The Iconic Value of Infrastructure Projects – A Case Study

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Abstract
This study aims to provide insight in the iconic value of infrastructure projects by measuring the iconic value of the Erasmus Bridge in Rotterdam. This study was motivated by the lack of insight in iconic value in the appraisal of infrastructure projects aspiring to become iconic artifacts in Cost-Benefit Analysis. We designed a contingent valuation experiment, with two contingent scenarios and two respondent samples. One sample representing the inhabitants of the city of Rotterdam and one sample representing the inhabitants of the Netherlands excluding the inhabitants of Rotterdam. For both respondent samples significant (from zero) WTP estimates were found. Furthermore, people who virtually never use the Erasmus Bridge for transportation goals, or even see the Erasmus Bridge still have a WTP for the iconic value of the Erasmus Bridge. Allowing for uncertainties we estimated a lower bound and an upper bound for the total WTP for the iconic value of the Erasmus Bridge for inhabitants of the Netherlands. Regardless if we choose the lower bound (69.7 million euros) or the upper bound (95.7 million euros) the iconic value of the Erasmus Bridge is higher than the extra costs made in reality to build the Erasmus Bridge instead of a more conservative design (18 million euros). Hence, it can be concluded that the iconic value of infrastructure projects can be substantial, at least in the case of the Erasmus Bridge. Therefore iconic value should not be ignored in the CBA.
1. Introduction

The Social Cost-Benefit Analysis (CBA) is in many OECD countries used in public policy making to inform decision makers if the societal benefits of a project outweigh its costs (Mouter et al. 1). In the Netherlands the CBA has been an important method for the evaluation of transport infrastructure investments for the last few decades as well. Especially after the financial-economic crisis virtually no large transport infrastructure projects with a benefit-cost ratio lower than ‘1’ received funding (Mouter, 2). However, from a survey among 86 key individuals in the Dutch CBA practice it follows that a shortcoming in the CBA is that effects which are difficult to monetize are not given as much attention as effects which are easy to monetize (Mouter et al., 1). The key issue is that the non-monetized effects are discussed in the CBA report, but are not included in the final indicator of the CBA (e.g. the benefit-cost ratio or the net present value) which is – with a few exceptions – the only information that is used in political process and the media. Hence, the attention for effects that are not monetized – and thus not included in the final indicator – is marginalized because of the institutionalization of CBA.

The weak position of non-monetized effects in the CBA is especially problematic when planners aspire to optimize these intangible effects through the design of the infrastructure projects. Key examples are infrastructure projects aspiring to become iconic artifacts like the Golden Gate Bridge, Oresund Bridge and the Erasmus Bridge. The final indicator of the CBA of these iconic bridges will always be lower than more conservative designs because the non-monetized benefits of these iconic designs are not included in the final indicator of the CBA, whereas the additional costs that come along with the spectacular designs are included in this indicator.

Given the current influential role of the CBA in (Dutch) public policy making and the limited attention for non-monetized effects excluded from the final indicator of the CBA it can be argued that as a results of the firm institutionalization of CBA in the Netherlands, less iconic infrastructures are built than socially desirable. This is under the assumption that the iconic value of infrastructures which are built to become an icon is non-trivial.

Since there is scant attention for measuring the iconic value of infrastructure projects this study aims to measure the iconic value of the Erasmus Bridge in Rotterdam (the Netherlands, see figure 1). Contrary to the other studies which aimed scrutinizing the economic value of iconic artifacts (e.g. Noonan, 3), this study aims to isolate iconic value from other values. A key reason for choosing the Erasmus Bridge as object of interest for this study is that although the additional payments for the iconic design (18 million euros) were heavily contested prior to the decision to build the bridge, these additional costs are considered to be worthwhile ex-post by virtually all stakeholders (Annema and de Jong, 4). Moreover, the Erasmus Bridge is built with as most important goal to become an icon (Annema and de Jong, 4). Therefore, the chance to find significant results (and derive interesting insights) is high for this project. Given the above, this study aims to derive the willingness to pay (WTP) of the inhabitants of the Netherlands for the iconic value of the Erasmus Bridge ex-post.
To approach this question in a comprehensive and structured way, this paper is structured as follows. Section 2 will discuss the theoretical background of iconic value in the context of economic valuation in order to come up with a suitable valuation method. Based on this section, the survey research design will be discussed in section 3. Section 4 presents the results and section 5 concludes.

