Unrealistic optimism in the financing of large infrastructure projects in Europe

Results of a survey among private investors, public investors, and lenders

Wenke Bengtsson, Prof. Dr. Andreas Pfnür

TECHNISCHE UNIVERSITÄT DARMSTADT

Forschungscenter Betriebliche Immobilienwirtschaft

Prof. Dr. Andreas Pfnür (Hrsg.)
Fachgebiet Immobilienwirtschaft
und Baubetriebswirtschaftslehre
www.immobilien-forschung.de

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Autoren: Wenke Bengtsson

Prof. Dr. Andreas Pfnür

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Prof. Dr. Andreas Pfnür
Fachgebiet Immobilienwirtschaft und Baubetriebswirtschaftslehre
Fachbereich Rechts- und Wirtschaftswissenschaften
Technische Universität Darmstadt
Hochschulstr. 1
64289 Darmstadt

Telefon +49 (0) 6151 / 16 - 24510
Telefax +49 (0) 6151 / 16 - 24519
E-Mail office-bwl9@bwl.tu-darmstadt.de
Homepage www.immobilien-forschung.de, www.fbi.tu-darmstadt.de
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Executive summary

There is a gap in infrastructure financing in Europe. One action that can be taken to close the gap is to optimize public and corporate spending. For this, project risks need to be understood in their full complexity. However, heuristics and cognitive bias can lead decision makers to under- and overvalue risks and rewards. Goal of the survey was to understand the use of cognitive bias in infrastructure project finance in order to find ways to make the risk assessments even more realistic than it is today. A major finding is that unrealistic optimism influences risk assessment in the financing of European infrastructure projects. However, the unrealistic optimism is at least partly situational and not strictly rooted in the head of the decision maker no matter the circumstance. Thus, companies can reduce the unrealistic optimism of the individual with the right institutional structure and team setting.

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1. Background and objectives

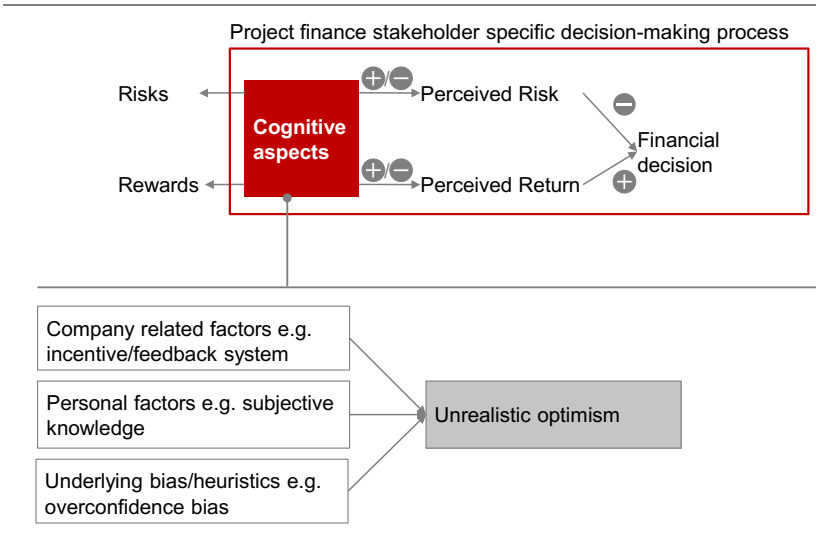
Investments into infrastructure assets are key to maintaining Europe's competitiveness (Woetzel et al. 2017). According to the European Commission, by 2020 there are investment needs of 2 trillion Euros in European energy, transport and information and communication technology infrastructures to keep the European Union competitive (Scannella 2012).

However, all over the world, even in Europe, there is a gap in infrastructure financing (Heath and Read 2014). Main reasons for this gap are the constrained public budget and long-term funding from banks, as well as problems to match supply of private sector finance with investable projects (Woetzel et al. 2017).

One action that can be taken to close the gap is to optimize public and corporate spending to make most of these constraint resources. The implementation of infrastructure projects as Public Private Partnership project financing typically optimizes public spending by transferring risks from the public to the private sector (Bundesministerium der Finanzen 2016). In the case of Public Private Partnership project financing, investors and lenders not only play an important role in the provision of capital for projects, but also evaluate, monitor, and control risks (Irimia-Diéguez et al. 2014).

