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Sources of Errors and Biases in Traffic Forecasts for Toll Road Concessions

Thèse pour le Doctorat ès Sciences Economiques

Mention Economie des Transports

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Contents

Acknowledgements	11
Abstract	13
Résumé	19
Introduction	27
Plan of the Manuscript	29
1 Errors and Biases in Transport Demand Forecasts	33
1.1 What is Forecasting?	35
1.2 Forecasting in Transport	36
1.2.1 The Classic 4-step Model	38
1.3 Errors in Traffic Forecasts	39
1.4 Sources of Errors	41
1.4.1 Uncertainty About the Future	42
1.4.2 Methodology, Assumptions and Data	43
1.4.3 Behavioural Sources	46
1.4.4 The Particular Case of Road Concessions	49
1.5 Objectives of this Research	51
2 Transport Forecasters' Behaviour and Overconfidence	55
2.1 Introduction	56
2.2 Who Forecasts Transport Demand?	57
2.3 The Latest Forecast	61
2.4 Models	63
2.5 Forecast Errors	66
2.5.1 Sources of Errors	67

2.6	Forecast's Environment	68
2.7	Overconfidence in Transport Forecasts	72
2.8	Econometric Analysis of Biases	76
2.9	Comments Uncommented	77
2.10	Conclusions	78
3	Winner's Curse in Toll Road Concessions	83
3.1	Introduction	85
3.2	Auctions for Toll Road Concessions	90
3.2.1	First-Price, Sealed-Bid Auctions	90
3.2.2	Common Value Auctions	90
3.2.3	Auctions with Differing Levels of Common Uncertainty	92
3.2.4	Renegotiation in Toll Road Concessions	94
3.3	Bidding for Toll Road Concessions: A Simple Model	96
3.3.1	Model Framework	96
3.3.2	Model Setting	97
3.3.3	Number of Bidders and Traffic Forecast Deviation	99
3.3.4	Number of Bidders and Level of Common Uncertainty	100
3.3.5	Number of Bidders and Renegotiation	101
3.4	Data on Road Concession Contract Auctions	103
3.4.1	Dependent Variable: Traffic Forecast Deviation	103
3.4.2	Explanatory Variables	104
3.5	Econometric Results	107
3.6	Robustness Analysis	109
3.7	Conclusions	111
4	Decreasing Long-Term Traffic Growth	119
4.1	Introduction	121
4.2	Traffic Growth	122
4.3	Why does Traffic Grow Decreasingly?	124
4.4	Econometric Issues	127
4.4.1	Partial Adjustment	127
4.4.2	Integrated variables, Cointegration and Error-Correction	128
4.5	Data and Estimation	131
4.6	Evidences of Decreasing Growth	131

4.6.1	Cross-section Time Series Analysis	132
4.6.2	Testing for Parameter Stability	134
4.6.3	Moving Regressions	136
4.7	A Functional Form for Decreasing Elasticity	137
4.7.1	Impact on Long-Term Forecasts	140
4.8	Conclusions	142
5	Estimating the Value of Travel Time Savings	147
5.1	Introduction	148
5.2	The Value of Time in Transport	151
5.2.1	VTTS in Freight Transport	154
5.3	Discrete Choice Models	155
5.3.1	The Multinomial Logit	155
5.3.2	The Mixed Logit Model	160
5.4	Bayesian Procedures	162
5.4.1	Overview of Bayesian Concepts	163
5.4.2	Drawing from the Posterior	165
5.4.3	Posterior Mean as a Classical Estimator	169
5.4.4	Posteriors for the Mean and Variance	170
5.4.5	Hierarchical Bayes for Mixed Logit	174
5.5	Challenges in Estimating VTTS	178
5.5.1	Identifying Preference Heterogeneity	178
5.5.2	Selecting Random Parameters	179
5.5.3	Selecting the Distributions of the Random Parameters	180
5.5.4	Revealed Preference Data	182
5.5.5	Optimization Problems	182
5.5.6	Imposing Constraints	182
5.5.7	Priors	183
5.5.8	Advantages and Problems of Bayesian Procedures	183
5.5.9	The Role of the Alternative Specific Constant	184
5.6	The Survey	185
5.7	Econometric Results	188
5.7.1	Maximum Likelihood estimations	188
5.7.2	Bayesian Estimations	189
5.8	Discussion	192