2. Theoretical background

2.1 The concept of iconic value

Already in the first century BC, Vitruvius described the architectural value of a structure on firmitas (firmness), utilitas (usefulness) and venustas (beauty). Throughout the literature about iconic architecture, iconic value and similar concepts are defined on the basis of criteria (e.g. Verheul, 5). Iconic value is used in a variety of contexts as a container definition for a variety of qualities of a project. Often recurring concepts are that iconic architecture symbolizes a certain event in history, it is a point of recognition and it has aesthetic characteristics which are distinguishing from other artifacts. The definition in this study is very similar to the one formulated by Verheul (5), who states that iconic architecture is famous, at least under a certain population, and that it distinguishes itself because of a certain symbolic or aesthetic meaning. Iconic value is in this study therefore defined as a function of aesthetic value, symbolic value and landmark value.

It is not claimed that this is a comprehensive definition which can be applied for all sites or situations. The definition is a starting point – focused on the Erasmus Bridge – and can be modified for a variety of situations. Furthermore, the attributes of iconic value can overlap and are therefore not distinct and exclusive. It is assumed that most of these values are embedded within the ‘harp design’ of the Erasmus Bridge, since that is what distinguishes the Erasmus Bridge from other bridges. However, it is also assumed that a part of the symbolic value of the Erasmus Bridge is not in the design of the bridge but in the fact that there is a direct bridge connection between flourishing center of Rotterdam and the deprived southern part of Rotterdam.
2.2 Measuring iconic value

The CBA aims to express the costs and benefits of a project as much as possible in monetary terms. This raises the question how iconic value of infrastructure projects can be expressed in monetary terms. According to the theory of welfare economics, efficient markets, in which consumers constantly make choices according to their preferences, ensure that goods and services are allocated optimally. Subsequently, the economic value of a good or service is based on the individual’s preferences for these goods and services (e.g. Baarsma, 6).

Iconic value is a positive external effect which means that stakeholders benefit from it, but they do not (or not fully) pay for it. The iconic value of iconic infrastructure projects is also a public good. A good is a public good if it is non-rival, which means that the consumption of it does not reduce its availability to others, and non-excludable, which means that it cannot be supplied to only those who pay for it. The fact that iconic value is a (positive) externality and a public good means that there is no market for it and therefore its economic value cannot be derived from the behavior of consumers in real markets.

Regarding economic valuation techniques, a distinction can be made between two basic strands of economic valuation methods for the valuation of non-market goods viz. revealed preference methods and stated preference methods. It is assumed that non-use values compose a significant part of the total economic value of the iconic value of infrastructure projects, this is supported in the literature (e.g. Hansen, 7). Given this assumption, revealed preference techniques are not suited, since they are only able to measure use values. Furthermore, given that the attributes of iconic value cannot be varied over a meaningful scale, the application of conjoint analysis is difficult. Therefore the contingent valuation method (CVM) is regarded to be the most suitable method to measure the WTP for the iconic value of the Erasmus Bridge.

2.3 The economic value of iconic value in the context of the CVM

The CVM relies on two important assumptions of the welfare economic theory. The first is that economic agents have well-structured preferences for many kinds of goods, and these agents are rational meaning that the choices they make are aimed at maximizing utility. The utility function of a utility maximizing economic agent can be represented as follows (Bateman et al., 8):

\[ U(Y, P, S, Q) = V(Y, P, S, Q) + \varepsilon \] (1)

In which Y is the income of the economic agent, P is the price of market goods and services, Q is the provision of non-market goods and S is a collection of other factors (both economic and demographic). In this study, Q represents the provision of iconic value by infrastructure projects. V is the systematic utility, which is the part of the utility that can be related to observed factors. Epsilon is the error term which represents the part of the utility which cannot be observed and is therefore treated stochastic. In a CV study respondents are presented with the prospect of change in provision of a non-market good or service from its present level (Q₀) to a greater level (Q₁). Assuming that an increase in provision of the non-market good represents an improvement, than the amount of money that will make the
respondent indifferent between having the money or having an increase in the non-market good can be expressed as follows:

\[ V(Y, P, Q^0, S) + \varepsilon_0 = V(Y - C, P, Q^1, S) + \varepsilon_1 \]  
\[(2)\]

Here, \( C \) can be interpreted as the maximum monetary compensation an economic agent is willing to give up for the provision of the non-market good, it is its maximum WTP (Bateman et al., 8).

