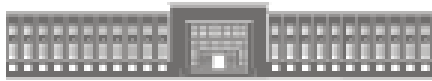




LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL



RISK MANAGEMENT IN CIVIL ENGINEERING ADVANCED COURSE

Lisbon, November 17-21, 2008

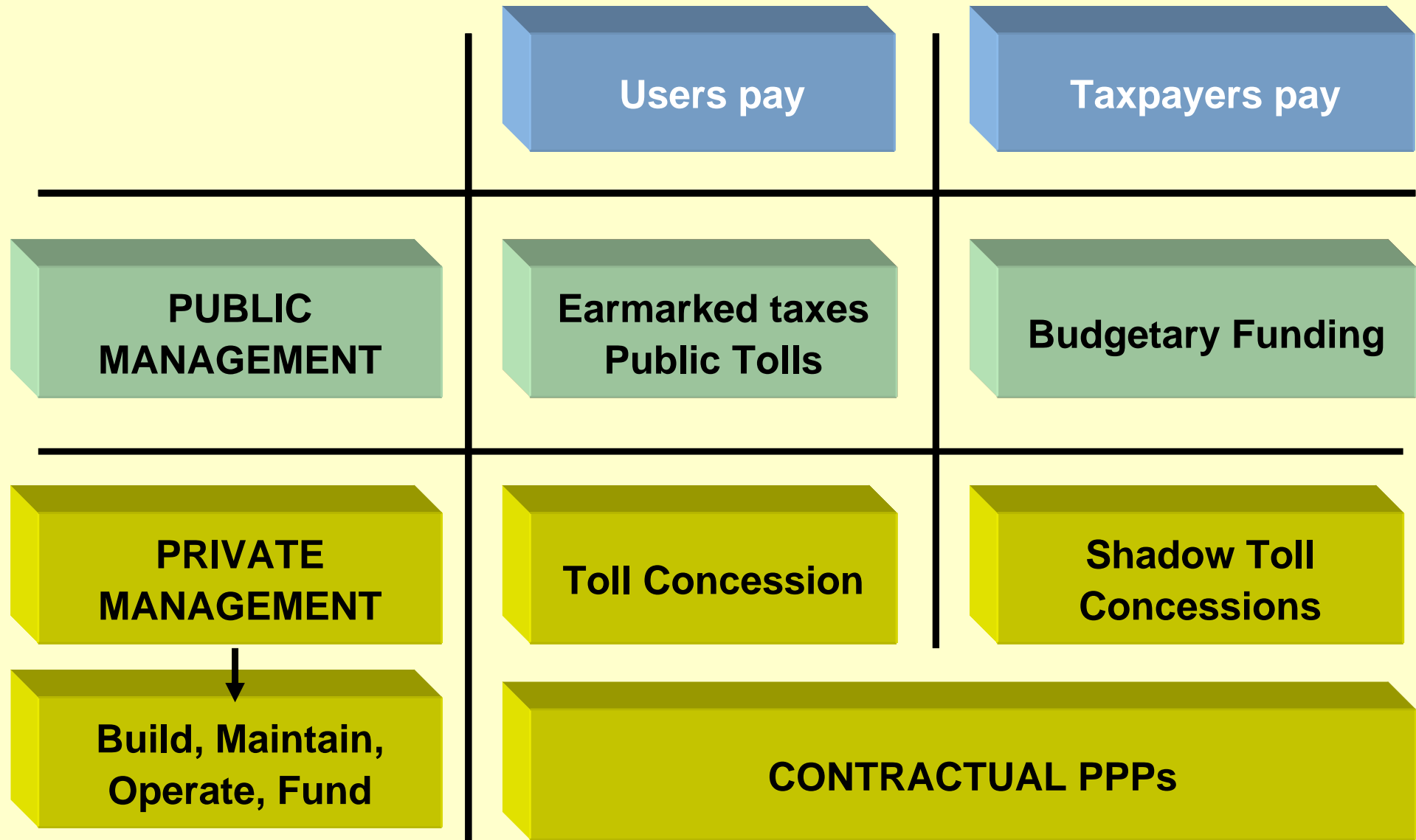
Dealing with risks in transportation projects: the case study of Public Private Partnerships

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Transport Infrastructure Management



Characteristics of PPP Contracts (I)

- According to the Green Paper on PPPs published by the European Union (2004):
 - Long duration of the relationship between the public and the private sector
 - The project should be funded at least in part by the private sector
 - The private sector should take part in the design, construction, maintenance and operation of the facility
 - A risk distribution between the public and the private sector should be established

Characteristics of PPP Contracts (II)

