Appraisal

PTRC Lecture Series

John Allan | Tuesday 3 March 2009

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Presentation Structure

- Definitions
- Why do we need appraisal
- New Approach to Appraisal
  - AST
  - Worksheets
- MSBC
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  - Costs, Risks and Optimism Bias
- Economic Evaluation
  - Consumer Surplus
  - Rule of half
  - Discounted Cash Flow
  - Transport Economic Efficiency
  - Value for Money

Definitions

DfT uses the following definitions

- **Appraisal** - carried out before you build the scheme

- **Evaluation** – carried out after you build the scheme

Why do we need appraisal?

- To support decision making
  - Is this action needed?
  - Is it the best use of our resources?
  - Have we chosen the best way forward?

New Approach to Appraisal

The Process

- Identify problems
- Appraise a range of solutions
- Select the preferred option

The Framework

- Appraisal Summary Tables
- Worksheets
- Problems and local objectives
- Supporting analyses

The Appraisal Summary Table

Option		Description	Problems	Present Value of Costs to Public Accounts £m
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT
ENVIRONMENT	Noise			PVB £m
	Local Air Quality			Concs wtd for exposure
	Greenhouse Gases			PVB £m
	Landscape			Score
	Townscape			Score
	Heritage of Historic Resources			Score
	Biodiversity			Score
	Water Environment			Score
	Physical Fitness			Score or PVB £m
	Journey Ambience			Score or PVB £m
SAFETY	Accidents			PVB £m
	Security			Score
ECONOMY	Public Accounts		Central Govt PVC, Local Govt PVC	PVC £m
	Business Users & Providers		Users PVB, Providers PVB, Other PVB	PVB £m
	Consumer Users			PVB £m
	Reliability			Score or PVB £m
	Wider Economic Impacts			Score or PVB £m
ACCESSIBILITY	Option values			Score or PVB £m
	Severance			Score
	Access to the Transport System			Score
INTEGRATION	Transport Interchange			Score
	Land-Use Policy			Score
	Other Government Policies			Score

Example Worksheet

3.3.3 Worksheet 1a Environment: Local Air Quality – Plan Level, 2008, PM_{10}, WLR Link 1.
This worksheet shows the methodology used for 2023 and all other links.

Grid references of x,y nodes: 441870, 387040, 443201, 385885	0-50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+ iii+iv)
Population (amin)	65	65	65	65	0
Population (asome)	65	65	65	65	260
PM_{10} concentration at average point within band for do-minimum (bmin)	At 20m: 22.76	At 70m: 22.76	At 115m: 22.76	At 175m: 22.76	N/A
PM_{10} concentration at average point within band for do-something (bsome)	At 20m: 22.80	At 70m: 22.77	At 115m: 22.77	At 175m: 22.76	N/A
Do-minimum PM_{10} assessment (c = amin*bmin)	1479.4	1479.4	1479.4	1479.4	Total route assess PM_{10} (I): 5917.6
Do-something PM_{10} assessment (c = asome*bsome)	1482.0	1480.1	1480.1	1479.4	Total route assess PM_{10} (II): 5921.6
Net total route assessment for PM_{10} (II-I)	2.6	0.7	0.7	0.0	4

Reference Sources: Traffic data as provided by MVA, model used was DMRB spreadsheet

Quantitative measures: Index of change to air quality

Assessment scores: Very small negative impact

Qualitative comments: Negligible impact to baseline PM_{10} concentrations in 2008 along this link.
Given the scale of the project it is not expected to have any significant impact at a regional level. Therefore, the impact of Waverley Link Road on regional air quality is not considered further in this appraisal

