NPV) of a certain project (Zerbe, 2008). The most important elements of such an analysis are implemented in this formula. There are different aspects of such a project with different Benefits (B) and Costs (C). These are discounted with the discount rate r . These different costs and benefits for individual people are calculated. Hence B_{jt} shows benefits for a specific person j in time t . T stands for the time period of calculating the projects effects.

Turvey and Prest (1965) have written an extensive survey on the theory of cost benefit analyses. They state that some important questions have to be answered before one can perform a proper cost benefit analysis. Below we will analyze these questions and the way they can or should be implemented in the analysis.

1. Which costs and benefits are to be included?

One of the most important decisions is to decide what costs and benefits are included in the project. Depending on the project this can be relatively simple or very hard. First of all, one has to think about the financial costs and benefits of a project and which costs and benefits should be attributed to the project itself or to other circumstances. It is also important to determine what

effects the project will have on the included economy. One can think of a rise or decline in local tourism, or the effect on the expenses in restaurants and bars. All these factors have to be taken into account in determining cost and benefits of a project (Prest & Turvey, 1965).

2. *How are they to be valued?*

Some costs and benefits are relatively easy to measure. The construction of something has certain costs and these can be estimated. The benefits of a major sports event can for instance be the increase in consumption. The total value of this can also be estimated.

However, sometimes it is also necessary to price something that is not directly priced. This can be calculated by researching actual actions of people. These actions can be the cost of acquiring other products to use a certain product, the costs of preventing something to happen or by measuring the compensation of losses. In this way, it is possible to price something without a direct price.

It is hard to measure some aspects of a CBA in money, for example time saved. One has to calculate the value of (in this case) time used in a CBA by researching actual behavior of people. This is called monetizing. One can do this in different ways. The averting expenditures method measures the costs of (for example) pollution by measuring what investments people do to avert this cost (Abdalla et al., 1992). This method is very applicable for certain situations. These are situations whereby the costs to avert pollution can be defined clearly. However, in some situations it is hard to define which of the acquired products are bought to avert losses and which investments are normal expenses.

The Travel Cost Model (TCM) measures the value of an object or site by determining the travel costs people are willing to pay to get on the specific location (Parsons, 1997). To compute this value one has to be able to account the costs of the travel. For this, one has to be able to compute

and assume the hourly cost of travel of a person. Also, it is important to decide whether the researched site or object is the sole purpose of the travel of a person. If a person goes to three different locations in one trip, it is not possible to calculate the entire cost of travel for a specific site. Also the TCM can be used limited in urban areas, because prices of travel are very low in these areas.

A popular method is the Hedonic Pricing Method (HPM). This method can be used to measure the price of non-market goods. For example it can be used to determine the value of environmental quality or public goods. This is done by calculating the costs and prices of related market transactions (Tyrvaainen, 1996). It is based on actual market data. It is possible to compare, for example, housing prices. If differences in environmental circumstances are responsible for different housing prices, one can determine the value of environmental quality. The advantage of using actual market data also holds a direct disadvantage. The extensive dataset has to be available. Also, it is questionable which environmental effects are perceived by the public and affect market prices.

One also has to be able to calculate how projects change markets. For example, prices can change because of projects. The change in prices might change the profits of private companies. This also has to be taken into account in CBA's.

3. At what interest rate are they to be discounted?

To measure the costs and benefits properly one needs a corresponding and common unit of measurement. Mostly this will be money, either in the domestic currency or in dollars. However, one has to deal with the time-value of money also. Money right now is worth more than money in five years. One has to deal with this properly (Prest & Turvey, 1965).

There are different parties who may profit from an investment. The rate of substitution can be used if the individuals who profit are the same as those who pay the costs (Stiglitz, 1988). However, in the events that are discussed in this thesis this will not always be the case. The government pays for most costs, but different parties profit from the event. Also, it is important to determine in what way public projects crowd out private projects (Kesenne, 2005). If this is the case, there are economists that are in favor of using the rate at which firms can obtain financing (Stiglitz, 1988). Anticipated benefits of a project depend very much on the choice of interest rate. It is very important to choose a correct and well-thought interest rate.

The Dutch government issued a general guideline to perform cost benefit analyses (OEEI, 2000). This also gives insight in the dictated discount rate. For projects the Dutch government dictates a discount rate of 4%.

4. What are the relevant constraints?

One has to account the actual and relevant constraints (Prest & Turvey, 1965). For example, is the project legally feasible? Second, what are the consequences of this project? Will the government change policy after the project has been implemented? One can for example think of increased taxation if a new road is used frequently. If this is a real possibility, one has to be able to account for this. In every CBA it is important to weigh the project against the situation without this project. One can call this the null-alternative. The null-alternative is the situation in which the project is not implemented. This is not a situation in which nothing happens, but a situation which would occur without the project. For example, there is a CBA performed on building a new national airport in the Netherlands. The null-alternative could be expanding the current national airport.

As mentioned before, CBA's were especially done to measure the effects of infrastructural projects. Presently, CBA's are performed for a much wider scale of projects. They are also used to support decisions on whether or not to host a major sports event, such as the World Cup and Olympic Games. In the following chapters we will take into account these four questions when we evaluate the CBA's done ex ante for the World Cup 2018/2022 and the ex ante and ex post CBA's for other major sports events.

Chapter 3. Comparing ex ante papers for the World Cup 2018/2022

3.1 General considerations for a CBA

In 2007 the Dutch and the Belgian football associations decided to bid for the World Cup 2018-2022. The same year the Dutch government enthusiastically supported this initiative. A condition was that the feasibility report that had yet to be performed should give a positive result. The Dutch ministry of Economic Affairs asked the *Stichting Economisch Onderzoek* (Foundation of Economic Research, from now on: SEO) in December 2009 to perform a CBA on hosting the World Cup of Football in 2018 or 2022 in the Netherlands and Belgium. This was presented in February 2010. The HollandBelgiumBid, responsible for getting the World Cup to the Netherlands and Belgium, asked for a second opinion in March 2010. The opinion of the HollandBelgiumBid was that the SEO report was too negative (Meerwaarde et al., 2010). This report was presented in March 2010. In this chapter we will analyze these two reports. It will be researched why and how they differ.

According to the literature there are some effects that are not generally taken into account while performing a CBA, especially CBA's for sports events. In this chapter it will be analyzed whether or not these difficulties also arise in the two reports.

Time Switching

In many CBA's the time switching effect is not taken fully into account. Shortly, this effect means that people that intended to visit a country will change their schedule to visit it during the event. This cannot be totally accounted as a surplus to the economy because of the event (Barclay, 2009). It is possible that there is extra income because of the event, because one might spend more in the city. However, the visit in itself is not an extra surplus.

Crowding Out

The crowding out effect may not be calculated correctly. Because of the event, it is possible that there are people who do not go the host country (or city). People may change their plans and visit another place (Baade & Matheson, 2004a). This is described as the crowding out of tourists.

An event makes it attractive for people to visit the host country. They want to see the event, the athletes and the show. However, people with no interest in the event may be crowded out. They may choose a different location to visit. This crowding out effect may affect estimations of benefits of extra tourism. If this crowding out effect is underestimated the net benefit of tourism is overestimated.

However, there may also be another crowding out effect taking place. This is described by Kesenne (2005). He describes how the building of venues crowds out other possible investments. The new sport venues may yield benefits in the future, it does crowd out other possible benefits from the investments that are not made. This is closely linked to opportunity costs.

Opportunity Costs

The hosting of a sports event may generate benefits in the future. However, another event may generate more benefits. The differences between these events are the opportunity costs. Also, opportunity costs are important in calculating benefits of employment. If, for example unemployed workers are hired for the building of a stadium, the opportunity costs are negative (Kesenne, 2005). The reason for this is that the otherwise unemployed workers would not have had a job and would have received unemployment benefits.

