Enhancing access to submarine cables for Pacific Island Countries

Session 6: How to determine cost based access prices

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Session 6:
How to determine cost-based access prices

Agenda

- What are we pricing?
- What are we costing?
- What are the key factors in the transition between costs and prices?
- Introducing the ITU training cost model for CLS

What are we pricing?

- Price of wholesale access to capacity on international submarine cable
  - Expressed as a price per Mbps per month
  - Potentially differentiated by capacity (e.g. E3, STM1)

- Charge for co-location in the CLS
  - Physical or virtual
  - One-off establishment charges plus recurring rental charges.

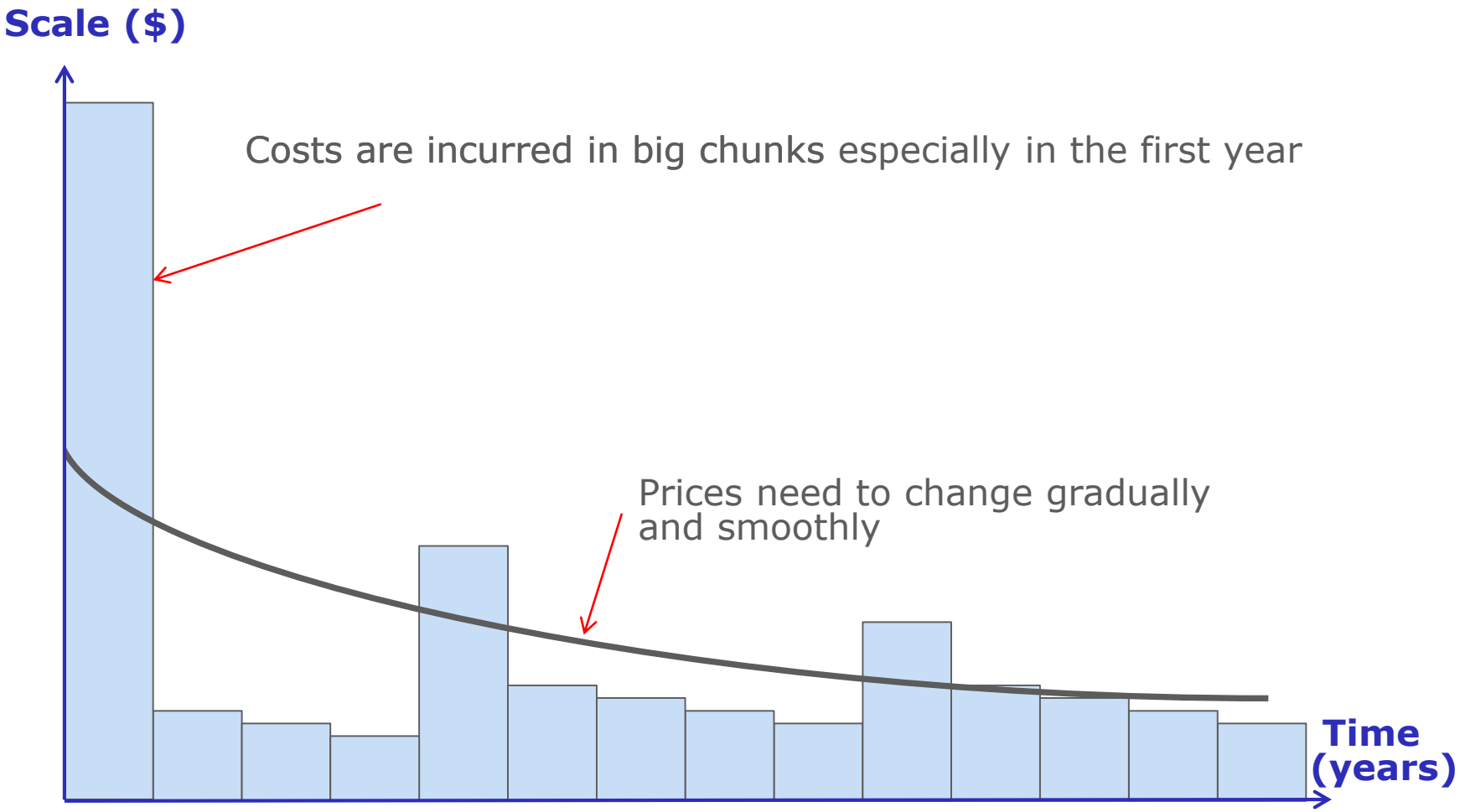
Price regulation options

- Forms of price regulation:
  - Price approval … the CLS operator takes the lead
  - Specification of the price … the regulator determines
  - Price cap … the regulator guides.
- Methods of determining cost-based prices:
  - Cost modelling … depends on input data and assumptions
  - Retail minus … but in this case what is the retail service?
  - Benchmarking … but are the relevant prices published?
- A price cap based on a cost model can be a good solution given the error-margins involved in cost calculation.