Example Worksheet

3.3.7 Worksheet 1 Environment: Landscape (and Townscape)

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact	Additional Mitigation
Pattern	The landscape is characterised by urban edge and railway to the west, open cast mining on site and railway and then open space to the east. The area immediately surrounding the route will become 'greener' once the remediation of the mining site to new parkland is complete which forms the do-minimum situation.					The presence of the road running through the recreational area will have a negative impact on the landscape.	
Tranquillity	Do-minimum is unlikely to have a sense of remoteness due to the urban edge and railway characterising the site. The scheme will result in increased intrusion from traffic noise.					The road will have an adverse impact due to traffic noise.	
Cultural	There is little cultural influence on the immediate surroundings as the parkland will be new and the area required for the road will be left compacted by UK Coal.					No impact will occur on the 'cultural' elements of the do-minimum scenario.	
Landcover	The parkland will be managed to maintain a recreational area for use by all. A new lake will be present and the parkland is likely to be interspersed with young trees and bushes although a detailed landscape plan has yet to be developed.					The road running through the open parkland will be detrimental to the overall landscape, thus creating an adverse impact.	
Summary of character	The parkland will dominate the immediate landscape, with views of a rural nature to the east of the site, although a railway will intersect those views. A grass covered hill will be situated to the west providing a barrier to the railway and urban edge. The new road would cause some visual intrusion in the parkland landscape.	Views across the landscape, particularly to the east will benefit the local recreational users of the new parkland and road.	Other parkland in the vicinity comprises Ulley Country Park and Nature Reserve is a large public recreation resource approximately 1 to 2 km to the east. Also the road will skirt a small recreation ground located next to the sewage works.	The new parkland will be valuable to the local residents.	It is not expected that there will be rare or especially old elements to the new parkland.	The road will have an adverse impact in the parkland landscape due to the noise generated from the road and by the creation of physical infrastructure through the relatively open landscape.	

Major Scheme Business Case

- Programme Entry , Conditional Approval, Full Approval

- Do-Something vs Do-Minimum

- Fully work up both the Scheme and either a
  - Low Cost Alternative or
  - Next Best Alternative