Ex ante bias

Researchers may have an ex ante bias when performing a CBA. Coates (2009) argues that if the organizing committee of an event hires someone to perform a CBA, there is pressure to produce

a positive report that profits the organizing committee. The chances on hosting an event in that case are higher, which means higher income for the committee. Because of this pressure a CBA may have a positive bias. Coates also suggests that researchers receive (too positive) information from organizing committees. There are parties that profit from hosting such an event. The FIFA and organizing committees have a financial interest in the hosting of such an event.

The FIFA 2010 Financial report gives a lot of information about the incomes and expenses of the FIFA which are due to the 2010 World Cup. The 2010 World Cup generated total revenue of \$3.655 million for the FIFA (excluding ticketing revenue) and incurred total expenses of \$1.298 million (FIFA, 2011). This is mostly due to the sale of broadcasting rights and marketing rights. It is clear that the FIFA is the great winner of the World Cup. However, within the country it greatly depends on regulation and legislation to derive who are the winners and who are the losers. The division within a country of costs and benefits on government level depends on the agreements between local and national governments. The FIFA has very rigid demands for a host country concerning legislation. This makes sure that the sponsors and officials of the FIFA have certain benefits, but it also makes sure that the tournament is organized the way the FIFA wants to market it. These parties might try to influence the outcomes of cost benefit analyses.

3.2 Comparing the SEO and Meerwaarde report

There are many differences between the SEO and Meerwaarde papers. These differences result in very different outcomes of the CBA. SEO has calculated that the probable benefits will be € 321 million and the probable costs will be € 475,8 million (SEO, 2010). The second opinion calculates that the probable benefits will be € 569,4 million and the probable costs € 340 million (Meerwaarde et al., 2010a). Instead of a probable loss of € 154,8 million, the second opinion suggests that there will be a probable benefit of € 229,4 million for hosting the World Cup. That is a difference of almost € 400 million for hosting an event. How can the final results be that different?

In table 1 the main differences between the two reports are summarized.

Table 1: Main differences reports: Information from SEO (2009) and Second opinion (2009)

	SEO-Research	Second Opinion
Stadium investment costs	€ 582 million	€ 245 million
Additional income tourism	€ 141,8 million	€ 387,7 million
Economic effects	No effect	Positive effect
Other effects	Minor effects	Positive effects

The second opinion argues that the *stadium investment costs* are much lower than in the original analysis. The main difference is because of the different valuation of the new Rotterdam soccer stadium ‘the Kuip’. According to SEO the complete costs of this stadium is accountable to the World Championship bid. Meerwaarde suggest that only 100 million of the originally 405 million is accountable to the bid. They suggest that the new ‘Kuip’ will be build regardless of the World Championship. Only the extra costs needed to make it (semi-)final ready should be attributed to the costs of the World Championship.

This is something we can test now, because there will not be a World Championship in the Netherlands and Belgium. It is more and more likely the current Kuip will be renovated, instead of building a new stadium. The financial risks of a new stadium might be too large.²

² Found on <http://www.ad.nl/ad/nl/5619/Feyenoord/article/detail/2992080/2011/10/26/Rotterdam-stelt-besluitnieuwe-Kuip-opnieuw-uit.dhtml> on 6th November 2011

The second opinion argues that the *additional income generated by tourists* will be higher. The report states they will stay in the country longer than the original report argues. The report by SEO argues that there will be a rate of substitution of 75%. The second opinion states that there is little research on this, but that the rate of substitution is probably lower, most likely 40%. This is a good example of the discussion on and the uncertainty of the magnitude of the crowding out effect.

Opportunity costs are also subject to debate. The long-term effects on *economic growth* are measured too low by the SEO, argues the second opinion. They state that because of the effects of country-marketing and the branding effects potential tourists will be more positive about visiting the Netherlands. This will generate more long term profits. As an example, they state that Barcelona developed heavily as a tourist destination after the Olympic Games of 1992. This is true indeed. However, there are no exact figures on how much hosting a major sports event will contribute to the development of tourists.

There are some other effects that will more positive, according to the second opinion. The second opinion states that the effects on national pride and happiness are measured too low. The second opinion argues that it is likely that the effects of the event on national pride and happiness will be larger than € 9 per person. In the cost benefit analysis done by the SEO this € 9 is necessary to compensate for the negative outcome of the cost benefit analysis. The second opinion does not calculate the size of the effect on national pride. However, based on other researches they assume that this effect will be larger than € 9.

Also, they argue that there is a relationship between hosting the World Cup and hosting the Olympic Games, which might yield other benefits. The second opinion also states that the hosting of the World Cup will have a positive influence on the quality of football in the Netherlands. This effect is neither supported by results nor quantified.

Another aspect of effects of the World Championship is media attention. According to the original CBA all media will leave the country when their team has been eliminated. The second opinion suggests that 15% of the media of that country will stay and cover the event. This yields larger benefits than was originally calculated.

3.3 Conclusions

It is clear that the difference in outcome of the CBA comes from different assumptions made by the researchers. The null-alternative that is used in the reports is different. The most notable difference is the building of the new Kuip. The difference in assumption is here that the second opinion assumes that the new Kuip will be build no matter what. This makes the costs that can be attributed to the World Championship much lower. This however is not the null-alternative that the SEO assumes. The SEO states that it is possible that the new Kuip will be build, but it is uncertain when and how it will be financed. Hence, the null-alternative both papers assume is very different. As we stated in chapter 2 one of the most important aspects of any CBA is the attribution of the costs and benefits of the project. In this case there was not sufficient reason to assume that a new football stadium would be build with or without a World Cup. The conclusion is that the decision making process on the building of a new stadium should be taken into account correctly before one can exclude these costs. In retrospect it seems that the assumption of the SEO was more likely, because it is still not certain whether or not a new stadium will be build.

Another major difference in assumptions is the scale of the crowding out effect. It is known from earlier literature that ex ante cost benefit analyses tend to underestimate the crowding out effect (Barclay, 2009). In the literature it is not concluded exactly how large these crowding out effects are. However, there are some indications. The number of tourists in South Korea during the World Cup was as large as the year before (Barclay, 2009). Also the Olympics in Atlanta caused crowding out effects. Some hotels and restaurants had lower than normal sales during the Olympics (French & Disher, 1997). The actual size of the crowding out effect is hard to measure. This also depends on the type of event and the type of visitors without an event. It is hard to

quantify the effect. Whether the underestimation of the crowding out effect is the case in any of these reports is hard to judge, because the event is not held and will not be held. However, the second opinion does assume these crowding out effects to be lower. It is thus plausible to assume that the second opinion underestimates the crowding out effect (more). From the literature it is known that this is a well known flaw of CBA's.

Another aspect that has to be taken into account is that the second opinion has only discussed issues that can be interpreted more positive. The analysis of the SEO takes into account also effects that can be assumed more negatively. According to M. de Nooij, who has one of the authors of the SEO research, the benefits might be interpreted differently.³ He states that it is questionable if every euro spent on benefits should be accounted as a euro of benefit to the economy. The euro could also be spent on other productive activities, for example building a highway which reduces transportation costs. Kesenne (2005) states that is common practice in cost benefit analyses to attribute benefits to the event and costs to other projects. He shows that other investment opportunities might be lost by investing the money in the hosting of the World Championship. There are not only direct costs of building or renovating a football stadium. Kesenne calls this the crowding out of other investment possibilities.

What Kesenne discusses here is that investing public funds not only has direct costs. These investments also have indirect costs. A method to measure the effects of government spending is calculating the marginal cost of public funding. To publicly finance a project, tax income must be used. These taxes alter the market equilibrium, which may change investment decisions and consumption (Dahlby, 2008). This may cause greater costs than is directly visible. Governments invest taxpayers' money. This has certain marginal costs and utility for the taxpayer. If the government spends very little on public goods the marginal utility is very high. When more is spend, the marginal utility decreases. The marginal costs is equal to the marginal utility of a dollar (otherwise spend on consumption of private goods) times the tax paid. The optimal level of expenditures for a certain individual is when the utility is maximized, hence where net

³ Information from <http://www.sportknowhowxl.nl/OpenPodium/5416> on 10th of November 2011.

marginal benefit is zero (Stiglitz, 1988). It is clear that certain investments for the World Cup can be considered as public goods. Governments invest in infrastructure. For example, Germany invested € 2 billion in infrastructure (Maennig, 2007). South Africa invested in public transport in the years preceding the World Cup⁴.