Principles of cost-based pricing

- The CLS operator must recover the costs of:
  - its investment in the international submarine cable
  - the CLS site and building
  - all of the constituent equipment.
- The costs that are included must be efficiently-incurred (based on best practice techniques and technologies).
- Prices will recover costs over the lifetime of the assets.

Converting costs into prices



Simple mechanics of a CLS cost model

- Take all the relevant costs:
  - Cable costs
  - Site and building costs
  - Equipment costs
  - Indirect operating expenses
  - Cost of capital
- Estimate annual cost-based wholesale prices for:
  - Capacity services
  - Colocation services
- Given an assumed level of demand

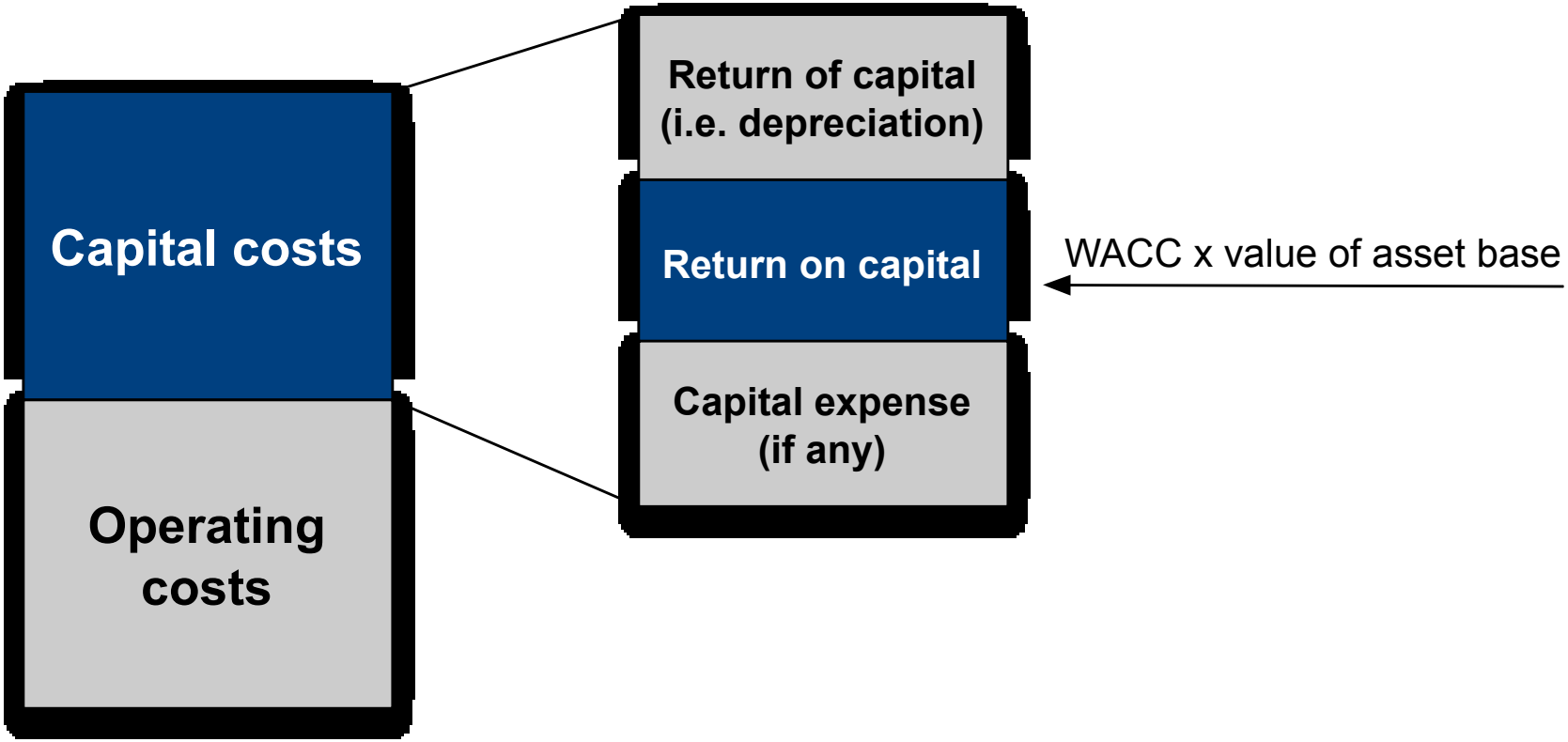
What is WACC?