3. Methodological approach

This section will describe the most important aspects of the survey design and will conclude with the discussion of some scientific concessions that were done in the iterative process of survey design in a multiple-stakeholder environment.

3.1 Target groups

This study has two target groups. The first is the inhabitants of Rotterdam. Since the Erasmus Bridge is located in Rotterdam, it is expected that the inhabitants of Rotterdam are well informed about the Erasmus Bridge, benefit significantly from its iconic value and therefore have a well-defined preference for this. However, since it is assumed that the total economic value of iconic value of infrastructure projects has a high share of non-use value, it is expected that people which derive utility from its iconic value are not geographically bounded to Rotterdam. Hence, a second target respondent group consists out of the inhabitants of the Netherlands excluding the inhabitants of Rotterdam.

3.2 Sampling

The data collection for both target groups was different. Per group the data collection will be discussed as well as the representativeness of the sample. The most important indicator for the representativeness in this study is the monthly net income of the household, since it is assumed that this is one of the main determinants of the respondents WTP. The inhabitants of Rotterdam were represented by the City Panel Rotterdam. This is a panel of 4000 respondents. The people in this panel fill out surveys on a voluntarily basis. In total 1848 people of the City Panel Rotterdam filled out the survey.

In figure 2 (left) the distribution of monthly net income of the City Panel Rotterdam is compared to the population of Rotterdam. Rotterdam has 283,820 households in total (in 2010) (de Graaf, 9). It can be observed that households with a low income (< €1500 per month) are clearly underrepresented and households within the highest income category are overrepresented. Furthermore, a substantial part (18%) of the respondents didn’t want to state the net monthly income of their household. Due to these misrepresentations, the panel is not very representative for the population of Rotterdam. Therefore, the results obtained from this panel should be treated with caution and cannot be blindly generalized to the population of Rotterdam. This limited generalizability is amplified by factors which cannot be captured by
socio-demographic variables. The fact that people are ‘member’ of a city panel, already implies they have certain characteristics which distinguishes them from people which are not a member.

When using the total population of the Netherlands, the inhabitants of Rotterdam are double counted. Hence, the population of Rotterdam should be subtracted from the population of the Netherlands. The total population of the Netherlands in 2010, except the inhabitants of Rotterdam consist out of 7,051,342 households (de Graaf, 9; CBS, 10). The households are subtracted in the ratio of income groups of the City Panel of Rotterdam. In figure 2 (right) the distribution of monthly net income of the sample collected outside of Rotterdam is compared to the population of the Netherlands. It can be observed that for the second and third income group, the sample is a good representation of the population of the Netherlands. However, as with the City Panel of Rotterdam, the lowest income category (< €1500 per month) is clearly underrepresented in the sample.

3.3 Contingent scenarios

Two different scenarios were designed, see figure 3. In both scenarios the respondents were asked to think of a state of affairs without an Erasmus Bridge. Moreover, the respondents were informed that the municipality is planning to build a bridge at the location where now the Erasmus Bridge is located. In the first scenario the municipality of Rotterdam has two alternative bridge designs: a ‘flat bridge’ with a standard design and a bridge which is equal to the current Erasmus Bridge. The alternatives only differ in costs and appearance. The infrastructural capacity etc. are equal. The municipality has enough budget to build the ‘flat bridge’, but not to build the Erasmus Bridge. Respondents have to state if they are willing to pay a monetary compensation to make it possible for the municipality of Rotterdam to build the Erasmus Bridge instead of the flat bridge. If not enough money is collected, the flat bridge will be built instead of the Erasmus Bridge. In the second scenario the municipality of Rotterdam plans to build a bridge which is equal to the current Erasmus Bridge. However, the municipality has not enough budget for building a bridge at all. Respondents have to state if they are willing to pay a monetary compensation to make it possible for the municipality of Rotterdam to build the Erasmus Bridge. If not enough money is collected, no bridge connection will be build.
Since the first scenario has to most resemblance with de definition of iconic value, as discussed in 2.1, the estimates from this scenario can be regarded as an indicator for the iconic value of the Erasmus Bridge. The main rationale for incorporating the second scenario is that in the CV literature it is argued that there seems to be a persistent part-whole bias in many CV studies. The second scenario can allow for this, since in reality much more costs are associated with the first scenario than with the second scenario. In theory, people should be willing to pay more for the Erasmus Bridge than for an ‘upgrade’ from a conventional bridge to the Erasmus Bridge.