The marginal cost of public funds can be calculated. It can be defined as the ratio of the marginal value of public investment compared to the marginal value of the same project done by the private sector (Jacobs, 2010). In well functioning markets this marginal cost is one. The marginal value of public investment is equal to the marginal value of private investment. However, there can be many reasons why this marginal cost is not one. For example governments that do not function well. Projects might not be chosen based on their net present value, but on their political importance. Also markets can fail due to different reasons. This gives reason to assume that this decreases the marginal cost of public funds. However, if markets fail chances are that governments fail because of the same market problems.

Another aspect of public goods is of course the value it has. An individual can give a certain value to a public good. Three factors determine an individual's attitude towards public goods expenditures. These will be shortly summarized. Some individuals simply attain a higher value to public goods. They like public goods better. Second, there is a difference between poor and rich people. The marginal utility of private goods is larger for poor people than for rich people. Very simply put, this is because they have less private goods. Poor people will be less willing to give up private goods (by paying taxes) for public goods. Thirdly, the taxation system determines the utility of public goods. People who pay less tax attain higher value to public goods than people who pay more taxes. In a progressive tax system, poorer people will give a higher value to public goods than richer people (Stiglitz, 1988).

⁴ Found on http://www.medioclubsouthafrica.com/index.php?option=com_content&view=article&id=95%3A2010_infrastruct ure&catid=39%3A2010_bg&Itemid=59#transport on 8th of February 2012

From the comparison between the two studies performed ex ante on the effects of hosting the World Cup in the Netherlands we may conclude that the second opinion has a more positive bias towards the effects. It is easy to see that the Meerwaard CBA allocated major costs to other projects than the World Cup and general positive developments to the estimation of the World Cup. Ex ante bias is likely. Both CBA's are not very clear on opportunity costs. The SEO report mentions this aspect, but doesn't take it into account furthermore. How to deal with these aspects in CBA's for sports events is not very easy. We will come to this problem later on. Coates (2009) argues that CBA's on economic effects that are commissioned by the organizing committee are generally not plausible. They are motivated to show positive results, mostly because the members of the organizing committee gains by organizing the event. On the whole it seems that the second opinion does not take fully into account the crowding out effects and the opportunity costs.

Chapter 4. What can we learn from ex ante and ex post analyses: 18 sports events analyzed

4.1 Introduction

To make an assessment of the validity and the assumptions of a cost benefit analysis and especially to learn from it, it could be useful to make an ex post evaluation of a project. Serious ex post evaluations with these goals are a rather new phenomenon. Reasons for this lack of ex post evaluations can be psychological: it is not easy to acknowledge that one was - knowingly - too optimistic (optimism bias). There can also be more political reasons: political reputations can be at stake when it becomes clear that money of the taxpayer was not well spent. And there can be more organizational (after the end of the project there is no room for evaluation) and methodology reasons that ex post evaluations are not very common (Berveling et al., 2009).

In this field again infrastructural projects lead the way. Just like cost benefit analyses are used for infrastructural projects, one tries to learn by ex post evaluations. A Dutch ex post study on an infrastructural project (Nijland et al., 2010) has given some recommendations for ex post evaluations. The original assumptions that are made should be checked. If circumstances have changed, initial assumptions might be wrong, which may have implications for the results of the ex ante estimation. Ex ante reports should be updated. If for example, circumstances like traffic change, the ex ante report should also be changed. This makes it easier to evaluate ex post. A practical recommendation is to archive properly. Generally, the longer ago a project is studied the less information is available. This is also clear from the data that is collected in this thesis.

In the literature about sport events a number of ex post analyses can be found. These are not common however. This paper strives to give insight in the value of ex ante cost benefit analyses. To do this, these ex ante estimations will be compared with actual results in a meta evaluation.

In this chapter ex ante and ex post valuations for a project will be compared. It gives insight in whether or not there are differences between estimations before a project and the real outcomes. It may also show whether researchers ex ante have a positive bias. In this chapter different aspects of the valuation will be tested. The tests performed will also give insight if there are certain aspects of a cost benefit analysis that are generally over or underestimated.

A number of sports events are compared. Analyses made for different Olympic Games, World Cups of Football and other events are compared. For all of these events ex ante estimations are made. These are compared with the ex post results. The differences will be tested for significance.

4.2 Testing for significance: Theory

There are many ways to test whether the obtained results are significant. Most tests are designed for populations with a normal distribution. In this research, where ex ante estimations are compared with the ex post results of sports events, we do not have such a normal distribution, due to the relatively low number of outcomes. That is the reason that the Sign test and the Wilcoxon test are used. These are nonparametric tests. Nonparametric tests can be performed for populations with nominal data, but also for pairwise comparisons. We can use this in our comparison between ex ante estimations and ex post results.

4.2.1 The Sign Test

The Sign Test is a very easy test. It tests if there is a significant number of results going one way. For example, there are two groups of people, each with 50 people. Their salaries are compared. Every person of group A is compared with one person of group B. One can assume that, if there is no significant difference between the two groups, the salary-comparison will be positive for group A 25 times and for group B 25 times. The Sign test measures if this is the case, with a certain probability.

One can test this using a Z-test. If the number of wins is at least $\frac{n}{2} + 1,96 * \sqrt{\frac{n}{2}}$, the group is significantly better with a probability of $\alpha=0.05$ (Derrac et al., 2011).

4.2.2 The Wilcoxon test

The Wilcoxon test is a test that defines if there are significant differences in the mean outcome of two groups. It is more refined than the Sign test because it not only shows whether or not one group differs from the other, but it also shows whether the difference itself is significant. The differences are ranked. It gives more insight in the differences between the two groups. Another major difference with the Sign test is that the observations are paired. This means that it is possible to compare, in this case, different observations for the same event. This gives more insight in the actual differences ex ante and ex post.

If one has all the outcomes of the two groups the significance of the differences can be tested. The set of outcomes has to be split.

$$(2) \quad R^+ = \sum_{d_1 > 0} \text{rank}(d_1) + \frac{1}{2} \sum_{d_1 = 0} \text{rank}(d_1)$$

$$(3) \quad R^- = \sum_{d_1 < 0} \text{rank}(d_1) + \frac{1}{2} \sum_{d_1 = 0} \text{rank}(d_1)$$

Let d_1 be the difference between two outcomes. We split the positive and the negative outcomes in two groups. R^+ is the set of outcomes where one group is larger than the other. R^- is the set of outcomes where the outcomes are smaller. All these differences are summed. This gives a certain value to R^+ and R^- . If for example the positive differences are much larger than the negative differences R^+ is much larger than R^- . Although the Sign Test might not show a difference between the groups, the Wilcoxon Test can show that there is a difference between the outcomes.

It has to be tested if the sum of the positive outcomes differs significantly from the sum of the negative outcomes.

T is the smaller of the sums, $T = \min (R^+, R^-)$. If T is smaller or equal to the value of the distribution of Wilcoxon, H_0 is rejected. Hence, there is a significant difference between the two groups (Derrac et al., 2011).

4.3 Testing

We have made a comparison of 18 ex ante and ex post evaluations of large sports events. The subject of this thesis is the use of cost benefit analysis for the decision about the World Cup football and the Olympics because of their comparable economic and financial impact. To get a better insight of the value of such a cost benefit analysis, we have also looked at evaluations of other sports events that are well researched.