- PPP Contracts can be classified in:
 - Contractual PPPs
 - Refers to a partnership based solely on contractual links between the different players
 - i.e. concession contracts, DBFO Contracts
 - Institutionalized PPPs
 - Involve the establishment of an entity held jointly by the public partner and the private partner

Characteristics of PPP Contracts (III)

- Main reasons to implement PPPs:
 - Circumvent Budgetary Constraints
 - Increase Technical Efficiency by:
 - Taking advantage of the private sector skills
 - Integrating the design, construction, and operation phases
 - Increase quality of service

Concession Contracts (I)

MAIN CHARACTERISTICS OF CONCESSION CONTRACTS

1. The private sector carries out the final design of the project
2. The construction and operation costs are financed by the private company which was granted the concession
3. The assets always belong to the government
4. Most of the risks are transferred to the private company
5. The private company has the right to collect tolls and the obligation to maintain and operate the highway for a period of time contractually agreed in advance
6. A user fee is usually the main revenue source

Concession Contracts (II)

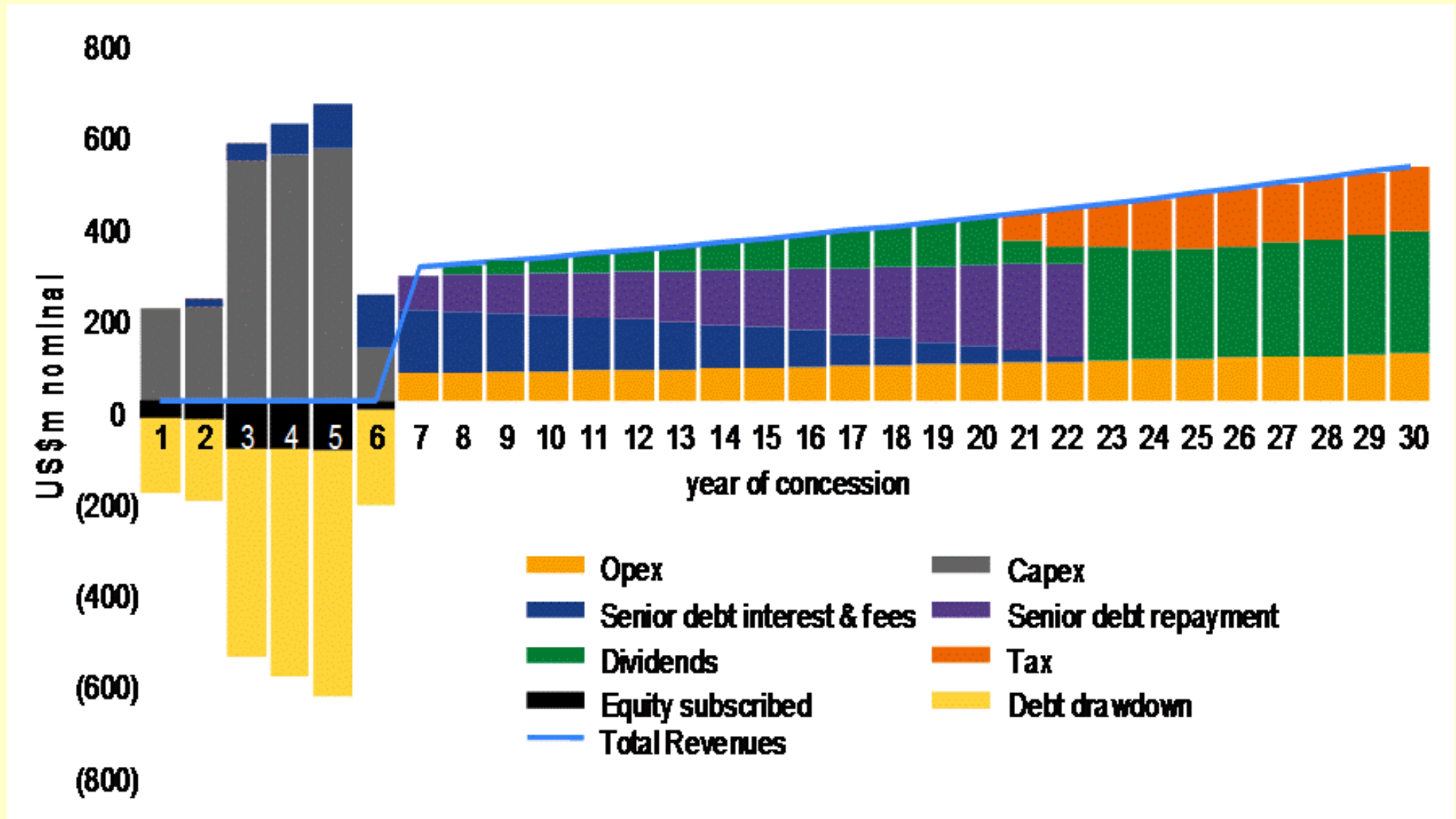
- Private capital for investment in infrastructure is now “in fashion”
- From 1985 to 2007 400,000 M€ were invested in Transportation, Water and Public Facilities through concession contracts:
 - 240,000 in Europe, US and Canada
 - 100,000 in Asia
 - 50,000 in Latin America
 - 10,000 in Africa