- A firm's assets are financed through a mixture of debt and equity
- The returns required by the providers of these two forms of capital tend to be different
  - Debt holders face a different level of risk to equity holders as they have a prior claim on a firm's earnings
- WACC is the average of the cost of each of these sources of financing, weighted by their respective usage
- It is the minimum expected return investors of all forms of capital require in order to invest in a business
- It is thus the minimum return that a regulator should allow in setting the price(s) of regulated services

Why do we need a WACC?

- A regulated firm should be able to recover the efficient costs incurred in providing a service
  - The costs of financing the business is one such cost
- Firms finances their operations through a mixture of debt and equity
- Revenue must cover its operating expenses and the costs of its capital investments
  - A profit on top of this is also highly desirable!
- Regulated prices should cover the efficiently incurred operating expenses and the cost of capital…but not the further profit
  - As the profit is not necessary for the provision of the service
- The WACC is used to calculate the required annual return on the capital investments to cover the costs of financing

The costs to be recovered in the regulated prices



What is the WACC important? (1)

- The WACC is a key component in any cost model because it determines the annual charges from capital investments
- Accurate determination of the WACC is thus crucial as it is a key determinant of the:
  - the regulated firm's revenues
  - the wholesale access prices (i.e. expenses) paid by competitors

What is the WACC important? (2)

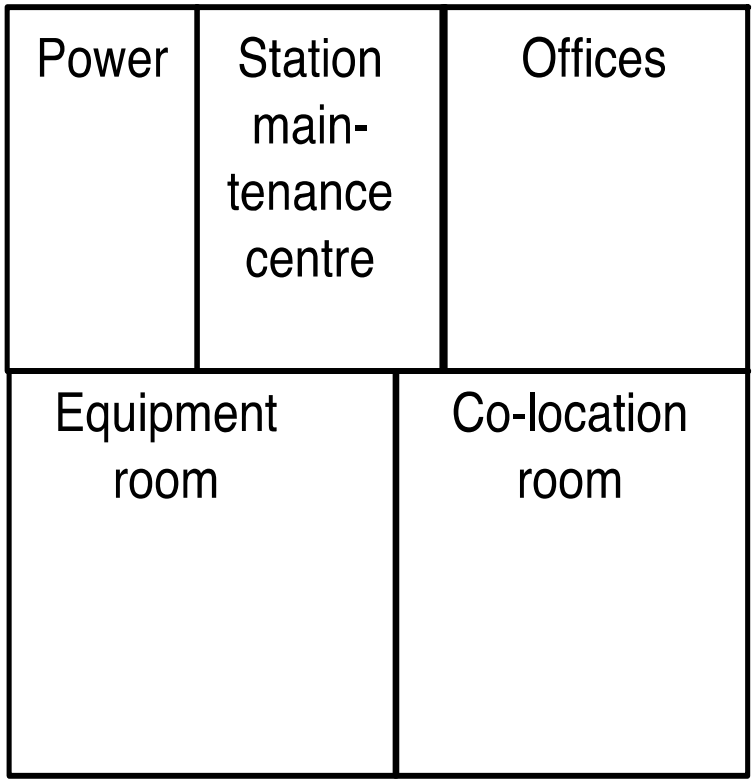
- If set correctly, the WACC provides an efficient price signal and an incentive for efficient investment
- If set too low, it risks making investment unattractive
  - Too low means less than the opportunity cost of capital
- If set too high, it would allow the regulated firm to earn excessive returns on its capital
  - Would affect the competitiveness of the market
  - Would distort pricing signals to customers and investors
  - Lead to a misallocation of resources

Submarine cable costs

- The capital and operating costs relating to the investment in the cable system and the associated CLS.
- Biggest item is the investment in the submarine cable – usually $ millions over 15-25 years in return for IRUs.
- Cost of international cable per 10Gbps (STM64) per annum
  - 10Gbps is the standard capacity unit for international cables – typically corresponding to a single wavelength
  - Lower capacities may be derived through de-multiplexing