- Sensitivity Tests

Treatment of Costs

- Base Cost

+

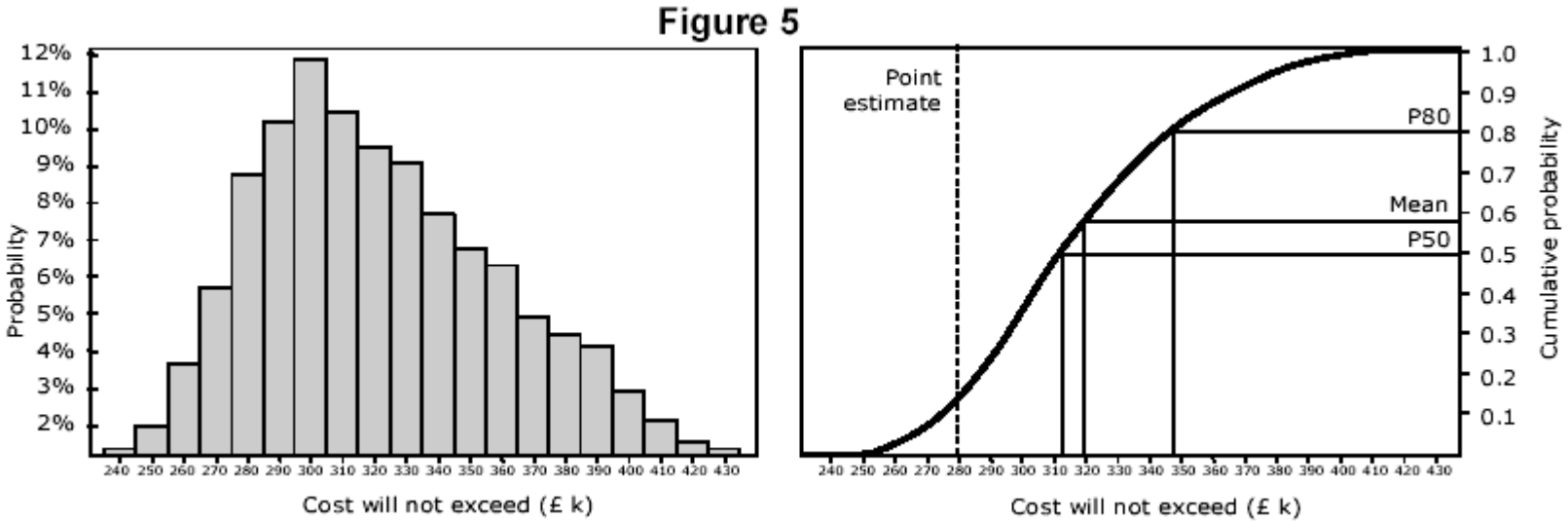
- Risk

+

- Optimism Bias

Quantified Risk Assessment

- Risk Register
- Risk Mitigation Plan
- Impact * Probability



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Optimism Bias

Table 8: Stages of Scheme Development by Scheme Category

Category	Stage 1	Stage 2	Stage 3
Local Authority and Public Transport Schemes	Programme Entry	Conditional Approval	Full Approval
Highways Agency Schemes	TPI entry/ Preferred Route Decision	Order Publication/Works Commitment	Works Commitment
Railways	Grip Stage 1: Pre-feasibility	Grip Stage 3: Option selection	Grip Stage 5: Design development

Table 9: Recommended Optimism Bias Uplifts

Category	Types of Projects	Stage 1	Stage 2	Stage 3
Roads	Motorway	44%*	15%	3%*
	Trunk roads			
	Local roads			
	Bicycle facilities			
	Pedestrian facilities			
	Park and ride			
	Bus lane schemes			
	Guided buses on wheels			
Rail	Metro	66%*	40%	6%*
	Light rail			
	Guided buses on tracks			
	Conventional rail			
	High speed rail			
Fixed Links	Bridges and Tunnels	66%*	23%	6%*
Building Projects	Stations and Terminal buildings	51%*	-	4%*
IT Projects	IT system development	200%*	-	10%*