Concession Contracts (III)

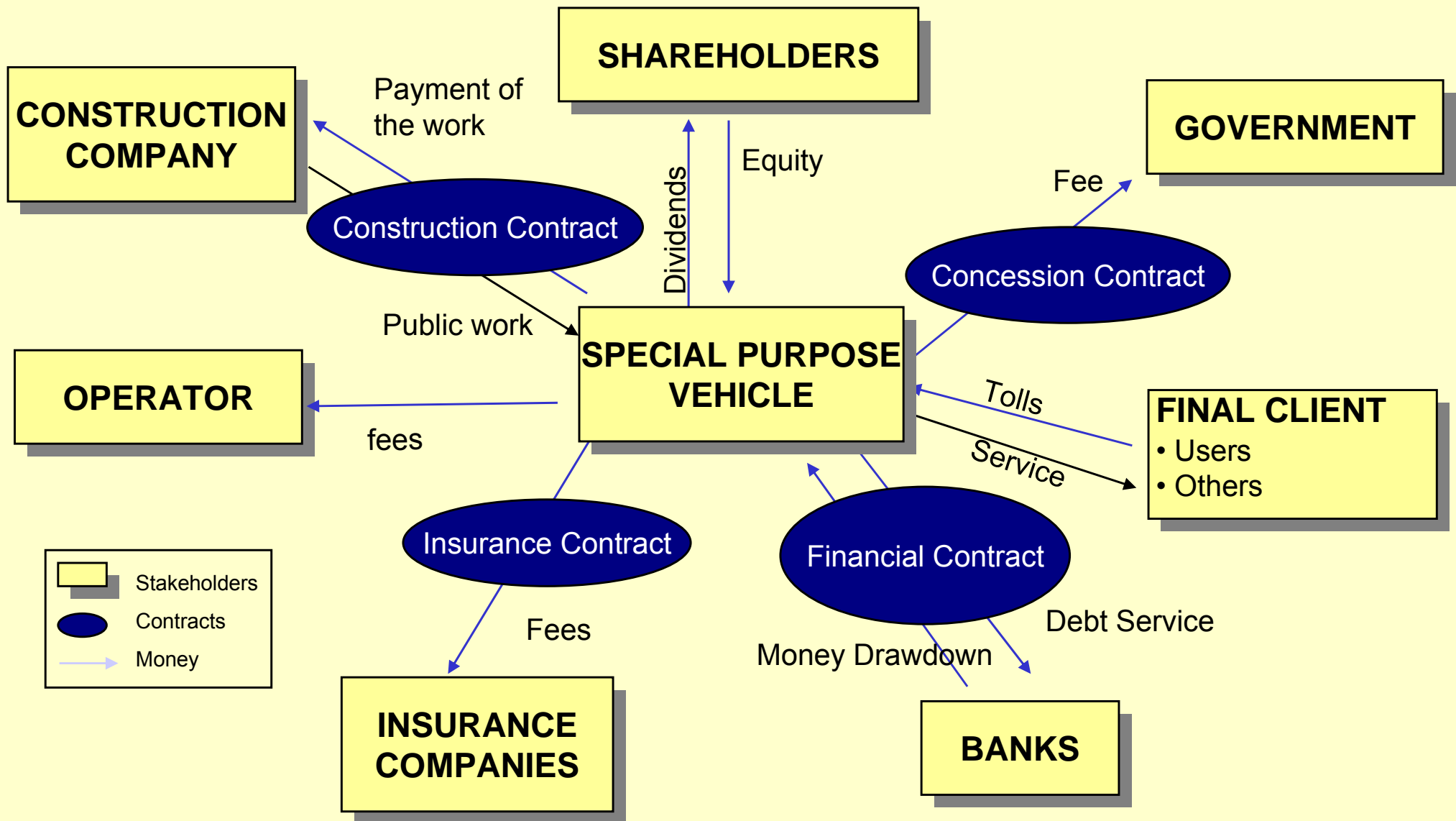
- Europe is recovering the concession model
 - PFI at full speed in the UK
 - Spain passed a new Concessions Law
 - Eastern countries implement toll road concessions
- A major default in Argentina is reducing the implementation of concessions in South America
- USA and Canada are implementing huge Brownfield tenders:
 - Chicago Skyway
 - Indiana Toll Road
 - Pennsylvania Highway