Site and building costs

- The capital costs associated with the CLS
  - Costs need to be allocated between the various functions of the CLS, typically on the basis of floor space
- An annual capital charge (i.e. depreciation expense)
  - Tilted annuity approach

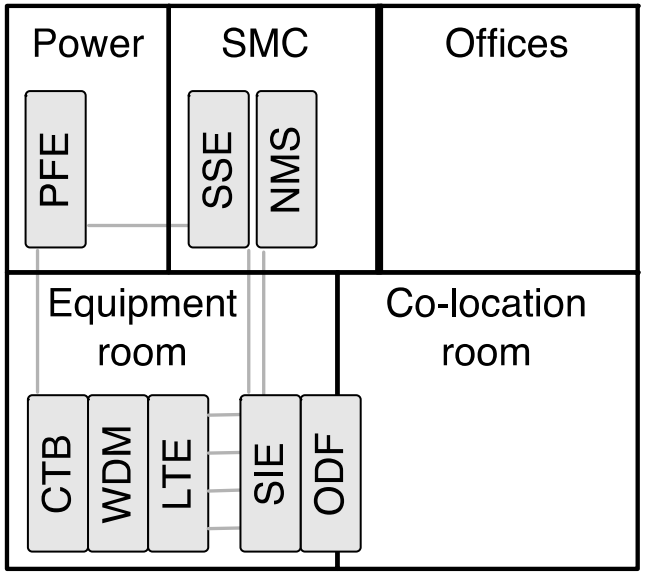


Cable landing station

Equipment costs

- The capital costs of equipment purchases and associated annual operating costs
  - Some of the capital costs may be included as part of the cable investment cost
  - De-multiplexing equipment costs will depend on the particular capacity services that are to be offered
- An annual capital charge (i.e. depreciation expense)
  - Tilted annuity approach – this allows for the same capital charge each year except tilted to allow for trends in equipment costs.

Key equipment to be costed



Cable landing station

CTB: cable termination box
LTE: line terminal equipment
NMS: network management system
ODF: optical distribution framework
PFE: power feeding equipment
SDH: synchronous digital hierarchy
SIE: SDH interface equipment
SMC: station maintenance centre
SSE: system supervisory equipment
WDM: wavelength division muliplexer

Operating expenses

- Each asset has an annual maintenance cost and some other costs (e.g. power) may be directly attributed.
- Other operating costs are not directly related to the cable equipment but still form part of the delivery of wholesale capacity services
  - Air-conditioning, security, cleaning.
- Typical approach is to establish a ratio between capital costs and operational expenditure.