However, for this, risks need to be understood in their full complexity. Investors and lenders along with other stakeholders in project financing, typically make decisions based on a process of carefully weighting risks and returns. For this they use frameworks and models that have been developed to support the decision-making process (Hampl and Wüstenhagen 2013). However, the use of models does not guarantee objective decision making. Inputs which decision makers put into the models are often inaccurate when risk or uncertainty are involved in the decision, because in situations of uncertainty, decision makers more frequently apply heuristics and fall prey to cognitive biases in their decision-making-process (Kahneman and Tversky 1982).

Exhibit 1: Unrealistic optimism in PF can lead to over- and underevaluating risks/rewards



Source: Adapted from Hampl and Wüstenhagen 2012

Heuristics and cognitive bias can lead decision makers on both the lender and investor side to under- and overvalue risks and rewards, as can be seen in Exhibit 1. In such situations, not actual risks play a role in decision making, but rather perceived risks i.e. subjective judgement the decision maker makes about the severity, likelihood, and other characteristics of the risk.

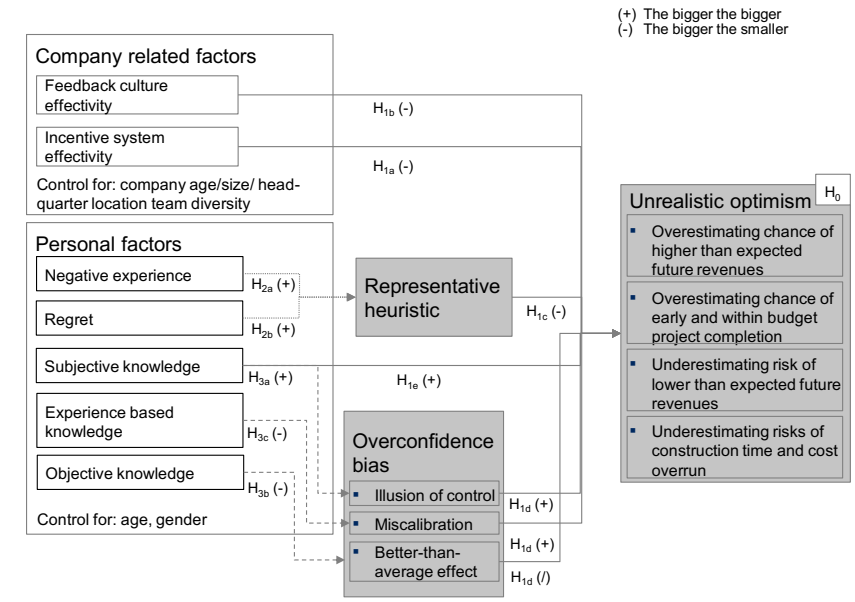
One of the cognitive biases that effect risk perception is unrealistic optimism. Unrealistic optimism may cause unnecessary risk taking and insufficient preparation for problems (Shepperd et al. 2016) and can lead to a systematically wrong allocation of probabilities and irrational decisions (Flyvbjerg et al. 2014). Previous research has focused on identifying factors

that influence unrealistic optimism in order to be able to reduce this bias. Among these are incentive system distinctiveness, feedback system distinctiveness, subjective knowledge i.e. the knowledge the decision maker thinks he has, and the overconfidence bias.

An important challenge for individual lenders and investors in making decisions in the context of project finance is to overcome own unconscious biases, specifically those related to the perception of risks and rewards like unrealistic optimism. Companies involved in infrastructure project finance lending and investing activities in turn face the challenge to provide an institutional environment that prevents biased decision making.

Therefore, using behavioral finance and project finance literature a theoretical causal model of unrealistic optimism was developed including all biases applicable in the PF large infrastructure projects, as well as relevant influencing factors. This model can be seen in Exhibit 2. It was hypothesized that company related factors (feedback system distinctiveness and incentive system distinctiveness), personal factors (negative experience, regret, objective knowledge, subjective knowledge, and experience based knowledge), and the overconfidence bias and representative heuristic influence unrealistic optimism.

