



Estimating the economic impact of transports

Dimitrios J. DIMITRIOU
Assistant Professor



Presentation Outline

Introduction

- > Why to estimate the economic impact?

Modelling framework

- > Taxonomy and Analysis objectives and s
- > Assumptions and key definitions
- > Key outputs – results

Case studies

- > Greek transport industry and projects

Key conclusions



DUTh/Economics Department

Decision making and Transport economics laboratory

it

6 professionals (2+4 professors)

6 PhD candidates

10 MSc – MBA graduates

search interest on

Transport Economics and project financing

Transport Business, Management and Decision making, (Management, Strategy, B.R.)

Methodological tools (O.R., M.I.S.-D.S.S., Economic Spatial and Big-

▶ Research

- ▶ European Research Frameworks
- ▶ Transport Industry
- ▶ Authorities
- ▶ Institutions, Associations

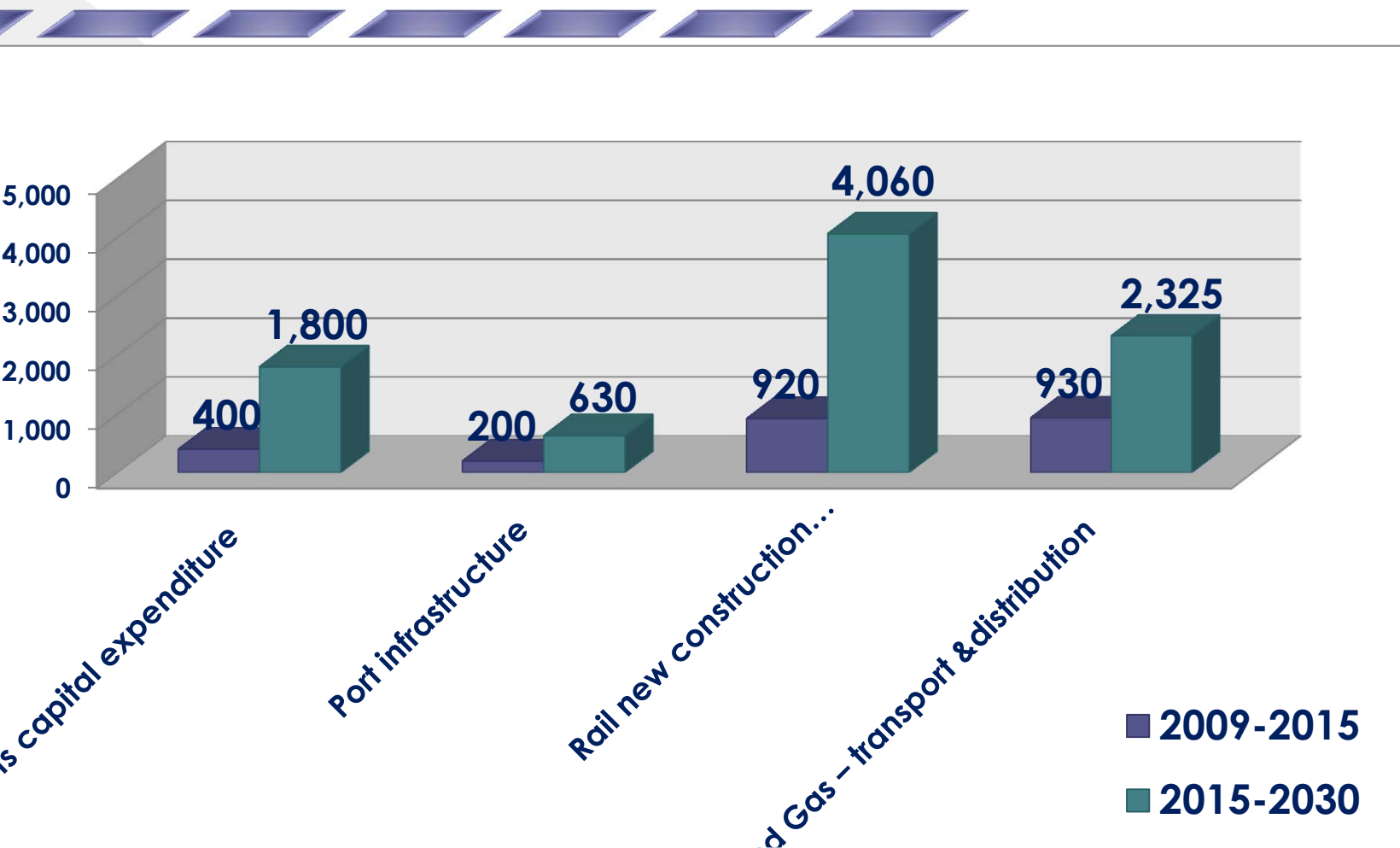
▶ Consulting

- ▶ Transport Authorities (Europe, MENA)
- ▶ Transport Industry

▶ Publications (2013-2016)

- ▶ 20 papers
- ▶ 3 reports

World Transport Infrastructure Investment needs 2009-2030



Definitions on Transport Infrastructure Economic Assessment

Investment in transport infrastructures is one of the **main preconditions** enabling countries to accelerate or sustain the pace of their development and achieve the Millennium Development Goals (MDGs) (*set by United Nations in 2000*).

Transport infrastructures attract a lot of interest because of **substantial impacts on communities, economy, and business development**

Transport infrastructures are crucial infrastructures that **boost economic growth** (*Esfahani & Ramirez, 2003; Phang, 2003; Sanchez-Robles, 2003; Shah, 1992; Short & Kopp, 2005; Wang, 2002; WDR, 1994*)

Transport infrastructure **decision making** involved politics, planners, economists, engineers, regulators, investors, and, almost, **every side of society**, (*Guangshe et al, 2011*).

Transport infrastructure decision makers consider economic development in project evaluation and selection as this as a **key decision criterion** in their long range plans. (*Choudhury, 2003; Prod and Gupta 2003*).