Example from the workshop cost model

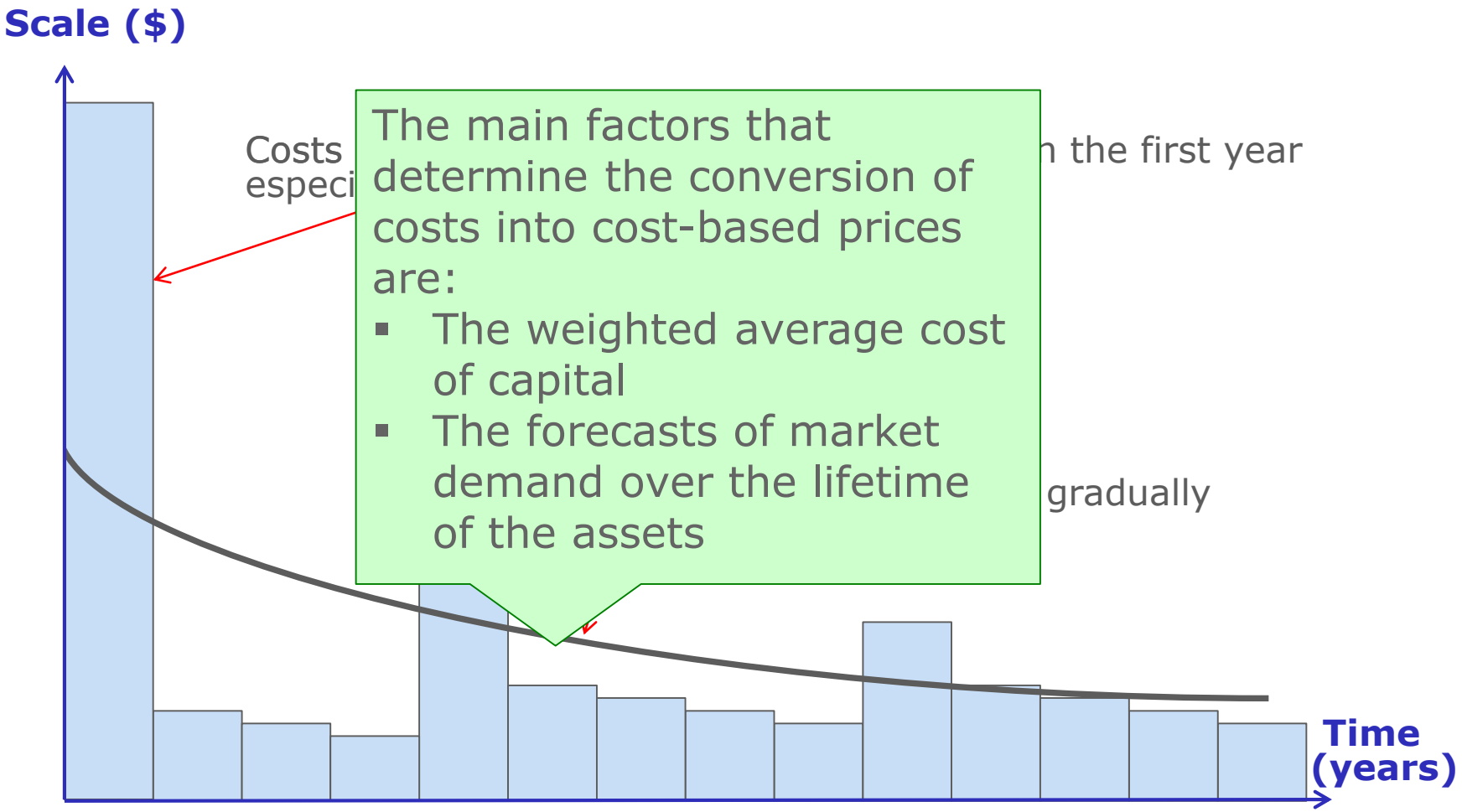
Capital costs

Capital costs	USD
Submarine cable cost	$3,045,472
Wet plant	$2,000,000
Marine survey and operations	$2,066,451
Terminal station equipment	$2,169,600
SLTE set	$1,181,100
Project management	$400,000
Contingency	$880,000
TOTAL CAPITAL EXPENDITURE	$11,742,622

Operating expenses

OPEX	USD
Wet segment operations and maintenance	$437,500
CLS operations and maintenance	$145,758
Annual licence & regulatory fees	$125,000
Sales, general and administration	$62,500
Staff expenses	$157,000
Contingencies	$15,000
TOTAL OPEX	$505,258
Total OpEx as a % of Total CapEx	4.30%

Converting costs into prices



The main factors that determine the conversion of costs into cost-based prices are:

- The weighted average cost of capital
- The forecasts of market demand over the lifetime of the assets

Cost of capital

- Can contribute to a very significant portion of annual expenses
- Investments in submarine cables are risky, so investors want higher rates of return
  - E.g. 15–20%
- Government or aid funding can result in much lower WACC
  - E.g. 0–5%
- So the source of funding can substantially affect investment risks, costs and prices.

Example from the workshop cost model

Pre-tax weighted average cost of capital (WACC) for initial investment

Component	World Bank grant	Equity	Commercial loan	Total
Weighting	25.0%	50.0%	25.0%	100.00%
Nominal cost	0.0%	15.0%	9.0%	
Tax rate	25.0%	25.0%	25.0%	
Tax adjusted nominal cost	0.00%	11.25%	6.75%	
Inflation rate	0.5%	3.0%	3.0%	
Real cost	-0.50%	8.25%	3.75%	
Weighted component of WACC	-0.13%	4.13%	0.94%	4.94%