3.4 Elicitation format

Based on the recommendations of the NOAA panel, a dichotomous choice format is chosen (Arrow et al., 11). However, the use of only one dichotomous choice question is statistically inefficient. Therefore, a Double Bounded Dichotomous Choice (DBDC) format was used with starting bids of 20 and 30 euros and follow-up bids, contingent upon the answer on the first bid, of 10, 20, 30 and 40 euros. After the DBDC questions an open-ended question asked respondents’ to articulate their maximum WTP. This question is used to identify respondents having a zero WTP and to get a more precise insight in the maximum WTP of the respondents since only two starting bids were used. When respondents stated that they have a zero WTP on the open-ended valuation question, they were presented a multiple-choice question about their motivation with the following response options:

- In my opinion, the flat bridge is as good as the Erasmus Bridge (for scenario 1). I do not see the need to build the Erasmus Bridge (scenario 2);
- I cannot afford it;
• I think that others should pay for this (for example the municipality of Rotterdam, the
Dutch National Government, companies, etc.);
• A different reason, viz. (people could fill in their reason in a text box).

3.5 Payment vehicle
The payment vehicle is a one-time voluntarily contribution to the municipality. The reason that
such a payment vehicle is used in this study is that the municipality of Rotterdam expected that
the panel members would be very susceptible towards coercive payment vehicles like taxes.
This would lead to many protest bids.

3.6 Non-response
In CV studies, it is common to separate the protest zero bids from the ‘normal’ zero bids. Protest
zero bids are respondents who state that they are not willing to pay anything and motivate this
WTP by something else than the change of provision of the non-market good in the scenario.
Separating the protest zeros from the ‘normal’ zero bids is to some degree judgmental. This
process is often criticized throughout the literature (e.g. Stolwijk, 12). To keep this process as
transparent and objective as possible, different data samples were created, each with different
criteria to identify protest bids. The first sample is the whole sample without removing any of
the zero bids, in the second sample the zero bids which are motivated by ‘others should pay for
this’ are removed and in the third sample all the zero bids which are motivated by a reference
to the payment vehicle were removed. These zero bids are removed because they can be
motivated by the payment vehicle (voluntary contribution) rather than the change in the
scenario. Sequentially these samples are referred to as ‘whole sample’, ‘Excl. others should
pay’ and ‘Excl. others should pay & tax arguments’.

3.7 Scientific concessions
The design of the survey was an iterative process in cooperation with the municipality of
Rotterdam. In this iterative process some design choices were made which were at the expense
of what would be theoretically optimal and are therefore referred to as scientific concessions.
These will be briefly summed up below and are important for the interpretation of the results.

• Building the Erasmus Bridge again instead of using the current situation as starting
point. It is questionable if respondents experience this as consequential, since
respondents may not feel that their response may influence the actions of the
municipality of Rotterdam;
• Using a voluntarily payment vehicle; the literature qualify this payments vehicle as
suboptimal;
• Using a very limited amounts of starting bids. In order to get as much information as
possible from the distribution of the underlying WTP of the respondents, the CVM
guidelines prescribe to use a large range of starting bids when using the dichotomous
choice format. However, due to time constraints only two starting bids were used, which
is low. Hence, the estimates in this study are rough.
4. Results
First, the econometric models which were used for the analysis of the dichotomous choice data will be discussed. Second, some relevant WTP estimates will be discussed as well as the aggregated WTP of the two samples. Finally, some remarkable results from the second scenario will be discussed. Stata 13 was used as statistical software package.