5.9 Conclusions	195
General Conclusions and Policy Implications	197
A Forecasters' survey questions	201
B Distributions of variables in chapter 3	205
C VTTS survey form	211

List of Figures

1	Ecarts (réel/prévu)	22
2	Distribution de la valeur du temps PL.	25
1.1	Caricature of weather forecasts	36
1.2	Errors on Flyvbjerg et al (2006) sample	40
1.3	Errors variation over time on Flyvbjerg et al. (2003) sample	40
1.4	Errors on Standards and Poor's (2005) sample	41
1.5	Forecasting error in 49 road concessions (chapter 3 sample)	41
1.6	From "be" forecast to "do" forecast	45
2.1	In which country do you work?(N=178)	57
2.2	Location of the projects.(N=178)	58
2.3	Degree.(N=178)	58
2.4	Post-grad degree. (N=178)	59
2.5	Sectors forecasters work in.(N=178)	59
2.6	Gender distribution.(N=178)	60
2.7	Distributions of respondents' age. (N=178)	60
2.8	Number of forecasts.(N=178)	61
2.9	When did you prepare your latest forecast? (N=172).	61
2.10	Has the project been launched?(N=176)	62
2.11	Modes in the last forecast.(N=176)	62
2.12	Financing.(172)	63
2.13	Operation. (N=167)	63
2.14	Constant x Distributed VTTS. (N=153)	64
2.15	initial <i>versus</i> growth in demand forecasts. (N=162)	64
2.16	Aggregated or disaggregated modal share.(N=156)	65
2.17	Models forecasters apply. (N=170)	65
2.18	Stated error in the latest forecast.(N=88)	66

2.19	Perception of own's quality of results. (N=147)	67
2.20	Average distribution of under/overestimation.(N=150)	67
2.21	Forecasters under pressure. (N=168)	69
2.22	Would they produce better forecasts without pressure? (N=167)	69
2.23	Role of strategic manipulation.(N=155)	70
2.24	Sense of strategic manipulation.(N=134)	70
2.25	Influence of the technical study on the decision. (N=158)	71
2.26	Knowledge of the minimum demand level. (N=161)	72
2.27	Distributions of forecast errors.	75
2.28	Self-evaluation of competence level.(N=155)	76
2.29	Distributions of self-evaluations.	77
3.1	Length and Forecast Error.	94
3.2	TDF.	104
3.3	Number of Bidders.	105
4.1	From preferences to elasticity.	126
4.2	Traffic on the A10 motorway.	132
4.3	Traffic on the A11 motorway.	132
4.4	LTM long-run elasticities.	133
4.5	PAM long-run elasticities.	133
4.6	ECM long-run elasticities.	134
4.7	PAM short-run elasticities.	134
4.8	ECM short-run elasticities.	135
4.9	Comparing elasticities.	138
4.10	k versus traffic.	139
4.11	γ versus traffic.	139
4.12	A hypothetical example.	141
4.13	Application on the A11 motorway.	141
5.1	Comparison of VTTS distributions.	152
5.2	Survey's Location.	186
5.3	VTTS Distribution for empty and own account by ML	191
5.4	VTTS Distribution for loaded and hire by HB.	192
5.5	VTTS Distribution for empty and own account by HB.	192
5.6	VTTS Distribution for average load and hire dummies by HB.	193

A.1	Questions in the survey of forecaster's behaviour.	203
B.1	TDF.	207
B.2	Number of Bidders.	207
B.3	Length.	208
B.4	Civil Law.	208
B.5	HIC.	208
B.6	Public Information.	209
B.7	Government Learning.	209
C.1	VTTS survey form	213