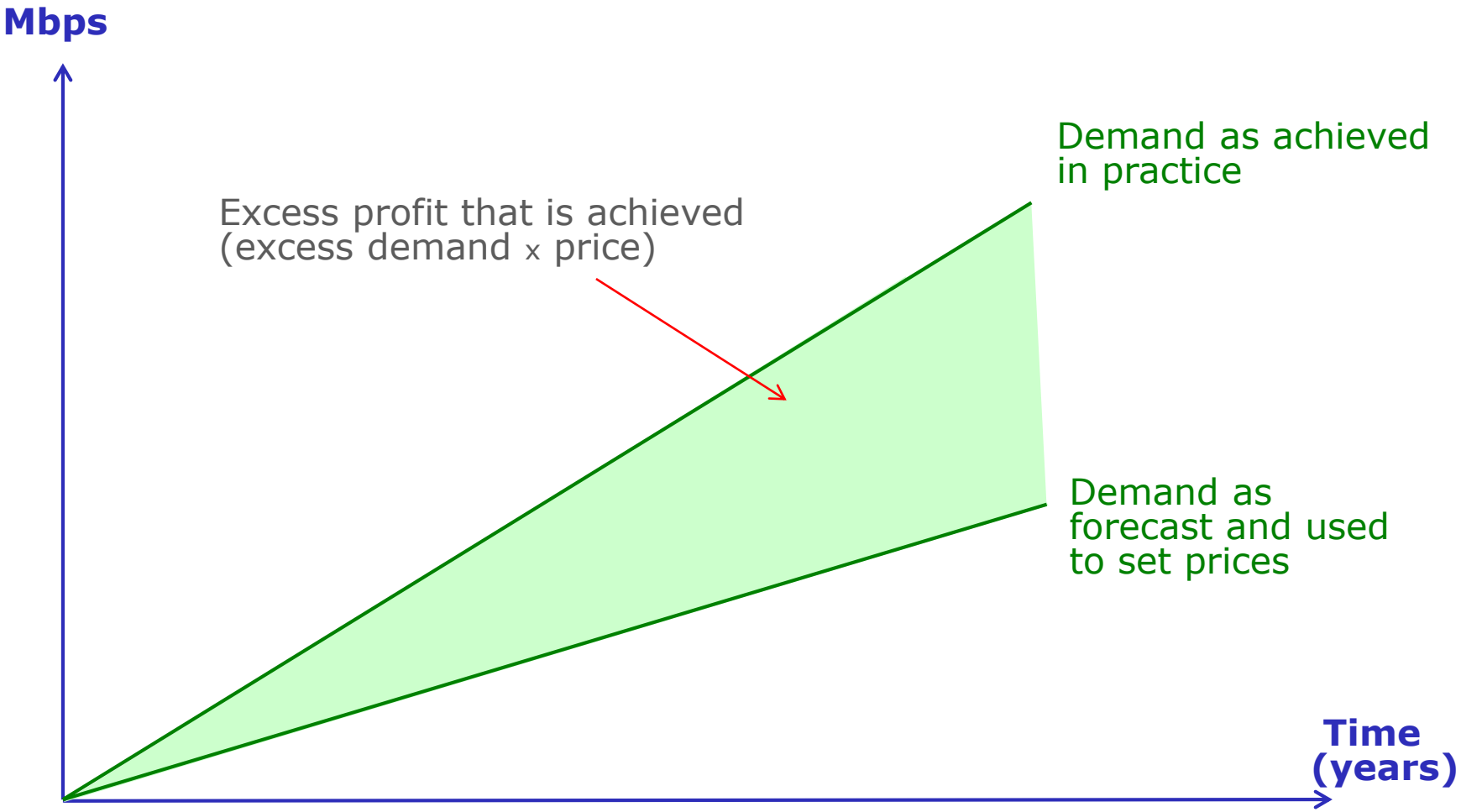
Pre-tax weighted average cost of capital (WACC) for incremental investment

Component	World Bank grant	Equity	Commercial loan	Total
Weighting	0.0%	60.0%	40.0%	100.00%
Nominal cost	0.0%	15.0%	9.0%	
Tax rate	25.0%	25.0%	25.0%	
Tax adjusted nominal cost	0.0%	11.3%	6.8%	
Inflation rate	0.5%	3.0%	3.0%	
Real cost	-0.5%	8.3%	3.8%	
Weighted component of WACC	0.0%	5.0%	1.5%	6.45%