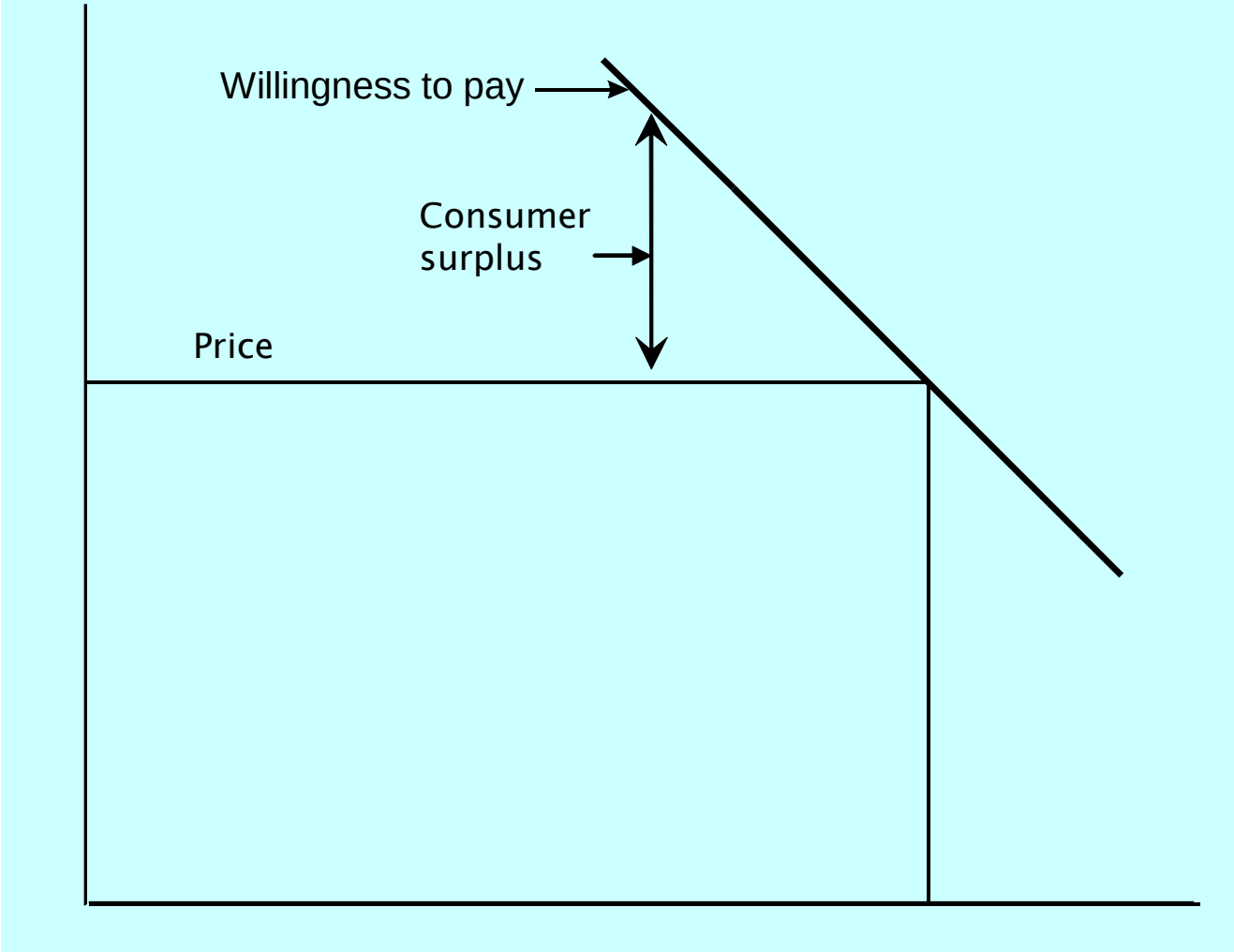
Notes

* Source Flybjerg 2004 and Mott MacDonal 2002
Flyvbjerg, B., (2004) Procedures for Dealing with Optimism Bias in Transport Planning
Mott MacDonald (July 2002), Review of Large Public Procurement in the UK