4.1 Choice models
Three models were applied on the dichotomous choice data viz. the univariate logit model, the interval-data model as introduced by Hanemann et al. (13) and the more general bivariate probit model as suggested by Cameron and Quiggin (14). Below a general formulation for the bivariate probit model is presented (Alemayehu and Smallholder, 15).

\[
\begin{align*}
Y_1^* &= x_1 \beta_1 + \epsilon_1 \\
Y_2^* &= x_2 \beta_2 + \epsilon_2
\end{align*}
\]  

(3)

\[
[\epsilon_1, \epsilon_2] \sim \text{N} \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right)
\]

(4)

In which \(Y_1^*\) is the respondent’s unobservable true WTP when the first bid is offered. The WTP is 1 if \(Y_1^*\) bigger than the first bid offered and zero otherwise. The same holds for \(Y_2^*\). The parameters \(x_1\) and \(x_2\) are the first and second bid offered to the respondents and \(\beta_1\) and \(\beta_2\) are the coefficients of the first and second bid. It is assumed that the error terms are normally distributed with a zero mean and variances \(\sigma_1\) and \(\sigma_2\) and have a bivariate normal distribution with correlation coefficient \(\rho\), BVN \((0,0,1,1,\rho)\) [14]. Restricting the bivariate probit model by \(\beta_1 = \beta_2\), \(\sigma_1 = \sigma_2\) and \(\rho = 1\) results in the interval-data model in which it is assumed that there is one underlying valuation function which drives both answers on the dichotomous questions (Cameron and Quiggin, 14). Even though the general bivariate probit model is technically superior to the interval-data model, since it is less constrained, there is no consensus regarding which model should be applied. Alberini (16) suggests that while the bivariate probit model might be technically superior, the estimates of the data-interval model are surprisingly robust to low values \(\rho\), even though the interval-data model is technically wrong...This suggest that the researcher’s model selection strategy might favor the interval-data model, even though the correlation between WTP values is less than perfect” (Alberini, 16, p. 179). Furthermore, given its more simple interpretation, the interval-data is often applied to the analysis of DBDC data. Alberini (16) suggests estimating both the interval-data model and the bivariate probit model to see if large differences in WTP estimates occur. The interval-data model is estimated by means of the “doubleb” command (lopes-feldman, 17). The bivariate probit model is estimate by using the “Seemingly Unrelated Bivariate Probit” command (e.g., 15).
4.2 WTP estimates
Since the first scenario has the most resemblance with the definition of iconic value, these WTP estimates should be interpreted as a proxy for the iconic value of the Erasmus Bridge. A distinction is made between the whole sample, people who stated that they virtually never use the Erasmus Bridge and people who stated that they virtually never see the Erasmus Bridge. In table 1 the WTP estimates are presented for the different samples. From the choice models, only WTP estimates which are significantly different from zero (within the 95% confidence interval) are presented. For the ‘non-see values’ of the City Panel Rotterdam, the people who stated that they see the Erasmus Bridge approximately once a month are also included in the estimation. There were not enough people in the City Panel Rotterdam who stated that they virtually never see the Erasmus Bridge to estimate significant WTP values. The different choice models gave different WTP estimates. The lowest estimation (LE) and the highest estimation (HE) of the mean WTP are given for each sample. For example, for the City Panel of Rotterdam the lowest estimation for the whole sample is €20.52 and the highest estimation is €25.87. Standard errors are presented in the parenthesis. The standard errors of WTP estimates are calculated by means of the Delta-method. When no standard errors are presented, the WTP is calculated by taking the average value of the open-ended valuation question.

<table>
<thead>
<tr>
<th>TABLE 1 WTP Estimates for the Different Samples</th>
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<tbody>
<tr>
<td>City Panel Rotterdam</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1. Whole sample</td>
</tr>
<tr>
<td>2. Excl. others should pay</td>
</tr>
<tr>
<td>3. Excl. others should pay &amp; tax arguments</td>
</tr>
<tr>
<td>Outside of Rotterdam</td>
</tr>
<tr>
<td>1. Whole sample</td>
</tr>
<tr>
<td>2. Excl. others should pay</td>
</tr>
<tr>
<td>3. Excl. others should pay &amp; tax arguments</td>
</tr>
</tbody>
</table>