Selection Criteria

The World Cups of the last twenty years are selected. The Olympic Games are in size comparable to the World Cup of Football. Although smaller than the World Cup and the Olympic Games, some other events are also comparable, such as cycling events as the Giro d'Italia. The exemption of the twenty year frame is the Los Angeles Olympic Games of 1984, because this event is well researched and is mentioned many times in the literature on CBA's for major sports events. Table 2 shows all the events studied.

Table 2: Events studied

Vancouver Olympic Games, 2010	Lillehammer Olympic Games, 1994	South Korea World Cup, 2002
Beijing Olympic Games, 2008	Calgary Olympic Games, 1988	Austria European Cup, 2008
Athens Olympic Games, 2004	Los Angeles Olympic Games, 1984	Giro Amsterdam Cycling, 2010
Salt Lake City Olympic Games, 2002	South Africa World Cup, 2010	France Rugby, 2007
Sydney Olympic Games, 2000	Germany World Cup, 2006	Superbowl American Football, 1973-1997
Atlanta Olympic Games, 1996	Japan World Cup, 2002	MLB Baseball, 1973-1997

We have looked at the estimated costs and benefits overall and three selected parameters: Costs of infrastructure and effects on employment and tourism. Costs of infrastructure is taken because these costs are the largest part of the costs overall and this data is rather coherent. For benefits we have looked at employment and tourism effects because these effects are generally used as a argument to organize a major sports event. The table in Appendix 1 sums up the sports events and the dates of the ex ante and ex post evaluations.

To make a meta evaluation of ex ante and ex post evaluations it is necessary to use comparable data. For every researched sports event it was necessary to analyze the parameters, to determine which costs of infrastructure are included in the ex ante evaluation and which costs of infrastructure are included in the ex post evaluation. For instance, we had to be aware that in the ex ante evaluation all costs were included and in the ex post evaluation only the costs of prioritizing the decision to build a stadium are included. This was for instance the case in the ex ante and ex post evaluations of the Olympic Games in Beijing. We have analyzed the reports with the objective to use the same parameters. Sen (2000) shows that there exist specific

problems when performing a cost benefit analysis. There are for instance valuation problems. In this thesis several problems are also described. To avoid these issues tests are performed on separate parts of the cost benefit analysis; Overall costs and benefits, costs of infrastructure and effects on employment and tourism. That way it is possible to comment on specific differences between ex ante and ex post reports.

In some cases multiple reports are used for the *ex ante* or *ex post* evaluation of one event (see Appendix 1). Not all reports gave estimations or results on all the parameters researched. If it was possible to find estimations of the missing parameters in other reports these reports were used also. It is preferable to use one report for one event, to avoid calculation problems. However, to obtain enough results it has sometimes been necessary to use multiple reports.

In some cases the overall effect on the economy was included in the presented benefits. This overall effect was in most cases not clearly defined. For example, see Preus (2011):

.. the Union Bank of Switzerland (..) estimates South Africa's tourism revenue from the World Cup at 0.54% of GDP for the year 2010, while Du Plessis and Venter (..) estimate it at 0.1% of GDP, but considering only the short period of the World Cup itself.

In our data we have only included this effect if this was used both in the ex ante estimation and in the ex post evaluation. Furthermore, we had to correct the financial effects for the exchange rates. In the table in Appendix 2 all the amounts are shown in 2011 Euro's. We can now test this data using the Sign-test and the Wilcoxon test.

The Sign test measures what result is larger. For this, we can use the results in the table in Appendix 2. The Wilcoxon test also accounts for the size of the differences between the groups.

Because the events are not similar in size we had to adjust for this. It is not fair to compare absolute differences if the events are not similar in size. To perform the Wilcoxon test the ex ante results were simplified to 1, and the ex post results were simplified also. This way, it was possible to compare the relative differences. In Appendix 3 the relative differences are shown. The summary of these relative differences is in table 3.

Table 3: Averages ex ante and ex post

Relative differences between ex ante estimations and ex post outcomes										
Type	Costs		Benefits		Infrastructure		Employment		Tourists	
Time	Ex ante	Ex post	Ex ante	Ex post	Ex ante	Ex post	Ex ante	Ex post	Ex ante	Ex post
Average	1	1,96	1	0,64	1	1,62	1	-0,73	1	0,57
Number of Observations (N)	10		12		8		8		8	

4.4 Outcomes

4.4.1 Sign Test Results

In the table below the results of the application of the Sign test are summarized. The extensive results are shown in Appendix 4. The tests are performed to compare the ex ante estimations with the ex post results. To test a hypothesis is needed.

H_0 : The ex post results are equal to the ex ante estimations

H_1 : The ex post results are not equal to the ex ante estimations

Table 4: Outcomes Sign Test

Type	Costs	Benefits	Infrastructure	Employment	Tourism
Wins (+)	10	2	8	0	3
Losses (-)	0	10	0	8	5
N	10	12	8	8	8
Critical Value for $\alpha = 0.05$	9	10	7	7	7
P-value	0.002	0.039	0.008	0.008	0.727

The situation *Wins* shows in how many cases the ex post results are larger than the ex ante estimations. The situation *Losses* shows in how many cases the ex ante estimations are larger than ex post results. *N* shows the total number of observations. The *critical value* shows how much wins or losses are needed to have a significant *difference* between the two groups.

With a significance of $\alpha = 0.05$ we can reject the null-hypothesis of equal ex ante estimations and ex post results for the estimation of costs, benefits, costs of infrastructure and the effects on employment. For the effects on tourism the null-hypothesis cannot be rejected.

4.4.2 Wilcoxon Test results

In the table below the results of the application of the Sign test are summarized. The extensive results are shown in Appendix 4. The tests are performed to compare the ex ante estimations with the ex post results. To test a hypothesis is needed.

H_0 : The ex post results are equal to the ex ante estimations

H_1 : The ex post results are not equal to the ex ante estimations

Table 5: Outcomes Wilcoxon Test

Type	R^+	R^-	p-value
Costs	9,62	0	0.005
Benefits	0,92	4,99	0.034
Infrastructure	4,96	0	0.012
Employment	0	13,9	0.012
Tourism	0,45	3,86	0.093

R^+ sums up all the cases where ex post results are larger than ex ante estimations. R^- sums up all cases where ex ante estimations are larger than ex post results. In the last column the p-value of the performed Wilcoxon test is shown.

With a significance of $\alpha = 0.05$ we can reject the null-hypothesis of equal ex ante estimations and ex post results for the estimation of costs, benefits, costs of infrastructure and the effects on employment. For the effects on tourism the null-hypothesis cannot be rejected. However, at a 10% level the null-hypothesis can be rejected.

4.4.6 Test conclusions

The conclusion is that ex ante the costs are underestimated and benefits are overestimated. The costs of infrastructure are underestimated. The same conclusion can be drawn for the estimated positive effects on employment. The effects on tourism are less significant. The effects on the other four factors are at least significant on a 5% level, the effects on tourism are significant on a 10% level in the Wilcoxon test.

This conclusion supports the more critical literature on the cost benefit analyses for major sports events. The difficulties on finding applicable data also shows the need for generally applied parameters to perform CBA's for major sports events. The question which costs of infrastructure should be attributed to the event has to be classified and generally applied. Especially these costs determine whether such a sports event will be financially attractive.