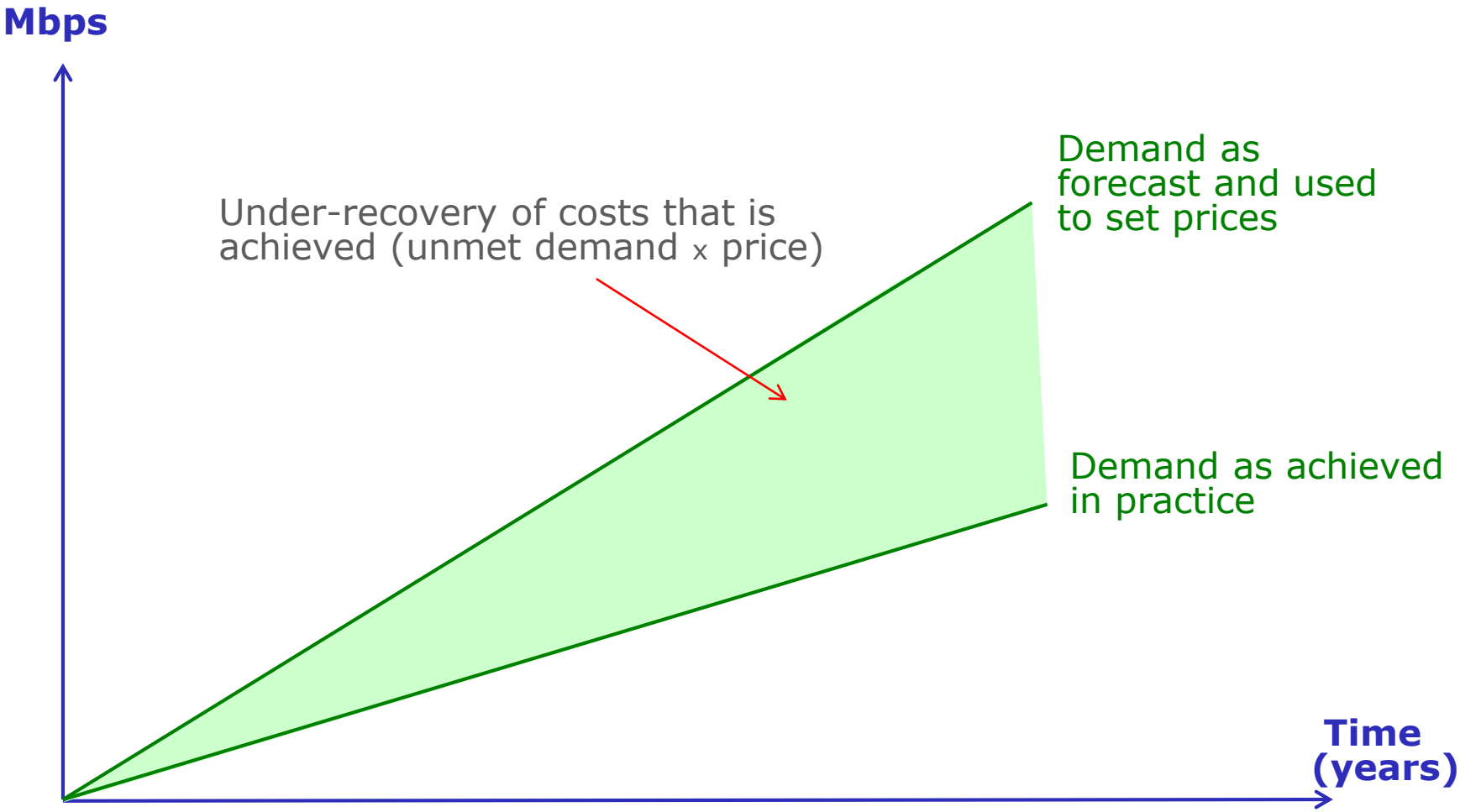
Demand forecasts

- Substantial growth in bandwidth demand may be expected as submarine cable capacity is installed.
- If costs are established based on annuity functions they are constant for each year of an asset's life.
- This means that unit costs drop every year as demand grows.
- To set prices that recover costs over the full lifetime of the assets, it is imperative to know (or estimate) demand levels over that same time period.
- Year 1 costs may be high, but year 1 prices should be low so as to stimulate demand in later years and recover costs over the long term.

How demand forecasts affect costs and prices - 1



How demand forecasts affect costs and prices - 2



Conclusions

- Costs and prices are crucially dependent on demand.
- It is impossible to forecast demand with any accuracy over the lifetime of a cable landing station.
- Errors will be magnified year-on-year.
- Cost models should be revised every few years to take account of any under- or over-recovery of costs that happens in practice.
- Prices (or price caps) should then be adjusted as well.