As discussed in the third section, in both the City Panel of Rotterdam as the sample collected outside of Rotterdam, the lowest income group (<€1500 per month) was underrepresented. It would therefore be inappropriate to simply aggregate the average WTP estimates to the target populations. This is corrected by taking into account the WTP per income category. For the City Panel of Rotterdam the average WTP is estimated per income category. For the lowest income category no significant WTP estimates were found. For this group the aggregated WTP estimates are given by a range, with assumptions about the WTP. The second income group has an estimated WTP of approximately €20.52. When multiplying this with the number of households in Rotterdam which fall within this income category...
(96,499 households, de Graaf, 9) the aggregated WTP becomes €1,970,505. The third income
group has an estimated WTP of approximately €38. Aggregating this over the associated
population of Rotterdam (45,411 households, de Graaf, 9) the aggregated WTP becomes
€1,725,625. The total WTP of both the second and third income group of the inhabitants of
Rotterdam is therefore approximately 3.7 million euros. Assuming that the WTP for the lowest
income category cannot be more than the WTP of the second group (€20.52), the maximum
aggregated WTP for this group will be €2,955,758. The total WTP of the inhabitants of
Rotterdam will therefore be somewhere between 3.7 million euros (when the WTP of the first
income group is equal to zero) and 6.7 million euros (when the WTP of the first income group
is equal to the second income group).

The sample collected outside of Rotterdam was not large enough to estimate the WTP
for each income category separately. However, the second and third income categories are well
represented by the sample collected outside of Rotterdam. Therefore, the lower bound of the
basic WTP estimate from table 1 will be aggregated over the population which falls within the
second or third income category. The most conservative estimate for the whole sample is
€12.65. Aggregating this estimate over the target population who fall within the second and
third income category (5,071,090 households, CBS, 10) gives a total WTP of approximately 66
million euros. This calculation does not incorporate the lowest income group. When applying
the same logic as above (for the City Panel of Rotterdam) the total WTP of the inhabitants of
the Netherlands will be somewhere between 64 million euros (when the WTP of the first
income group is equal to zero) and 89 million euros (when the WTP of the first income group
is equal to the second and third income group). When we add up the WTP of citizens of
Rotterdam and the WTP of citizens of the Netherlands excluding the citizens of Rotterdam the
WTP for the iconic value of the Erasmus Bridge is somewhere between 69.7 million euros and
95.7 million euros which implies that the iconic value of the Erasmus Bridge is higher than the
extra costs made in reality to build the Erasmus Bridge instead of a more conservative design
(18 million euros).

Above the mean WTP estimates are aggregated over the households of the target
population. This is the most conservative estimate which can be given, since it assumes that the
other persons in the households do not have a WTP. This can be defended by the fact that
people might consider such expenses for their households instead of on an individual basis. If
it is assumed that the children in a household do not have a WTP, the number of people with a
potential WTP in Rotterdam is approximately 447,000 (de Graaf, 9), (COS, 18) (in 2010)
people and in the Netherlands 12,059,000 people (in 2010) [10].
4.3 Second scenario

A remarkable observation is that the second scenario resulted in lower WTP estimates than the first scenario, while in reality there are much more costs associated with the second scenario than with the first scenario. The cause of this discordance cannot be pointed out with certainty. However, at the end of the survey respondents could leave any comments regarding the survey. Various respondents who were presented with the second scenario stated that they missed the possibility of the municipality of Rotterdam to build a bridge for which there is sufficient budget. They argued that there is now the choice between nothing and something very expensive (even megalomaniac). People might consider the provision of an infrastructure for basic transportation needs a task of the government. Therefore people might find it difficult to express a WTP for such a scenario and miss the option to build a more sober bridge which falls within the budget of the government. In contrary, the first scenario could be regarded as 'something extra' on the basic function of an infrastructure, and may thereby not be regarded something that only the government should decide upon.

5. Conclusions and discussion

This study was motivated by the lack of insight in iconic value and its impact for the appraisal of infrastructure projects aspired to become iconic artifacts. The empirical approach used in this study provides interesting insights in the mainly qualitative debate about iconic value.

5.1 Conclusions

The first important conclusion is that the iconic value, as defined in the first scenario, is significantly different from zero for both the City Panel of Rotterdam as the sample collected outside of Rotterdam. In other words, both the inhabitants of Rotterdam and the people outside of Rotterdam have a WTP for the iconic value of the Erasmus Bridge. This suggests that the Erasmus Bridge is not only a city icon, but maybe even considered a national icon.

A second important conclusion is that people who virtually never use the Erasmus Bridge for transportation goals still have a WTP for the iconic value of the Erasmus Bridge which is significantly different from zero. This supports the hypothesis that the total economic value of iconic value consists for a part out of non-use values.