Concession Contracts (IV)

Cash Flow of a Concession Contract



Concession Contracts (V)



Three key issues of concession contracts

- TENDER
 - To award the concession to the most efficient consortium
 - To ensure that the profitability of the concessionaire equals its cost of capital
- REGULATION
 - To grant quality to the users
 - To preserve the Public Interest
- RISK ALLOCATION
 - To align incentives and abilities
 - To be fair

Risk Allocation in Concession Projects (I)

- It is important to distinguish between:
 - **MANAGEABLE RISK** → statistical behaviour
 - **UNMANAGEABLE RISK** → unpredictable behaviour
- Risks in long-term contracts exists regardless the mechanisms implemented to mitigate them
 - Risks are merely allocated to different stakeholders
 - The stakeholders can have a greater or a lower ability to manage those risks

Risk Allocation in Concession Projects (II)

- General principle: “*Risks should be allocated to the stakeholder best able to control them*”
- Some risks have a clear stakeholder to be allocated:
 - Construction
 - Operation
- Some risks does not have a clear stakeholder to be allocated:
 - Traffic
 - *Force Majeur*

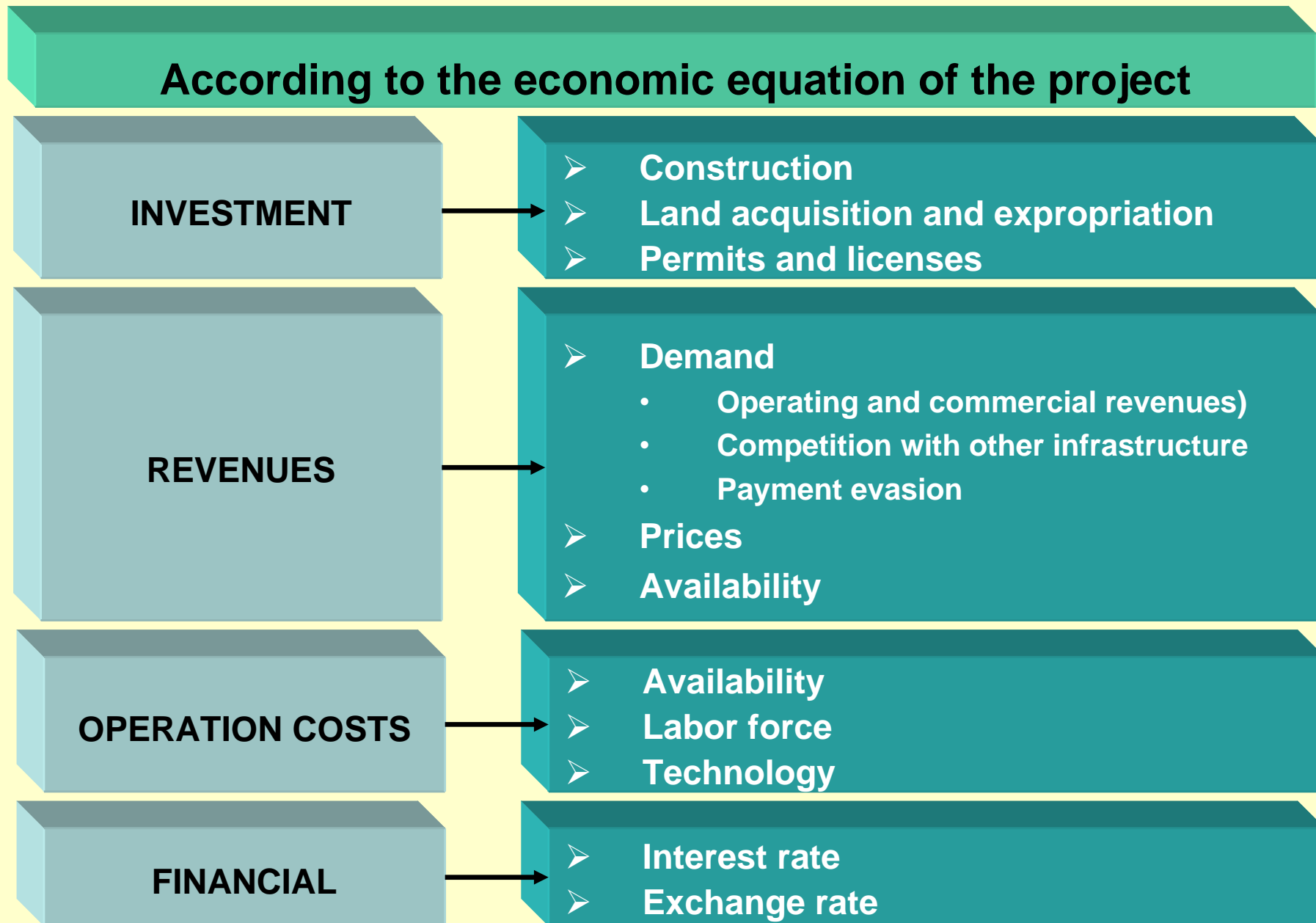
Risk Allocation in Concession Projects (III)