Exhibit 2: Hypothesized causal model of individual decision maker unrealistic optimism in infrastructure project finance



Source: Own illustration

2. Survey method

To test the initially proposed theoretical model, unrealistic optimism, overconfidence, and the use of the representative heuristic were measured using questions in a survey. This is a common method in empirical social science (Vetter, Benlian, & Hess, 2011). All questions were derived from previous literature and adapted to the field of infrastructure project finance. Further company related factors, personal factors, and control variables were measured in the survey.

The survey was conducted with relevant decision makers in European infrastructure project finance.

To identify the relevant population for lenders those banks were targeted that were included in the Project Finance International Top 100 ranking 2016, had a lead-arranging role in at least one European infrastructure PF deal with debt >75 million in 2016, and performed at least 5 PF deals in 2016. Relevant decision makers were identified over LinkedIn. Those decision makers were chosen whose profile on LinkedIn showed that they were currently working in the

relevant department of the identified banks and whose business E-Mail addresses were found online or contact could be established through LinkedIn. This yielded an overall lender population of 472 bankers from 45 companies.

To identify the relevant population for private investors those companies were targeted that were included in the 2016 Infrastructure Investor Top 50 ranking, have invested in infrastructure in Europe, and have participated in PF deals in the past. Relevant decision makers were identified over LinkedIn. Those decision makers were chosen whose profile on LinkedIn showed that they were currently working in the relevant companies and whose business E-Mail addresses were found online or contact could be established through LinkedIn. This yielded an overall private investor population of 374 investors from 37 companies.

To identify the relevant population for public investors those public departments/agencies were targeted that were member of the International Project Finance Association in 2016 and that focused on energy and transport/infrastructure. Relevant decision makers were identified over LinkedIn. Those decision makers were chosen whose profile on LinkedIn showed that they were currently working in the relevant public department/agency and where business E-Mail addresses were found online or contact could be established on LinkedIn. This yielded an overall public investor population of 45 officials from 11 European public departments/institutions.

The survey was answered by 145 lenders, private and public investors, however due to some incomplete answers, only 102 survey results could be used for analysis.

Table 1: Survey participation

	Companies contacted	Decision makers contacted	Complete responses	Partial responses	Brutto response rate, percent
Lender	45	472	67	34	21.4
Private investor	37	374	16	18	9.1
Public investor	11	45	4	6	22.2
Total	**93**	**891**	**87**	**58**	**16.3**

3. Results of the survey

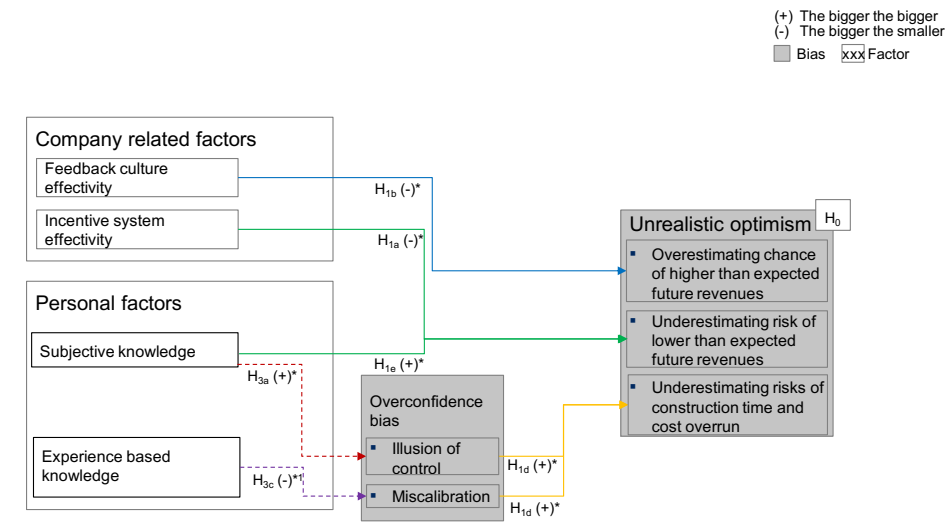
To find out if decision making behavior is biased by unrealistic optimism, participants were asked to indicate how large the likelihood of experiencing certain events was for themselves compared to the likelihood for colleagues. Overall clear evidence for unrealistic optimism was found in the sample. Results show for instance that on average decision makers estimate the probability that one of the projects they are responsible for right now will face massive time and cost overruns in the future at 19.29%. The same risk is seen at 23.16% for colleagues. So, unrealistic optimism regarding risk of construction time and cost overrun is estimated 3.86% higher for colleagues. Another example for overall unrealistic optimism in the sample is that decision makers estimate the probability that one of the projects they are responsible for right now will deliver less revenues in the future than they estimated on average at 3.43 on a 7-point Likert scale. The same risk is seen at 3.53 for colleagues. So, unrealistic optimism regarding risk of lower than expected future revenues is estimated 0.25 points higher for colleagues.