The decision may lead from **some days to some years** depends on



Transport Infrastructure projects

The funding process of the transport infrastructure projects is seen as a **Foreign Direct Investment (FDI)** for the national economy, providing new business opportunities, motivation and better performance (*Estache 2006, Sahoo and Dash 2009*)

National, supranational government, private capital and development banks **have supported a sharp increase** in the magnitude and frequency of infrastructure projects, (*Mosseini H.2005*)

Decision makers have associated improvements in the business with **greater inflows of FDIs in major infrastructure projects**, (*World Bank, 2013*).

Several investment projects in transit systems have been undertaken with **an explicit goal of economic development** (*Schauer 2000*)



Transport Infrastructure funding



The reality of today in increasingly more uncertain times re-affirmed by recent developments associated with the increasingly inter-dependent multidimensional global economic crises

the longstanding crisis of world poverty (Hollander, 2003),

the growing food production crisis (The Observer, 2008a; 2008b),

the declining availability of global energy resources (Pfeiffer, 2007),

the climate change induced global warming (Stern, 2007), and

the global finance liquidity crisis (Porter, 2005).

Major public infrastructure procurement through concession contracts was booming before financial and credit crisis (World Bank, 2013)

The recession increased the demand for concession contracts from governments as it is seen as a way to continue building transport

Key questions in strategic planning and decision making



Key questions

Strategic planning and decision making

plans

actions

What is the Region Economic Base

How many jobs will be gained?



How much total Output will be gained?

Key outputs

What will be the ripple effects across the Regional Economic System?

Economic Impact Assessment Methods

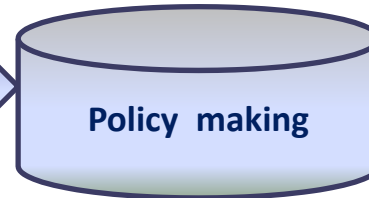
1. QUANTITATIVE METHODS

→ Input-output analysis
→ Linear programming
→ Cost-benefit analysis
→ Input-output flow
→ Input-output session
→ Benefit
→ Output analysis