- Many risks in long-term concession contracts can hardly be covered by insurance companies
 - Traffic risk
 - Some unpredictable events (i.e. a terrorist attack)
 - Political risk
- Reasons to explain the lack of insurability
 - Lack of a long track record or statistical behavior
 - Hugh size of the projects
 - Incentives problems → traffic risk

Risk Allocation in Concession Projects (IV)

- Monoline insurance companies are becoming quite popular to improve the rating of the long term contract loans
 - Financial institutions that give their AAA rating in compensation of a fee
 - They are allowed to replace the lenders in their relationship with the shareholders
 - They require a minimum rating → they are not applicable to many developing countries

Risk Allocation in Concession Projects (V)



Risk Allocation in Concession Projects (VI)

According to the origin of the risk

MARKET RISKS

- They come from market fluctuations
- They are mostly assumed by the concessionaire

UNPREDICTABLE AND FORCE MAJEURE RISKS

- Events difficult to predict
- Sometimes they can be insured
- Sometimes they are taken on or mitigated by the government

POLITICAL AND LEGAL RISKS

- They refer to the legal and regulatory framework
- They are usually assumed by the government

Risk Allocation in Concession Projects (VII)

According to the stakeholder that ultimately bears the risk

Risks borne by the project itself (shareholders)

Risks transferred to third parties through contracts

Insurable risks

Risks borne or mitigated by the government

Risks assumed by the sponsors to mitigate the loan risk assumed by the lenders

Risk and cost of capital (I)

Economic Balance of a Concession Contract

$$I_o - S = \sum_{i=1}^{i=n} \frac{(p_i \cdot q_i(p_i) - c_i - t_i)}{(1 + \alpha)^i} \quad I_o + \sum_{i=1}^n \frac{c_i + t_i}{(1 + \alpha)^i} = \sum_{i=1}^{i=n} \frac{(p_i \cdot q_i(p_i))}{(1 + \alpha)^i}$$