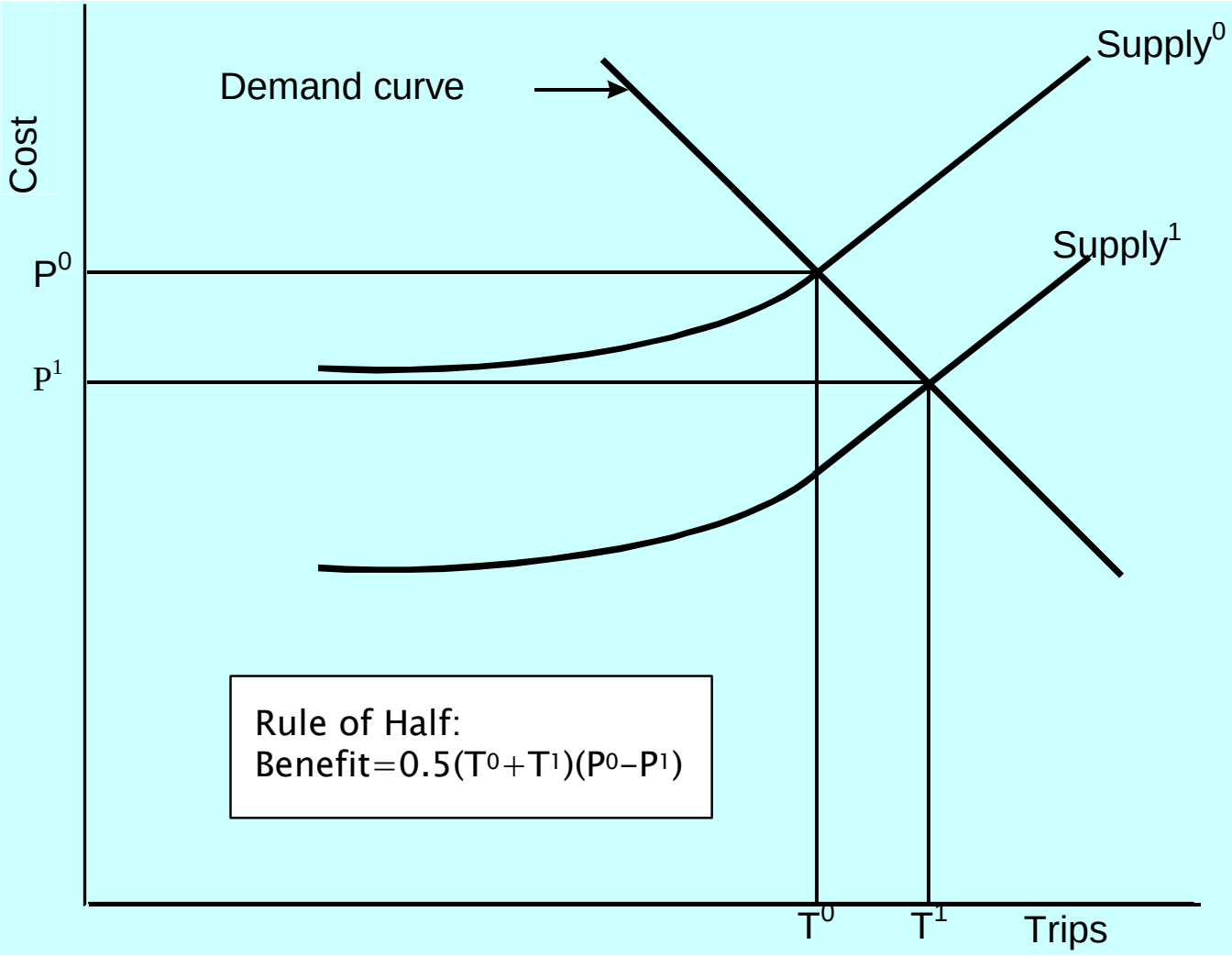
Economic Analyses

- Traditionally used
  - Time savings (convert to money using VOT)
  - Vehicle Operating Costs, Fares, Road User Charges
  - Accidents – cost of disruption and loss of life
- Recently added
  - Greenhouse gases
  - Noise
  - Option Values and Journey Ambience
- Soon to be added
  - Physical Fitness
  - Reliability
  - Wider Economic Benefits

Consumer Surplus



Benefit: Change in Consumer Surplus



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Discounted Cash Flow Technique

		Year					
		0	1	2	3	4	5
1	Costs	-5,000	-10	-10	-10	-10	-10
2	Sales	0	1,200	1,200	1,200	1,200	1,200
3	Cash Flow	-5,000	1,190	1,190	1,190	1,190	1,190
5	Discount Factor	1	0.966	0.934	0.902	0.871	0.842
6	Discounted Cash Flow	-5000	1150	1111	1073	1037	1002
	NPV	373					

DCF Applied To Transport

			Year				
		0	1	2	3	4	5
1	Costs	5,000	10	10	10	10	10
2	Benefits	0	1,200	1,200	1,200	1,200	1,200
5	Discount Factor	1	0.966	0.934	0.902	0.871	0.842
6	Discounted Costs	5000	10	9	9	9	8
	Discounted Benefits	0	1159	1120	1082	1046	1010
	PVB	5418					
	PVC	5045					
	NPV	373					
	BCR	1.1					

TEE Table

	Option A	Option B1
Consumer User Benefits	15,394	21,663
Business User Benefits	9,820	10,512
Private Sector Provider Impacts - Revenue	463	4,967
Private Sector Provider Impacts - Operating Costs	- -	8,301
Present Value Benefits	**25,677**	**28,841**
Investment Costs	10,747	14,203
Indirect Tax Revenues	757	1,515
Present Value Costs	**11,504**	**15,718**
Net Present Value	**14,173**	**13,123**
Benefit Cost Ratio	**2.23**	**1.83**

Value for Money

Poor	BCR < 1
Low	1 < BCR < 1.5
Medium	1.5 < BCR < 2
High	BCR > 2

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