4.4.7 The overall effect on the economy

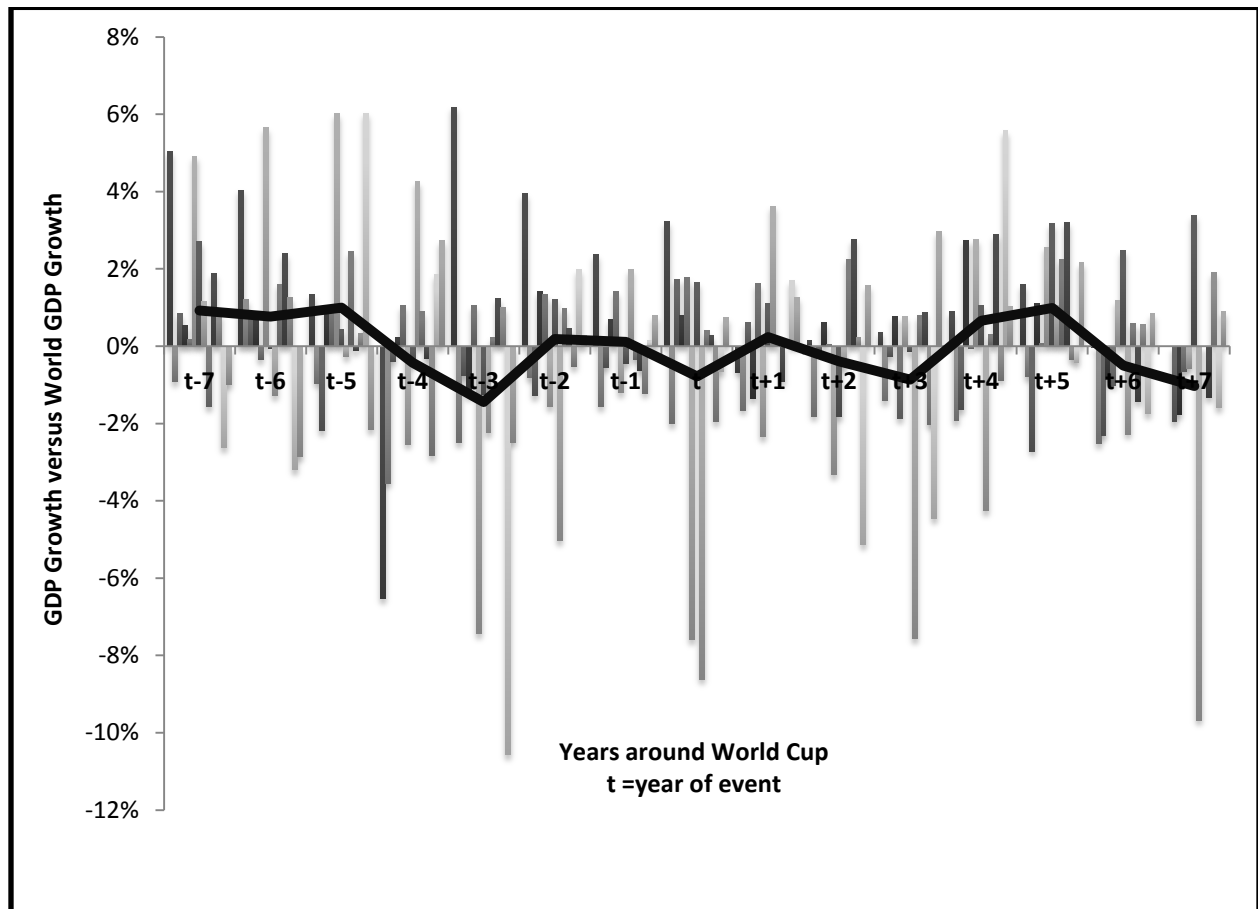
In almost all instances the positive effect on the economy is used as a strong argument for organizing a major sports event, such as the World Cup of Football or the Olympic Games. Is there any truth in this argument? And do we have any data to argue that there is such a positive effect? Although we have excluded this effect from our evaluation, we think it is useful for our insight in the value of cost benefit analyses to say something about this question.

In figure 1 we have used the information on GDP growth from thirteen host nations of the World Cup. In table 6 we see the 13 nations included.

Table 6: World Cup hosts

South Korea 2002	Argentina 1978
Japan 2002	West-Germany 1974
France 1998	Mexico 1970
United States 1994	England 1966
Italy 1990	Chili 1962
Mexico 1986	Sweden 1958
Spain 1982	

Figure 1: GDP effects World Cup



For this, we have used the data of the economic growth of the countries that have organized the World Cup since 1958 until 2002. This is extracted from the data of Angus Maddison⁵. The GDP growth in host countries is compared to the average GDP growth in the world. For every host we have compared GDP data from seven years before the tournament until seven years after. The columns in Figure 1 represent the individual countries in a specific year t compared to the average World GDP growth. The line in figure 1 shows the average of the thirteen countries compared to the average World GDP. As we see in the figure there is almost no or a small negative effect on economic growth compared with the average GDP growth of all countries in the years surrounding the World Cup. The conclusion that can be drawn from the figure above is

⁵ The data on GDP of countries in the World was collected by Angus Maddison. The information that is used in this paper is found on his website on 18th of October 2011 on <http://www.ggdc.net/MADDISON/oriindex.htm>

that there is no general effect on the economy. It is also mentioned by Coates (2009) that there is no significant effect from hosting such an event. Irons (2006) does find a positive effect in the two years following the event. However, he also states that the hypothesis that the GDP growth in the year of the event is not different from the years before and after cannot be rejected.

This however is a very simple way of calculating the effect of a World Cup on a host nation's economy. It is assumed that the World GDP growth is the GDP growth a country would have normally experienced. This is a simple assumption. It is questionable if a county that had a 1% higher GDP growth in World Cup year than the World GDP growth can attribute this to the World Cup. It is visible that in year $t-1$ and in year $t+1$ the average GDP growth of the World Cup hosts is equal by estimation to the average World GDP growth. In year t however the GDP growth of hosts is lower than the World GDP growth. This is in line with the findings of Irons (2006) who states that the economic growth is higher in the years following the event than in the year of the event. Coates (2009) states that these events have a very small impact on the economy. This also makes it very hard to attribute changes in the figure above to the World Cup.

The main problem with the analysis lies in the limited dataset. We have information on 13 countries. Another problem is that it is possible to see the changes in GDP growth. But how much is attributable to the World Cup? Thereby, hosting the World Cup needs investments in the years preceding the World Cup. Calculating these investments and their effect on the economy is very difficult. It is possible to see trends in GDP and make careful assumptions on the World Cup countries and corresponding growth rates. However, from this limited information it is not possible to analyze what the effect of the World Cup is on its host nation.

Chapter 5. What are the recommendations for the use of a cost benefit analysis to decide on hosting major sports events?

5.1 Conclusions

In the previous chapters we have analyzed two *ex ante* cost benefit analyses for the same event. An evaluation is also made of eighteen *ex ante* and *ex post* evaluations for different events. In the *ex ante* cost benefit analyses for the same event we recognized the aspects that are signaled in the literature about opportunity costs, the substitution effect and the crowding out effect. The positive bias gives a reason to be skeptical about cost benefit analyses that are commanded by interested parties.

In the meta evaluation we used the Sign-test and the Wilcoxon-test. It is clear there is a significant difference between the *ex ante* estimations and the *ex post* results. As we have seen in the literature this is not surprising conclusion. But we compared the *ex ante* and *ex post* evaluations to learn from them for future cost benefit analyses. We experienced a lot of difficulties in this evaluation process. For instance one has to make the data comparable and for this it is necessary to make a profound analysis of the reports. To learn from an *ex post* evaluation, it is imperative to use the same parameters. One has to be able to be very clear about which costs are attributed to the project and in which way one dealt with opportunity costs and crowding out effects.

5.2 Recommendations on the use of cost benefit analyses

Given the results found in this thesis there are a number of ways CBA's can be used in deciding on major sports events. Researchers should use *ex post* results of other events to make proper evaluations. There is data on earlier events. This gives insight in the potential costs and benefits of an upcoming event. This can reduce the *ex ante* bias. It is also important that the analyses are performed by impartial researchers. If an analysis is asked for by the organizing committee it is possible that researchers can be tempted to present more positive results.