I_o : Initial investment

S : Upfront subsidy

α : Cost of capital of the project

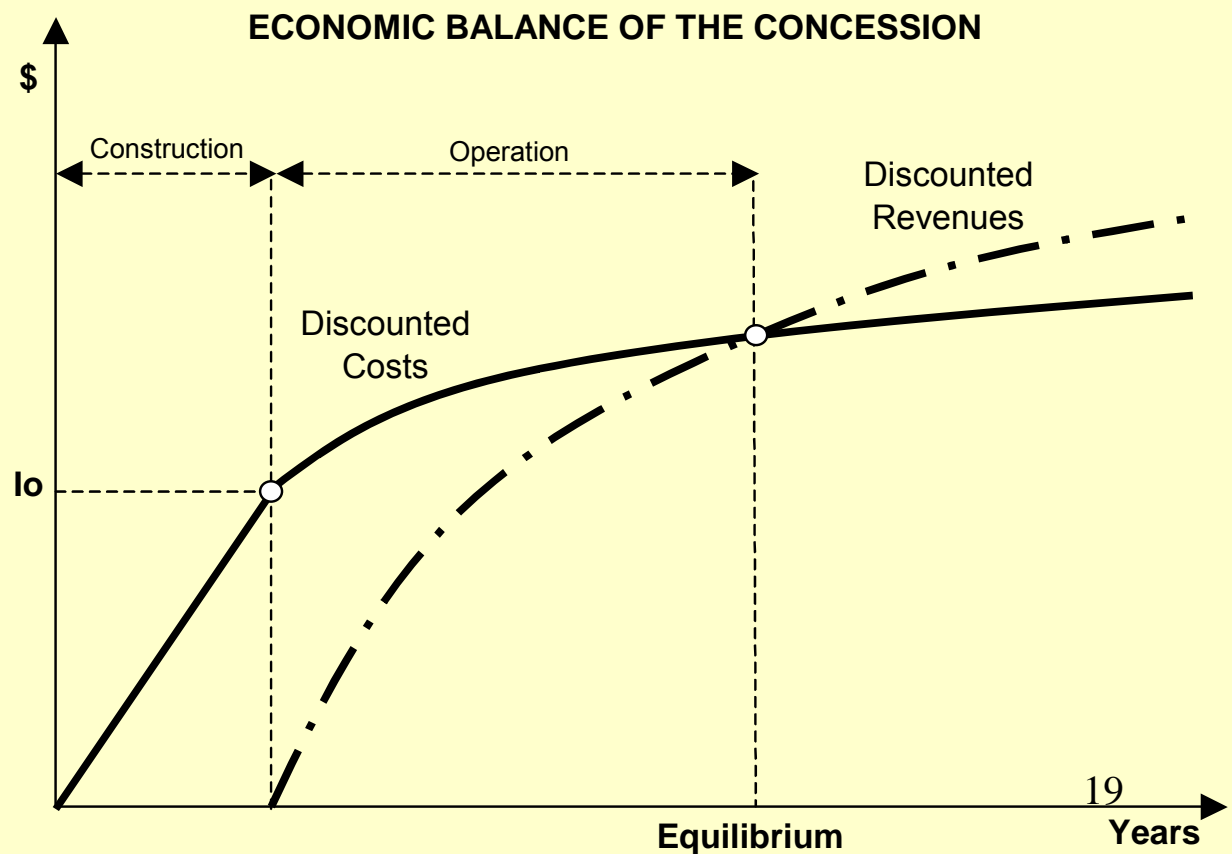
n : Concession term

p_i : Price for year i

q_i : Annual traffic in year i

c_i : Operation and maintenance cost in year i

t_i : Corporate taxes in year i



Risk and cost of capital (I)

If there is competition, the expected profitability should be equal to the weight averaged cost of capital (WACC)

$$r_{WACC} = (1 - t_c) \frac{D}{V} r_d + \frac{E}{V} r_e$$

D: Debt value

E: Equity value

V: Firm Value

r_d: Debt cost

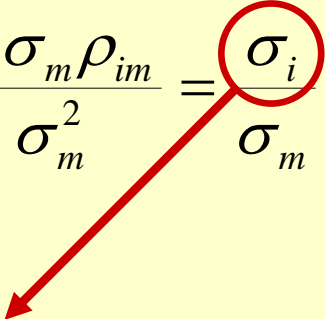
r_e: Equity cost

t_c: Profit Taxes

Risk and cost of capital (III)

Cost of Equity can be estimated through the Capital Asset Pricing Model (CAPM)

$$r_e = r_f + \beta_i (r_m - r_f)$$

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2} = \frac{\sigma_i \sigma_m \rho_{im}}{\sigma_m^2} = \frac{\sigma_i}{\sigma_m} \rho_{im}$$


Cost of capital depends on the project risk

The Concession Law in Spain

MAIN CONTRIBUTIONS OF THE NEW LAW

The concession contract can include or not the construction of a new infrastructure

The Law introduces the “progress clause”

Private persons and entities may propose concession projects to the Public Administration

The Law introduces a new mechanism to mitigate traffic risk

The Law introduces bonuses or penalties related to quality criteria

The Law regulates new private funding sources to finance concession projects

Maximum term of 40 years for BOT concessions

Principles of risk allocation in Spain (I)

- The main risk allocation principles in the Law are:
 - The private sector should take on all the market risks
 - Construction and operation risks
 - Traffic risk up to a certain level
 - Risks that are difficult to manage by the private sector may be mitigated:
 - The mitigation is carried out through re-balancing the economics of the concession contract if some events eventually happen
 - The re-balance of the concession contract can be in favour either the concessionaire or the government

Principles of risk allocation in Spain (II)

- The Law establishes the circumstances that may cause the re-balance of the economics of the contract
 - Contract modifications required by the government
 - *Force majeure* events
 - Large traffic deviations
- Ways to re-balance a concession contract:
 - Extension or reduction of the contract duration
 - Modification of tolls
 - Subsidies
- The rebalance has to be symmetrical

Risk Allocation: Unpredictable Events

UNPREDICTABLE EVENTS

- Impossible to foresee at the beginning of the contract
- Impossible to do a checklist of them at the beginning

1. *Force Majeure* events
2. A new means of transportation that might displace the traffic
3. A terrorist attack
4. And so on

THE LAW SAYS THAT:

The government must re-establish the economic balance of the contract only due to *force majeure* causes

FORCE MAJEUR EVENTS ARE:

1. Fire caused by Atmosphere electricity
2. Natural phenomena with catastrophic implications
3. Damages caused by war and alteration of public order

Risk Allocation: Construction Risk

- Construction risks have to be borne by the private contractor
- The concession contract can be re-balanced in case that some specific events substantially affects the economics of the contract:
 - Design changes imposed by the government
 - *Force majeure* events

Risk Allocation: Operational Risk (I)