However, in the case of the iconic value of infrastructure projects, a better proxy for the non-use value are people who virtually never see the Erasmus Bridge. People can still derive utility from the iconic value of the Erasmus Bridge, even though they do not use the Erasmus Bridge for transportation goals. A third important conclusion is that people who virtually never see (in the sample collected outside Rotterdam) and people who see the Erasmus Bridge approximately once a month (for the City Panel Rotterdam) still have a WTP for the iconic value of the Erasmus Bridge.

Finally, regardless if the lower or upper WTP bound for the lowest income group is chosen (69.7 million euros and 95.7 million euros respectively), the total WTP for the iconic value of the Erasmus Bridge is higher than the extra costs made in reality to build the Erasmus Bridge instead of a more conservative design (18 million euros).
5.2 Limitations

This study is bounded to a number of limitations. The first one is its generalizability, especially regarding the misrepresentation of the lowest income group (< €1500 net income per month) in both samples.

Second, the application of the CVM in this study. The NOAA panel concluded that the CV method could convey useful information if strict conditions are fulfilled (Arrow et al., 11). However, certain concessions have been made in the design of the survey. These concessions were often at the expense of what would be theoretically optimal according to CV guidelines like the one of the NOAA panel. In short these concessions were: the use of a voluntarily payment vehicle instead of a mandatory payment vehicle, the hypothetical situation in which respondents had to imagine that the Erasmus Bridge was never built and the use of only two starting bids.

5.3 Implications and recommendations for future research

The main contribution of this study is not to come up with an unambiguous value for the iconic value of the Erasmus Bridge. Instead of using the CVM to come up with 'true' values for non-market goods like iconic value, it should be used as a policy support method to estimate the subjective values of such non-market goods. When the results are approached from such a perspective, this study has some interesting implications.

Despite the shortcomings of this study, for example in the design of the survey, significant WTP estimates were found with a substantial total estimated WTP for the inhabitants of the Netherlands. Therefore, from this study, it can be concluded that the iconic value of infrastructure projects can be substantial, at least in the case of the Erasmus Bridge. Iconic value should therefore not be ignored in the CBA. It is recommended to clearly point out, which aspects of iconic value (or any other related non-market values) are being measured. By doing so iconic value is treated as a complex non-market value, like many others. Expressing such values in monetary terms can definitely be useful, but results should be interpreted prudently.

Incorporating iconic value as a monetary item in such a way in the ex-ante CBA that a well-founded discussion regarding this subject can be held, might be seen as a sort of ultimate goal. In our opinion, well-founded refers in this context to a situation in which there in no underinvestment in iconic value, but also no over investment in prestige projects of which the benefits are disproportionate to the costs. However, more research is needed to find the optimal approach and method. It is recommended to perform more ex-post analysis to gain insight in the types of effects associated with iconic infrastructure projects and to get a rough understanding of the magnitude of iconic value. Therefore, an interesting avenue for further research is replicating this study for other infrastructure projects which are considered iconic artifacts. When the knowledge base about the value of iconic infrastructures is expanded policy makers could decide in a more informed way about the amount of money they wish to allocate towards iconic designs when they are armed with these empirical results.

This study made an attempt to express the iconic value of the Erasmus Bridge in monetary terms, by means of the CVM. Above it is argued that it could be interesting to
replicate this study for other infrastructure projects. Therefore this paper finalizes with some recommendations for such future studies, based on the experiences from this study.

1. As discussed in the fourth section, the second valuation scenario resulted in very remarkable results. However, some respondents who were presented with the first scenario stated that the design of the flat bridge was not as clear as the design of the improved situation (the Erasmus Bridge). It is therefore very important to specify the status-quo, for instance by showing a prototype design to the respondents. However, there is a risk that the status-quo also has properties of iconic value. If this is the case one should bear in mind that the iconic value of the improved situation is not determined relative to zero, but relative to the iconic value of the basic design;

2. Even though the Erasmus Bridge is often labeled as a ‘city icon’, the respondents in the sample collected outside of Rotterdam still had a WTP significantly different from zero. This suggests that the Erasmus Bridge is not only a city icon, but maybe also a national icon. This observation should be taken into account when studying other iconic infrastructure projects. The target population might be larger than one assumes a priori, which can lead to an underestimation of the iconic value.

6. References