Mini working group exercise - 1

- New submarine cable investment of $25m needed for 10 year access to 10Gbps cable capacity.
- Incumbent offers to invest and run CLS:
  - WACC based on 50% equity and 50% commercial loan
- Government considers alternative of taking 50% loan from World Bank and rest in equity participation of various operators.
- Annual operating expenditure of CLS estimated at $500k.
- **What is the % difference in total annual CLS costs under these two scenarios**:
  - Assume WACC for WB loan is 0%; for commercial loan is 4%; for equity is 8%.
  - Assume straight-line depreciation.

Answers to mini working group exercise - 1

Item	Case 1 - incumbent	Case 2 - Government
Depreciation	$25m/10 = $2.5m	$2.5m
Opex	$0.5m	$0.5m
Cost of capital	6% * $25m = $1.5m	4% * $25m = $1.0m
Total annual costs	$4.5m	$4.0m

The incumbent option is 12.5% more expensive

Mini working group exercise - 2

- New submarine cable investment of $25m needed for 10 year access to 10Gbps cable capacity.
- Incumbent suggests that total demand in year 1 is 500Mbps and will rise to 5Gbps in year 10.
- Government's consultants agree that year 1 demand will be 500Mbps but rising to 8Gbps in year 10.
- Assuming straight line growth (and taking the cost estimates from mini exercise 1) **what % difference is there now in year 3 prices**?

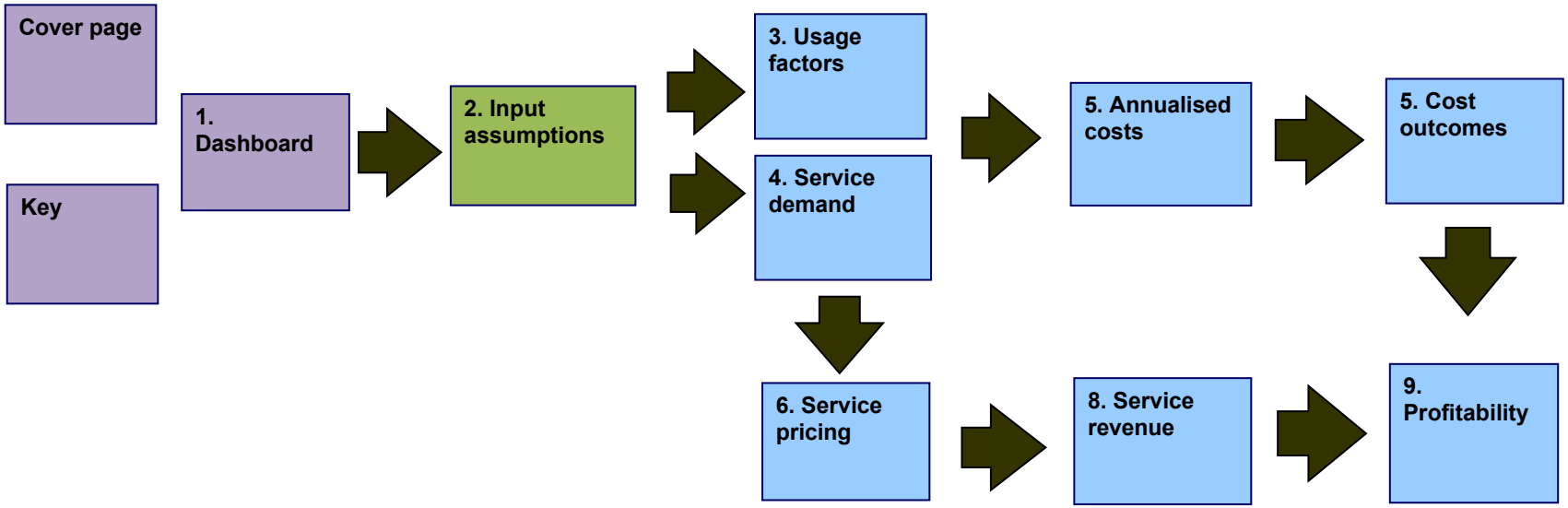
Answers to mini working group exercise - 2

Item	Case 1 - incumbent	Case 2 - Government
Total annual cost	$4.5m	$4.0m
Annual growth in demand	(5000-500)/10 = 450Mbps	(8000-500)/10 = 750Mbps
Demand in Year 3	500+3*450 = 1850Mbps	500+3*750 = 2750Mbps
Cost per Mbps in year 3	$4.5m/1850 = $2432	$4.0m/2750 = $1455

The incumbent option is 67% more expensive

Introducing the costing and pricing model

Model Structure



Model Conventions