Also, cost benefit analyses can be used in the years preceding the actual event itself. Especially in the case of major sports events, one sees there is a large time frame between the moment a cost benefit analysis is performed and the event itself. Circumstances can change and they will change more the longer the time between the cost benefit analysis and the actual event. A cost benefit analysis as an instrument in the decision-making process would work with different options that can be varied in time. Between the decision on who hosts the World Cup and the actual event is at least seven years. This is a long time frame. When scenarios change in this period one can adjust the initial cost benefit analysis. If the results change, it is possible to change investment decisions (Nijland et al., 2010). The analysis can be used to determine policy. For instance, the decision for the investment of a new motorway or a new stadium could also take into account the possibility of the venue for a World Cup or for the Olympic Games. With this approach a cost benefit analysis is becoming a living document instead of a snapshot.

After the event has been appointed to a country the cost benefit analysis can still be used. If another investment decision must be made it is useful to take into account the effects on the upcoming event. If the investment decision can be changed to optimize the effects the cost benefit analysis is still very useful, even after the actual process on deciding to host the World Cup.

5.3 Recommendations for further research on this subject

In this thesis a lot of data is collected on major sports events. The data is analyzed in a limited number of ways. One can use the data for more in depth research. For instance, is there a relation between the size of the event and the relative deviation between ex ante estimations and ex post results? Or, is there a relation between the benefits of the event and the overall economic situation of the organizing country? Is there a relation between benefits and the level of democracy? The guarantees that are demanded by the FIFA suggests there might be a relation here.

In conclusion, it is clear that this is a fruitful terrain for more research. This could also contribute to the decision-making process for major sports events. The economic and societal importance suggests that such a research should not be in vain.

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Appendix 1

The table below summarizes the data used for chapter 4. For each event that is studied the reports and analyses used is shown.

Event	Ex ante research	Ex post research
Vancouver Olympic Games, 2010	Mc Hugh, 2006 CPB, 2002	Vancouver Financial Statement, 2010
Beijing Olympic Games, 2008	Owen, 2005	Zhang & Zhao, 2009 Rosenblum, 2009 Wu, 2009
Athens Olympic Games, 2004	Kartakoulis, 2003 Liebreich, 2003	Kasimati & Dawson, 2008 BBC, 2005
Salt Lake City Olympic Games, 2002	Travel and Tourism Research Association, 2001 Findling, 2004	Baade et al., 2008 Baumann et al., 2010
Sydney Olympic Games, 2000	NSW Treasury, 1997	Giesecke & Madden, 2007 London Assembly, 2007
Atlanta Olympic Games, 1996	Humphreys & Plummer, 1995	Hotchkiss, 2001 London Assembly, 2007 Owen, 2005
Lillehammer Olympic Games, 1994	Teigland, 1999 New York Times, 1993	Teigland, 1999
Calgary Olympic Games, 1988	Ritchie & Aitken, 1984	Ritchie & Aitken, 1990 Ritchie & Smith, 1991 Wishart, 2011 Olympic Games Study Commission, 2002
Los Angeles Olympic Games, 1984	Baade & Matheson, 2002	Baade & Matheson, 2002

South Africa World Cup, 2010	Bohlmann, 2006 Baade & Matheson, 2011	Preuss, 2011 Plessis & Venter, 2010 Plessis & Maennig, 2011
Germany World Cup, 2006	Germany Tourism Report, 2006 Kurscheidt, 2000	Maennig, 2007
Japan World Cup, 2002	Manzenreiter, 2008 Finer, 2002	Manzenreiter, 2008 Baade & Matheson, 2004
South Korea World Cup, 2002	Lee, 2002 Finer, 2002	Horne & Manzenreiter, 2004 Baade & Matheson, 2004b
Austria European Cup, 2008	Hachleitner & Manzenreiter, 2010	Vienna Tourism Board, 2009
Giro Amsterdam Cycling, 2010	Gemeente Amsterdam, 2009	Meerwaarde, 2010
France Rugby, 2007	Chaire de marketing Sportif,	Barget & Gourget, 2010
Superbowl American Football, 1973-1997	Matheson, 2003	Matheson, 2003
MLB Baseball, 1973-1997	Baade & Matheson, 2001	Baade & Matheson, 2001

Appendix 2

Event	CBA	Costs (in million €)	Benefits (in million €)	Infrastructure (in million €)	Effect on employment (jobs)	Effect on tourism (nr. of tourists)
<u>Vancouver 2010</u>	Ex ante	1.328	1.252	-	34.000	37.000-83.000
<i>Olympic Games</i>	Ex post	1.377	1.377	-	-	-
<u>8Beijing 2008</u>	Ex ante	1.199	1.211	141	-	-
<i>Olympic Games</i>	Ex post	2.083,6	2.207,9	-	-	-
<u>Athens 2004</u>	Ex ante	7.419,7	-	2.804,39	32.000	440.000
<i>Olympic Games</i>	Ex post	7.478,3	-	4.900	7.700	-
<u>Salt Lake City 2002</u>	Ex ante	596	3.353,7	-	35.000	-
<i>Olympic Games</i>	Ex post	1.565	2.507,92	-	0	-
<u>Sydney 2000</u>	Ex ante	982,689	2.886,4	-	80.000	-
<i>Olympic Games</i>	Ex post	1.526,3	1.601,5	-	2.369	-
<u>Atlanta 1996</u>	Ex ante	1.178	3.800,8	446,6	77.000	€ 606.065.000
<i>Olympic Games</i>	Ex post	1.270	1.515	640	24.742	-
<u>Lillehammer 1994</u>	Ex ante	212	298	-	-	102% up
<i>Olympic Games</i>	Ex post	1.370	-	-	450	25% up
<u>Calgary 1988</u>	Ex ante	408,68	304-322 (in test: average)	106,74	4.500	887.000
<i>Olympic Games</i>	Ex post	511,77	310,71	255,88	-	900.000

<u>Los Angeles 1984</u>	Ex ante	-	-	-	73.375	600.000
<i>Olympic Games</i>	Ex post	-	-	-	5.043	-
<u>South Africa 2010</u>	Ex ante	2.906	3.60% GDP benefits	968,8	198.400	373.000
<i>World Cup</i>	Ex post	5.006	0.54% GDP benefits	-	120.000- 150.000 (in test: average)	109.621
<u>Germany 2006</u>	Ex ante	-	3.000	1.400	50.000	€ 1.250.000.000
<i>World Cup</i>	Ex post	-	-	1.510	25.000- 50.000 (in test: average)	€ 60.000.000
<u>Japan 2002</u>	Ex ante	-	0,6% GDP impact	1.117,5	-	-
<i>World Cup</i>	Ex post	-	-	2.981	-	482.000
<u>South Korea 2002</u>	Ex ante	-	2,3% GDP impact	1.117,5	350.000	400.000
<i>World Cup</i>	Ex post	-	-	1.490	-	463.000
<u>Austria 2008</u>	Ex ante	-	641	173	13.400	2.2mil-3.2mil
<i>European Cup</i>	Ex post	-	437	212	-	600.000
<u>Giro Amsterdam</u>	Ex ante	4,446475	25	1,5165	-	500.000
<u>2010</u>						
<i>Cycling</i>	Ex post	5,048	9,5	1,623	-	166.000
<u>France 2007</u>	Ex ante	-	250	-	-	350.000
<i>Rugby</i>	Ex post	99,45868	212,694461	28,025583	-	449.364

<u>Superbowl 1970-2001</u>	Ex ante	-	300-400 (in test: average)	-	-	-
<i>American Football</i>	Ex post	-	92	-	-	-
<u>MLB 1973-1997</u>	Ex ante	-	44,71	-	1.000	-
<i>Baseball</i>	Ex post	-	0	-	-8.000	-

Appendix 3

The figure below shows the simplified results used to perform the Wilcoxon tests.