2. QUALITATIVE METHODS

- SWOT analysis
- Ratios
- Indicators
- Multicriteria analysis



ECONOMIC ASSESMENT METHODS

ECONOMIC IMPACT AND ECONOMIC VALUE ANALYSIS

ECONOMIC IMPACT ANALYSIS

COST BENEFIT ANALYSIS

INPUT
OUTPUT
ANALYSIS

COMPUTABLE
GENERAL
EQUILIBRIUM

COST
BENEFIT

IO

CGE

CBA

COST BENEFIT ANALYSIS

Supports clarification of the aim of the project; estimate what will happen if the project is undertaken, and what will happen if it is not;

Evaluate whether the proposed project is the best option available;

Identify whether components of the project are the most efficient;

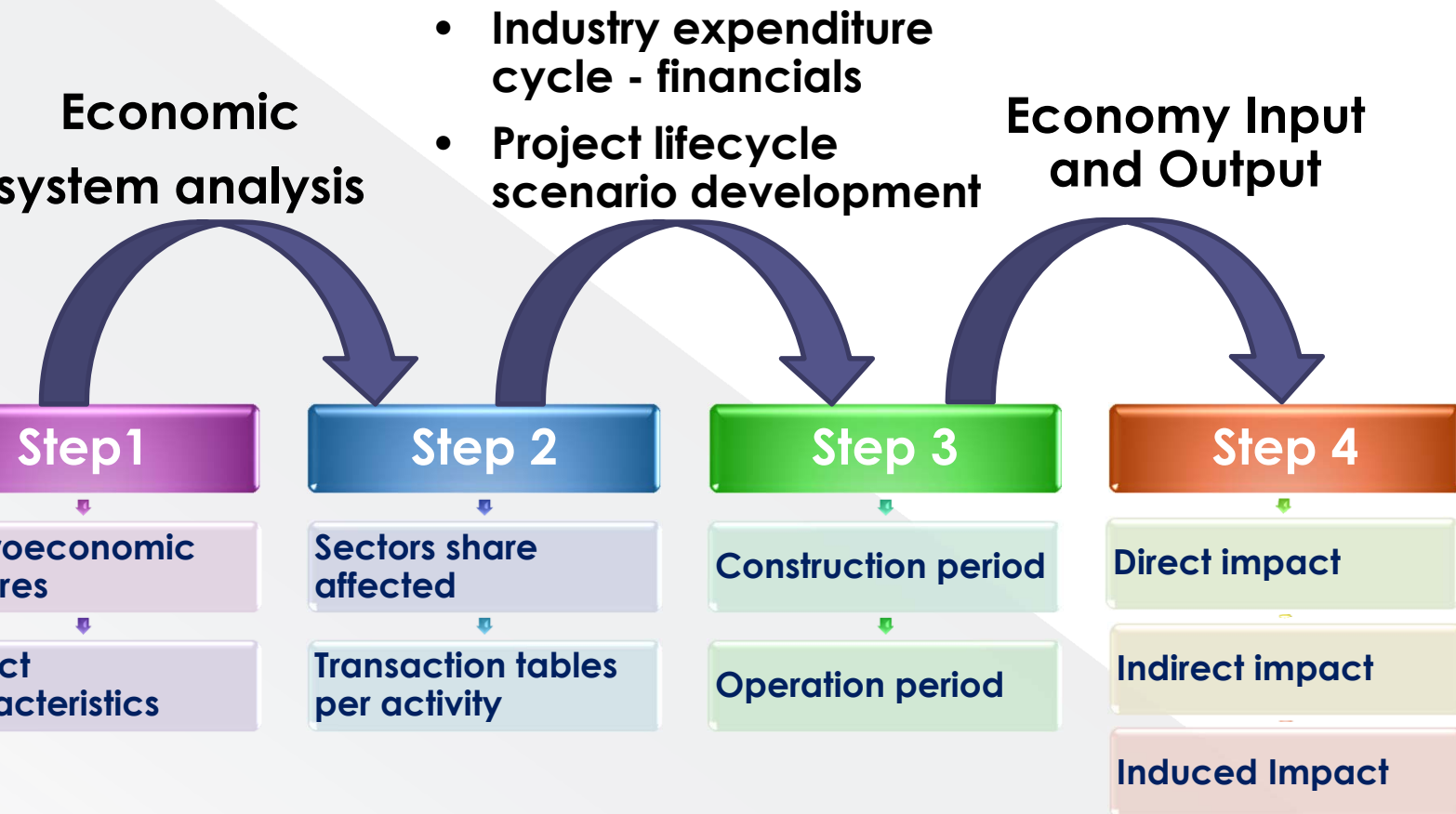
Evaluate whether the project is financially sustainable; (payback, NPV, **Risks**;