The unrealistic optimism was fueled by subjective knowledge on personal level and overconfidence bias. The overconfidence bias itself is driven by subjective knowledge and reduced by work experience a decision maker has.

Further feedback/incentive system distinctiveness could be identified on company level as institutional structures that reduce individual decision maker unrealistic optimism. In specific regarding the feedback system distinctiveness the following three factors have a reducing effect on unrealistic optimism: the speed with which feedback is delivered, the importance their

employees place on their colleagues' feedback, and the overall feedback culture in the company. In terms of the incentive system, two factors have a reducing effect on unrealistic optimism: high importance on how the success of the individual influences their career advancement, as well as on the individuals feeling of accountability for his/her actions.

Exhibit 3: Confirmed model



Statistically significant values are marked with *, level of significance p= 0.05
1 significance of effect has to be seen with caution

Source: Own illustration

When comparing companies whose decision makers were on average unrealistically optimistic with those whose decision makers were on average not unrealistically optimistic, certain company characteristics could be identified, which can be used to predict the likelihood of a company to have an institutional environment that fuels unrealistic optimism. Besides feedback/incentive system distinctiveness, overconfidence on company level, and subjective knowledge, as described above, also company age and company size could be identified as such characteristics. Statistical tests showed that companies with above average unrealistic optimism are significantly younger (1988.2 ± 16.46) than companies with below average optimism (1942.83 ± 67.97). Further tests showed that companies with above average unrealistic optimism are significantly smaller in terms of the number of employees (8,339.2 ± 8,223.45) than companies with below average unrealistic optimism (52,455.33 ± 63,212.86). Team diversity interestingly could not be shown to affect unrealistic optimism.

Detailed results of the individual survey questions can be seen in the following.

Category	Questions	Average answer across all participants
Unrealistic optimism risks	Estimate the probability that one of the projects you are responsible for right now will face massive time and cost overruns in the future? [100% Scale]	Average: 19.29± 19.97 Median: 10.00
	Estimate the probability that one of the projects you are responsible for right now will deliver less revenues in the future than you estimated? [7-point Likert Scale]	Average: 3.42± 1.30 Median: 3.00
	Estimate the probability that one of the projects your colleagues are responsible for	Average: 23.16±23.31 Median: 17.50

Category	Questions	Average answer across all participants
	right now will face massive time and cost overruns in the future? [100% Scale]	
	Estimate the probability that one of the projects one of your colleagues is responsible for right now will deliver less revenues in the future than the colleague estimated? [7-point Likert Scale]	Average: 3.68±1.41 Median: 4.00
Unrealistic optimism rewards	Estimate the likelihood that a project you are responsible for right now will exceed all your expectations by delivering the project faster and less expensive? [7-point Likert Scale]	Average: 3.63±1.46 Median: 4.00
	Estimate the probability that a project you are responsible for right now will exceed all your expectations by having higher future revenues? [100% Scale]	Average: 30.66±25.58 Median: 22.50
	Estimate the likelihood that a project one of your colleagues is responsible for right now will exceed all of the colleague's expectations by delivering the project faster and less expensive? [7-point Likert Scale]	Average: 3.53±1.51 Median: 4.00
	Estimate the probability that a project your colleagues are responsible for right now will exceed all their expectations by having higher future revenues? [100% Scale]	Average: 31.77±25.91 Median: 25.00
Overconfidence facet illusion of control	News about infrastructure projects gone wrong do not surprise me at all [7-point Likert Scale; Do not agree at all-agree completely]	Average: 4.72±1.62 Median: 5.00
	When future cash flows do not reach the initial estimates I am not surprised anymore [7-point Likert Scale; Do not agree at all-agree completely]	Average: 3.78±1.58 Median: 4.00
	When my decisions lead to a good financing structure, it is due to my good preparations [7-point Likert Scale; Do not agree at all-agree completely]	Average: 5.02±1.20 Median: 5.00
	Already early in the decision process I can forecast if the project will be financially viable [7-point Likert Scale; Do not agree at all-agree completely]	Average: 4.99±1.30 Median: 5.00
Objective knowledge (and miscalibration facet	Please estimate the total deal value in the European infrastructure project finance sector 2016 in billion Euro. [low and high border of 90% confidence interval]	Average: [94.72; 215.76] Median: [72.50; 150.00]