List of Tables

1.1	Transport Modelling	53
2.1	Sources of errors.	80
2.2	Comparing ex-post and revealed errors	81
2.3	Comparing drivers and forecasters skilful	81
2.4	Impact of the main characteristics on self-evaluation.	82
3.1	Toll Road Concessions by Country and by Year	114
3.2	Data Definitions and Descriptive Statistics	115
3.3	Econometric results	116
3.4	Econometric results - extended	117
4.1	ADF test - exogenous variables	129
4.2	ADF test - traffic	143
4.3	Summary of descriptive statistics	144
4.4	CUSUM of squares test	145
4.5	Subsamples Elasticities	146
5.1	Sample and traffic count data	187
5.2	Final Sample	187
5.3	Summary of descriptive statistics	188
5.4	Econometric results	194

General Conclusions

We focused here on four important issues on traffic forecasting for toll roads under concessions schemes, sources of errors and biases. We analysed the forecasters' behaviour, the bidders' behaviour, the aggregated and the disaggregated users' behaviour.

Regarding the forecasters' behaviour, we presented the results of the first large sample survey on forecasters' characteristics and their opinions about forecasting demand for transport projects, based on an on-line survey. Results describe which are their main characteristics, details about their latest forecast, the models they apply, the forecast errors they declare and the main sources of errors according to them and the environment these forecasts take place in terms of pressure forecasters receive. These unique results provide a picture of the world of forecasters and forecasts, allowing for a better understanding of them.

Results show that the distribution of errors transport forecasters state has a smaller average magnitude and a smaller variance than those found in literature. Comparing forecasters perception of their own competence with the results found in literature about drivers skill self-evaluation, however, we could not find a significant difference, meaning that the forecasters' overconfidence is in line with what could be viewed as a normal human overconfidence level.

The pressure for results forecasters receive and the strategic manipulation they affirm exist merit a special attention. They imply that while forecasters' behavioural biases may exist and should be take in account when evaluation forecasts, the project promoter may influence forecasts by pressuring the forecasters to produce results which better fit his expectancies.

We modeled bidders behaviour using a unique, self-constructed, dataset

of 49 worldwide road concessions. We show that the winner's curse effect is particularly strong in toll road concession contract auctions. Thus, we show that bidders bid less aggressively in toll road concession auctions when they expect more competition. Besides, we observe that this winner's curse effect is even larger for projects where the common uncertainty is greater. Moreover, we show that the winner's curse effect is weaker when the likelihood of renegotiation is higher, i.e. bidders will bid more strategically in weaker institutional frameworks, in which renegotiations are easier.

The policy implication of our results is not straightforward. In fact, while we show that asymmetric information overturns the common economic wisdom that more competition is always desirable, since we find a strong winner's curse effect in toll road concession auctions, we also show that there is a systematic traffic overestimation due to methodological and behavioural sources, so that in most cases bidders would know *ex post* very low or negative profit rates in they do not renegotiate the contractual terms. Thus, the short-term policy implication of our results would fit the standard view: governments should restrict entry, or favour negotiations over auctions, in toll road concession auctions to favour aggressive bidding. By contrast, the long-term policy implication of our results is that governments may wish to maintain the procedure as open as possible to the extent that the winner's curse effect reduces the systematic traffic overestimation and then reduces the likelihood that the procuring authority will have to renegotiate the contract, once eventual bidding competitors are gone.

Modelling aggregated users' behaviour, we put in evidence a decreasing function for the traffic elasticity with respect to the economic growth, which depends on the traffic level on the road. A new model of decreasing elasticity is proposed setting up an intrinsic relation between the traffic level and its reactivity to economic growth. This model allows for a good representation of the phenomenon, a good interpretation of results and gives a rigorous econometric approach to time-series traffic forecasts, at the cost of introducing a non-linearity in the equation. In the short term the model results are closer to that given by the classical constant elasticity model; in the long term, where classic models tend to produce linear or convex profiles, this model reproduces the observed concavity. This model allows for a better interpretation of the

coupling between traffic and economic growth, and a more accurate long-term forecast.

We modeled the individual choice most important variable, the value of time, in the particular case of road freight transport in France. We find that the bayesian procedures represent many advantages compared to traditional maximization; that the standard use a single constant value of time, representative of an average, can lead to demand overestimation. We find a distributed value of time with mean about €45, depending on the load/empty and hire/own account variables, which indicates that the standard value recommended in France should be reviewed upwards.