	Costs_ex_ante	Costs_ex_post	Benefits_ex_ante	Benefits_ex_post	Infrastructure_ex_ante	Infrastructure_ex_post	Employment_ex_ante	Employment_ex_post	Tourism_ex_ante	Tourism_ex_post
1	1.00	1.55	1.00	.55	.	.	1.00	.03	.	.
2	1.00	1.01	.	.	1.00	1.75	1.00	.24	.	.
3	1.00	2.63	1.00	.75	.	.	1.00	.00	.	.
4	.	.	.	.	1.00	1.08	1.00	.75	1.00	.05
5	.	.	.	.	1.00	2.67	.	.	.	.
6	1.00	1.08	1.00	.40	1.00	1.43	1.00	.32	.	.
7	1.00	1.04	1.00	1.10	.	.	.	.	.	.
8	1.00	1.74	1.00	1.82	.	.	.	.	.	.
9	1.00	6.46	.	.	.	.	.	.	1.00	.25
10	1.00	1.72	1.00	.15	.	.	1.00	.69	1.00	.29
11	.	.	.	.	1.00	1.33	.	.	1.00	1.16
12	1.00	1.14	1.00	.38	1.00	1.07	.	.	1.00	.33
13	.	.	1.00	.00	.	.	1.00	-8.00	.	.
14	1.00	1.25	1.00	.99	1.00	2.40	.	.	1.00	1.01
15	.	.	1.00	.26	.	.	.	.	.	.
16	.	.	1.00	.68	1.00	1.23	.	.	1.00	.22
17	.	.	.	.	.	.	1.00	.07	.	.
18	.	.	1.00	.85	.	.	.	.	1.00	1.28

<i>Event 1</i>	Sydney 2000	<i>Event 10</i>	South Africa 2010
<i>Event 2</i>	Athens 2004	<i>Event 11</i>	South Korea 2002
<i>Event 3</i>	Salt Lake City 2002	<i>Event 12</i>	Giro Amsterdam 2010
<i>Event 4</i>	Germany 2006	<i>Event 13</i>	MLB 1973-1997
<i>Event 5</i>	Japan 2002	<i>Event 14</i>	Calgary 1988
<i>Event 6</i>	Atlanta 1996	<i>Event 15</i>	Superbowl 1970-2001
<i>Event 7</i>	Vancouver 2010	<i>Event 16</i>	Austria 2008
<i>Event 8</i>	Beijing 2008	<i>Event 17</i>	Los Angeles 1984
<i>Event 9</i>	Lillehammer 1994	<i>Event 18</i>	France 2007

Appendix 4

Below the extensive results of the Sign test and the Wilcoxon test are shown. The summaries of these tests are used in chapter 4.

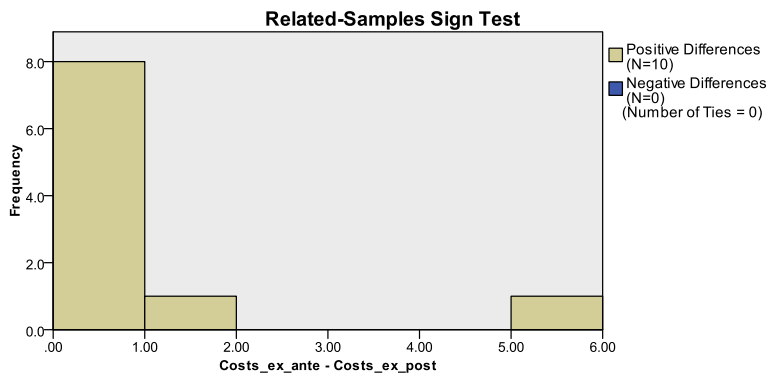
Test results Costs

Hypothesis Test Summary

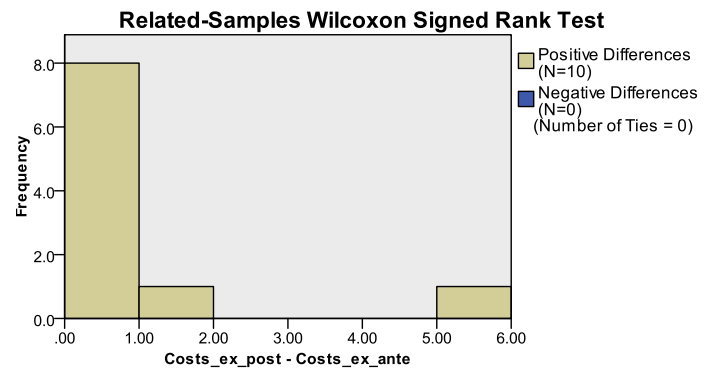
	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Costs_ex_post and Costs_ex_ante equals 0.	Related-Samples Sign Test	.002 ¹	Reject the null hypothesis.
2	The median of differences between Costs_ex_ante and Costs_ex_post equals 0.	Related-Samples Wilcoxon Signed Rank Test	.005	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

¹Exact significance is displayed for this test.



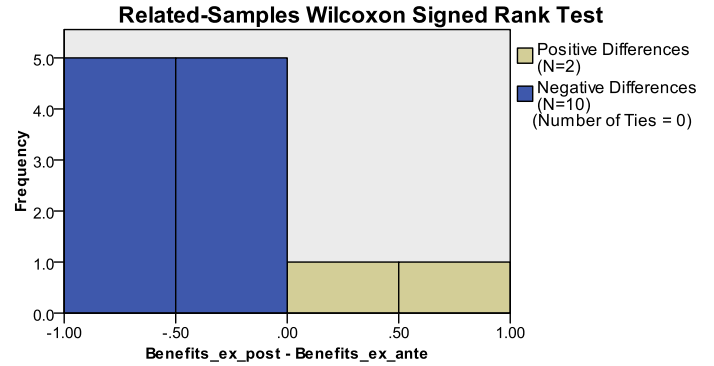
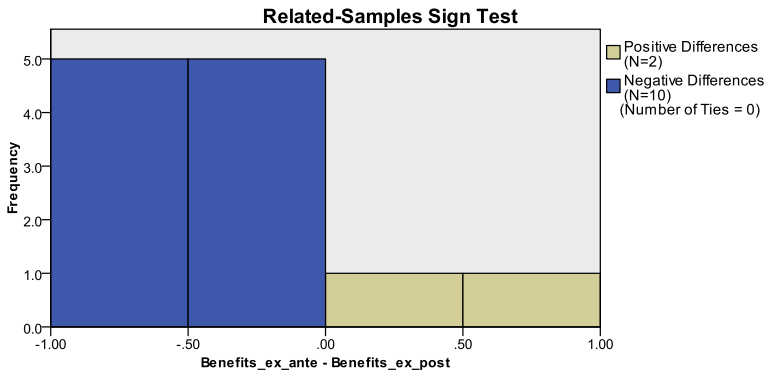
Total N	10
Test Statistic	10.000
Standard Error	1.581
Standardized Test Statistic	2.846
Asymptotic Sig. (2-sided test)	.004
Exact Sig. (2-sided test)	.002



Total N	10
Test Statistic	55.000
Standard Error	9.811
Standardized Test Statistic	2.803
Asymptotic Sig. (2-sided test)	.005

1. The exact p-value is computed based on the binomial distribution because there are 25 or fewer cases.

Test results Benefits



Total N	12
Test Statistic	2.000
Standard Error	1.732
Standardized Test Statistic	-2.021
Asymptotic Sig. (2-sided test)	.043
Exact Sig. (2-sided test)	.039

Total N	12
Test Statistic	12.000
Standard Error	12.748
Standardized Test Statistic	-2.118
Asymptotic Sig. (2-sided test)	.034

1. The exact p-value is computed based on the binomial distribution because there are 25 or fewer cases.

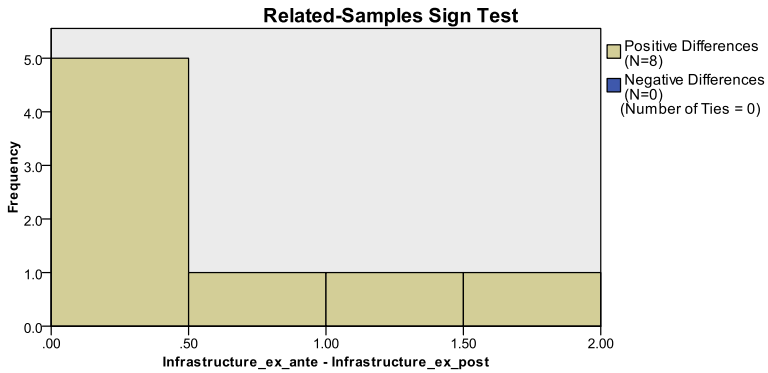
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Benefits_ex_post and Benefits_ex_ante equals 0.	Related-Samples Sign Test	.039 ¹	Reject the null hypothesis.
2	The median of differences between Benefits_ex_ante and Benefits_ex_post equals 0.	Related-Samples Wilcoxon Signed Rank Test	.034	Reject the null hypothesis.