Category	Questions	Average answer across all participants
	Please estimate the total deal value in the European infrastructure project finance sector 2015 in billion Euro. [low and high border of 90% confidence interval]	Average: [84.62; 199.39] Median: [55.00; 150.00]
	Please estimate what % of project finance loans 2016 in Europe was for projects in the power sector. [low and high border of 90% confidence interval]	Average: [34.10; 56.54] Median: [36.00; 60.00]
	Please estimate what % of project finance loans 2016 in Europe was for projects in the transport sector. [low and high border of 90% confidence interval]	Average: [23.33; 41.26] Median: [24.00; 40.00]
	Please estimate the typical cost overrun in percent for an European infrastructure project financed through project finance. [low and high border of 90% confidence interval]	Average: [12.95; 29.01] Median: [10.00; 25.00]
Above average effect facet of over-confidence	How do you think you performed in the knowledge questions compared to your industry colleagues (investors and creditors) participating in the surveys? [please indicate how many colleagues in percent you believe to be better in the knowledge questions]	Average: 42.32 ± 18.66 Median: 42.59
Representative heuristic	When you privately lose money in any investment you, you would: (a) never reinvest money into this investment (b) reinvest money to try to regain the lost value quickly (c) look from time to time to see the evolution of its price without doing anything [a/b/c]	(a) 22, (b) 19, (c) 61
Feedback system distinctiveness	How fast do you receive feedback about the decisions you took from colleagues [7-point Likert Scale; never-in a very timely manner]	Average: 5.08±1.31 Median: 5.00
	How fast do you receive feedback about the decisions you took from superiors [7-point Likert Scale; never-in a very timely manner]	Average: 4.89±1.32 Median: 5.00
	How important is the following feedback for you: feedback from colleagues [7-point Likert Scale; unimportant – very important]	Average: 5.72±1.23 Median: 6.00
	How important is the following feedback for you: feedback from superiors [7-point Likert Scale; unimportant – very important]	Average: 5.96±1.13 Median: 6.00
	From your point of view, how important is an active feedback culture in your company? [7-point Likert Scale unimportant – very important]	Average: 5.51±1.37 Median: 6.00

Category	Questions	Average answer across all participants
Incentive system distinctiveness	How high is your accountability for the decisions you take in project financing? [7-point Likert Scale]	Average: 5.04±1.35 Median: 5.00
	How much are the following aspects dependent on the success of the infrastructure projects you are involved in: (a) your compensation [7-point Likert Scale]	Average: 4.11±1.79 Median:4.00
	How much are the following aspects dependent on the success of the infrastructure projects you are involved in: (b) your career path [7-point Likert Scale]	Average: 4.43±1.55 Median: 5.00
	How much are the following aspects dependent on the success of the infrastructure projects you are involved in: c) the success of the company you work for [7-point Likert Scale]	Average: 4.79±1.56 Median: 5.00
Negative experience	Have any projects you were involved in turned out below your expectations (lower rate of return, later completion date, lower revenue stream)? [7-point Likert Scale; never-often]	Average: 3.02±1.47 Median: 3.00
	Do you know of projects of colleagues or industry peers that turned out below their expectations (lower rate of return, later completion date, lower revenue stream)? [7-point Likert Scale; none-many]	Average: 4.37±1.52 Median: 4.00
Regret	Do you regret any project financing related decisions you have taken in the past? [7-point Likert Scale; not at all- yes definitely]	Average: 2.88±1.80 Median: 2.00
Subjective knowledge	How do you rate yourself in the following dimensions in comparison to other decision makers (lenders and investors) involved in infrastructure project finance: (a) skills [7-point Likert Scale; much worse than average-much better than average]	Average: 5.11±1.25 Median: 5.00
	How do you rate yourself in the following dimensions in comparison to other decision makers (lenders and investors) involved in infrastructure project finance: (b) performance [7-point Likert Scale; much worse than average-much better than average]	Average: 5.21±1.03 Median: 5.00
	How do you rate yourself in the following dimensions in comparison to other decision makers (lenders and investors) involved in infrastructure project finance: (c) success [7-	Average: 5.00±1.02 Median: 5.00