- Operational risks have to be borne by the private sector
- Concession contracts should include bonuses and penalties to encourage the concessionaire to render a good quality level
- Some of the quality criteria adopted for highways are:
 - Pavement condition
 - Safety
 - Congestion in the highway and in toll plazas
 - Users' perception

Risk Allocation: Operational Risk (II)

- The “progress clause” is *the obligation of the concessionaire to maintain and operate the infrastructure according to technical, environmental and safety regulations that may be applicable at each moment*
- It may increase substantially the operational risk due to:
 - Modifications on the environmental requirements that end up being very costly
 - Relevant changes on the technical issues that end up being very costly

Risk Allocation: Operational Risk (III)

Mechanism established in some concession contracts

IF

And IF

THEN

Imposed by an
official requirement

Substantial

Re-balance of the
financial plan

Non-substantial

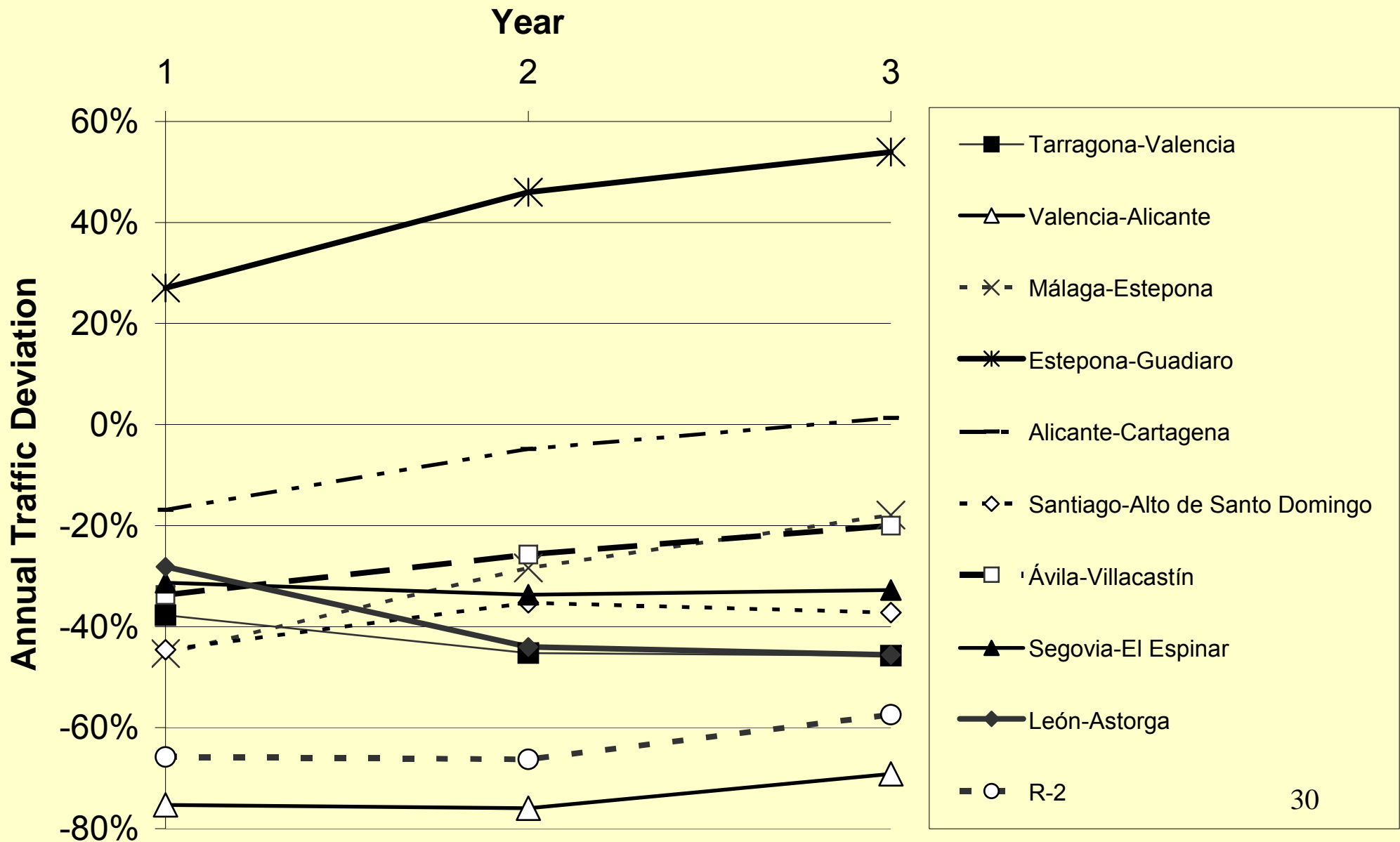