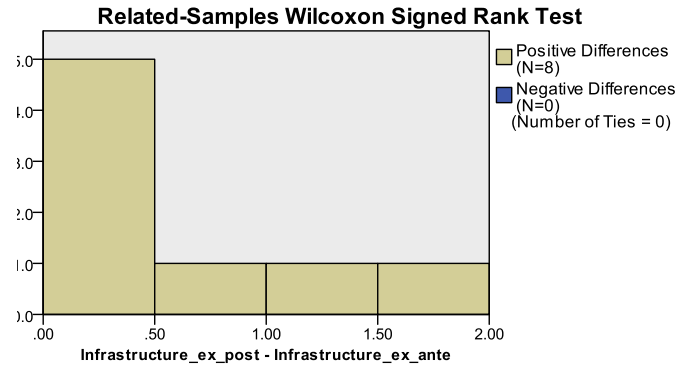
Asymptotic significances are displayed. The significance level is .05.

¹Exact significance is displayed for this test.

Test results costs of Infrastructure



Total N	8
Test Statistic	8.000
Standard Error	1.414
Standardized Test Statistic	2.475
Asymptotic Sig. (2-sided test)	.013
Exact Sig. (2-sided test)	.008



Total N	8
Test Statistic	36.000
Standard Error	7.141
Standardized Test Statistic	2.521
Asymptotic Sig. (2-sided test)	.012

1. The exact p-value is computed based on the binomial distribution because there are 25 or fewer cases.

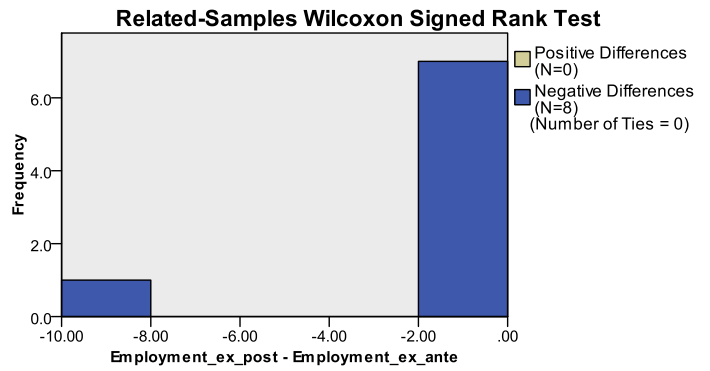
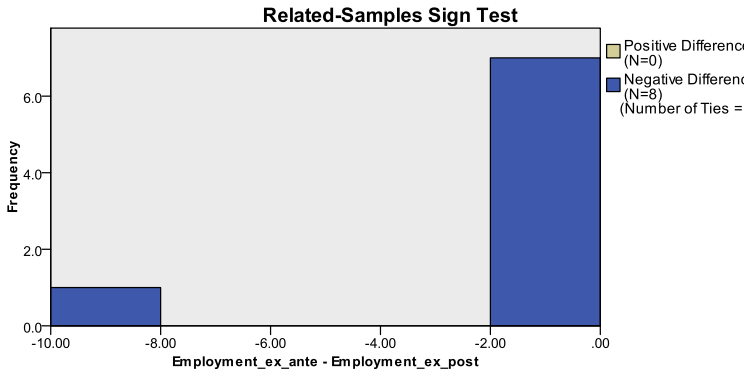
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Infrastructure_ex_post and Infrastructure_ex_ante equals 0.	Related-Samples Sign Test	.008 ¹	Reject the null hypothesis.
2	The median of differences between Infrastructure_ex_ante and Infrastructure_ex_post equals 0.	Related-Samples Wilcoxon Signed Rank Test	.012	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

¹Exact significance is displayed for this test.

Test results effects on Employment



Total N	8
Test Statistic	.000
Standard Error	1.414
Standardized Test Statistic	-2.475
Asymptotic Sig. (2-sided test)	.013
Exact Sig. (2-sided test)	.008

Total N	8
Test Statistic	.000
Standard Error	7.141
Standardized Test Statistic	-2.521
Asymptotic Sig. (2-sided test)	.012

1. The exact p-value is computed based on the binomial distribution because there are 25 or fewer cases.

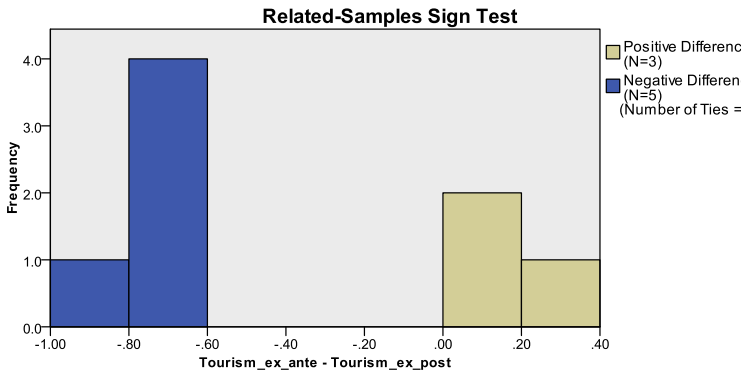
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Employment_ex_post and Employment_ex_ante equals 0.	Related-Samples Sign Test	.008 ¹	Reject the null hypothesis.
2	The median of differences between Employment_ex_ante and Employment_ex_post equals 0.	Related-Samples Wilcoxon Signed Rank Test	.012	Reject the null hypothesis.

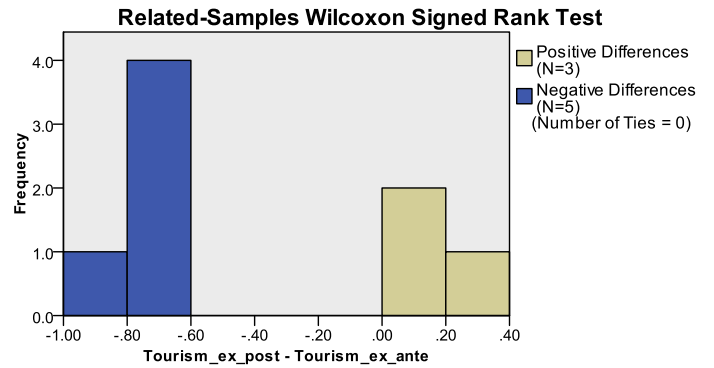
Asymptotic significances are displayed. The significance level is .05.

¹Exact significance is displayed for this test.

Test results effects on Tourism



Total N	8
Test Statistic	3.000
Standard Error	1.414
Standardized Test Statistic	-.354
Asymptotic Sig. (2-sided test)	.724
Exact Sig. (2-sided test)	.727



Total N	8
Test Statistic	6.000
Standard Error	7.141
Standardized Test Statistic	-1.680
Asymptotic Sig. (2-sided test)	.093

1. The exact p-value is computed based on the binomial distribution because there are 25 or fewer cases.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Tourism_ex_post and Tourism_ex_ante equals 0.	Related-Samples Sign Test	.727 ¹	Retain the null hypothesis.
2	The median of differences between Tourism_ex_ante and Tourism_ex_post equals 0.	Related-Samples Wilcoxon Signed Rank Test	.093	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

¹Exact significance is displayed for this test.