Category	Questions	Average answer across all participants
	point Likert Scale; much worse than average-much better than average]	
Experience based knowledge	On which hierarchy level are you in your company? [analyst/associate, lower management, middle management, senior management]	26 analysts/associates, 22 lower management, 39 middle management, 15 senior management
	How many years of job experience do you have in total? [Free field]	Average: 16.48±9.80 Median: 15.00
	How many years of job experience do you have in the area of infrastructure project finance? [Free field]	Average: 10.18±6.26 Median: 10.00
	How many years of job experience do you have in making and being responsible for project financing decisions? [Free field]	Average: 6.78±5.58 Median: 6.00
Team diversity	How divers is your team regarding job experience? [7-point Likert Scale]	Average: 4.25±1.35 Median: 4.00
	How divers is your team regarding age? [7-point Likert Scale]	Average: 4.45±1.17 Median: 4.00
	How divers is your team regarding academic background? [7-point Likert Scale]	Average: 3.77±1.48 Median: 4.00
	How divers is your team cultural background? [7-point Likert Scale]	Average: 4.25±1.70 Median: 4.00
	How high is the percentage of males in your team? [100% Scale	Average: 67.29±22.37 Median: 70.00
Company size	Please indicate how many employees the company you work for has globally.	Lender median: 4, public investor median: 5, private investor median: 9
Company age	When was the company you work for founded?	Lender median: 1, public investor median: 1, private investor median: 3
Age	How old are you?	Average: 40.59± 8.99 Median: 41.00
Gender	Please indicate your gender [1 male, 2 female]	87 males, 15 females

Category	Questions	Average answer across all participants
Stakeholder group	To which stakeholder group do you belong to when it comes to the financing of infrastructure projects? Lender (credit risk management), lender (credit risk sales), investor (public), investor (private)?	16 lenders (credit risk management), 51 lenders (credit risk sales), 7 investors (public), 21 investors (private)

4. Implications

Unrealistic optimism is at least partly situational and not strictly rooted in the head of the decision maker no matter the circumstance. Thus, companies can reduce the unrealistic optimism of the individual with the right institutional structure and team setting.

When companies are small in terms of employee number, were recently founded, incentivize employees heavily over compensation, and provide room for subjective knowledge e.g. through relying heavily on big data the likelihood that employees are on average unrealistically optimistic is significantly higher than for companies with opposite characteristics. Therefore, especially those companies should be aware of the risk of their employees being unrealistically optimistic and conduct awareness workshops, debiasing training, and even account for bias to a certain extend in the decision making.

Companies that are awarded a project finance deal should keep in mind several following points, when putting together the project team. They should be aware of the phenomenon unrealistic optimism in the assessment of risks and rewards and the causal enhancing and diminishing factors of unrealistic optimism. Companies need to act cautiously when staffing people with high subjective based knowledge on projects, where the correct assessment of risks and rewards is vital and ensure that each project team has an experienced decision maker when it comes to assessing risks and rewards. Companies should further install a distinctive feedback system for the team that focuses on the speed with which feedback is delivered, the importance their employees place on their colleagues' feedback, as well as the overall feedback culture in the company. Finally, it is recommended that companies install a distinctive incentive system for the team that focuses on how the success of the individual influences their career advancement, as well as on the individuals feeling of accountability for his/her actions, but not on compensation.

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