Risk borne by the
Concessionaire

Not imposed by
and official
requirement

Re-balance of the
financial plan

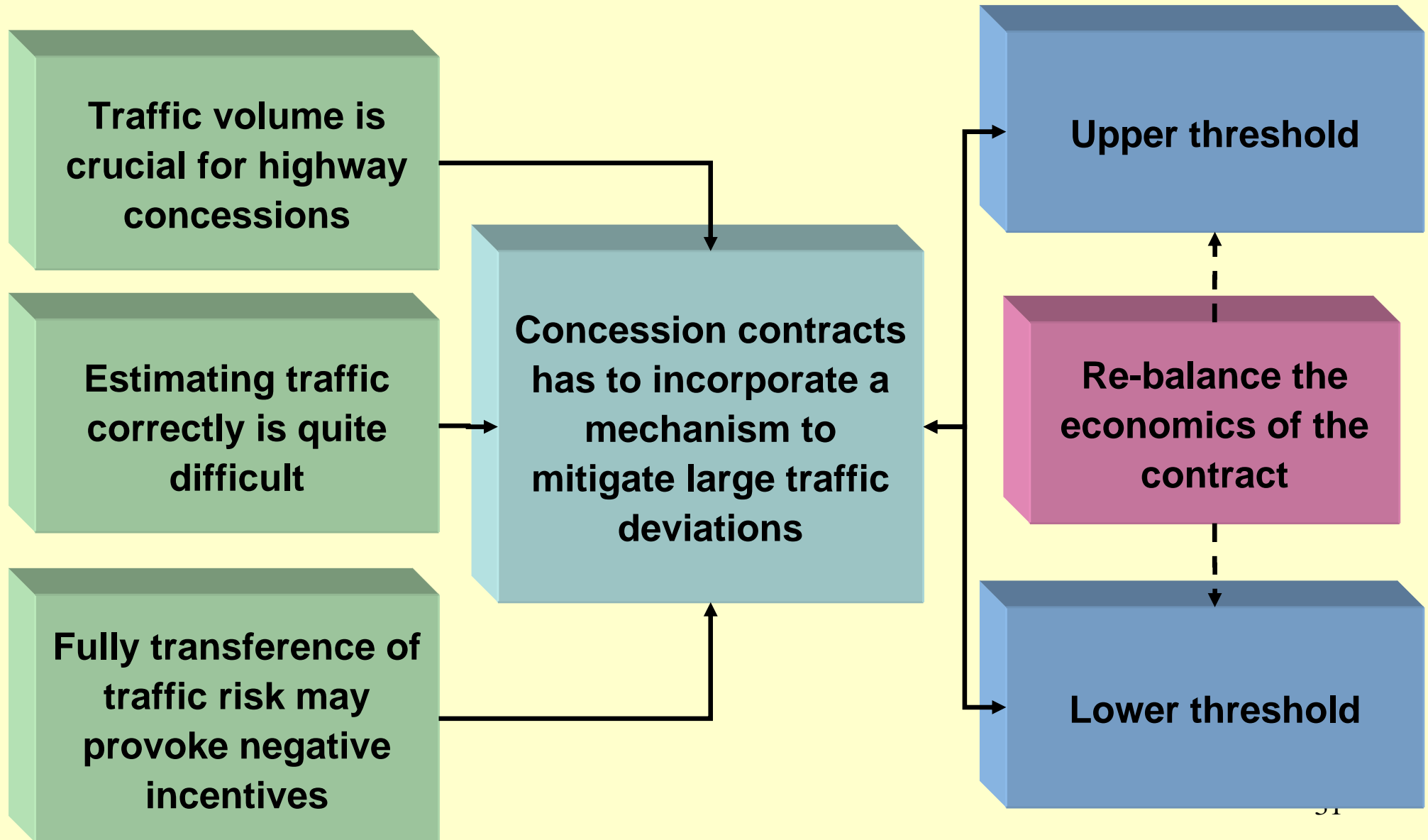
Risk Allocation: Traffic Risk (I)

Traffic Deviations in Highway Concessions in Spain



Risk Allocation: Traffic Risk (II)

Traffic Risk Mitigation Approach Established in the Law



Protection of the Public Interest (I)

- The Law limits the contract duration:
 - 40 years
 - This duration can be extended to 60 years in case that the economics of the contract has to be re-balanced
- the government has the right to get the concession back whenever it wants
 - In this case the government has to compensate the concessionaire

Protection of the Public Interest (II)

- The government can seize the concession in case that:
 - The concessionaire is not able to operate the concession correctly
 - This may affect the users
- In this case, the government will be in-charge of operating the concession
- This seizure can be no longer than three years
 - If the problems remains after that, the concession contract will expire