Provide an informed view to decision-makers as to whether the project is worthwhile for society.



Methodology framework

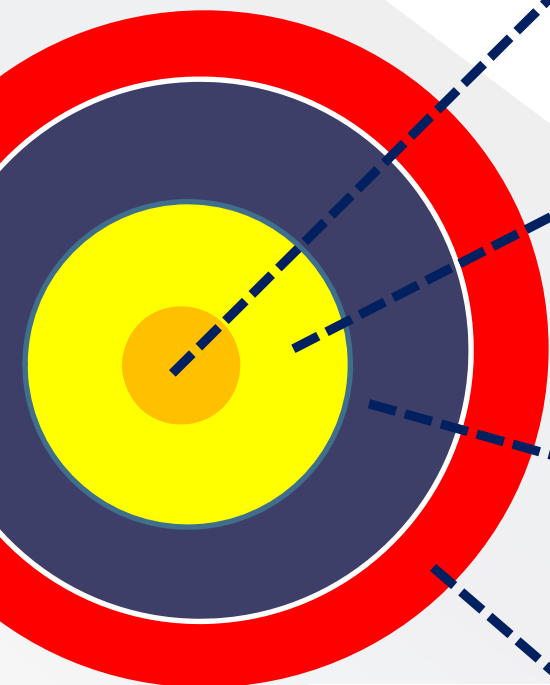
4 Step analysis



Economic impact



Types of Impact



DIRECT

Generated by firms which will construct and operate the transportation infrastructure

INDIRECT

Generated by wider supply-chain firms purchasing goods and services from nation-based suppliers, in turn generating output, profits and employment among suppliers

INDUCED

Recycling of Euros as a result of spending from direct and indirect

CATALYTIC IMPACT

ECONOMIC IMPACT: 2 ANALYSIS FRAMEWORKS



Based on the measuring the flow of expenditures around the economy



Analysis by the sectors of economy



Provide information regarding the distribution of impacts per economic activity

COMPUTABLE GENERAL EQUILIBRIUM

is complicated to data collection
models interconnectedness of
sectors, institutions, factors, and
market transactions
explicitly accounts for price changes
contains explicit supply constraints

INPUT OUTPUT

- High level of confidence in results
- Models interconnectedness of sectors and market transactions
- No correlation with the price elasticity and changes
- Demand driven

ECONOMIC IMPACT ANALYSIS –MULTIPLIERS

Multipliers Concept

Economic Impact measures how a change in income or employment in one sector flows around to all other sectors

Compare ratio of income from a counterfactual (policy or shock) to actual data

→ **Direct**: affect on immediate sector or industry

→ **Indirect**: affect on upstream or downstream sectors from direct sector

→ **Induced**: affect on secondary sectors

Total economic impact can be expressed as a multiplier

Direct+Indirect+Induced = x

For each 1Euro (or 1%) change in direct sector, the total economic

Case studies

Airports

- ▶ AIA
- ▶ Kastelli – Crete inland

Sea ports

- ▶ Piraeus
- ▶ Thessaloniki

Motorways

- ▶ 5 PPPs motorway project in Greece

CASE STUDIES I – IO AIA

Total Economic Impact
on Greece

Added Value 5.1 bn
euro

63% of Greek GDP

2,987 Jobs

5% Employment of
Greece



CASE STUDIES – IO AIA

3% National GDP

Impact on employment

99,987 Jobs

71,791

15,036

13,160

1.95bn

500m

2.65bn

Added Value

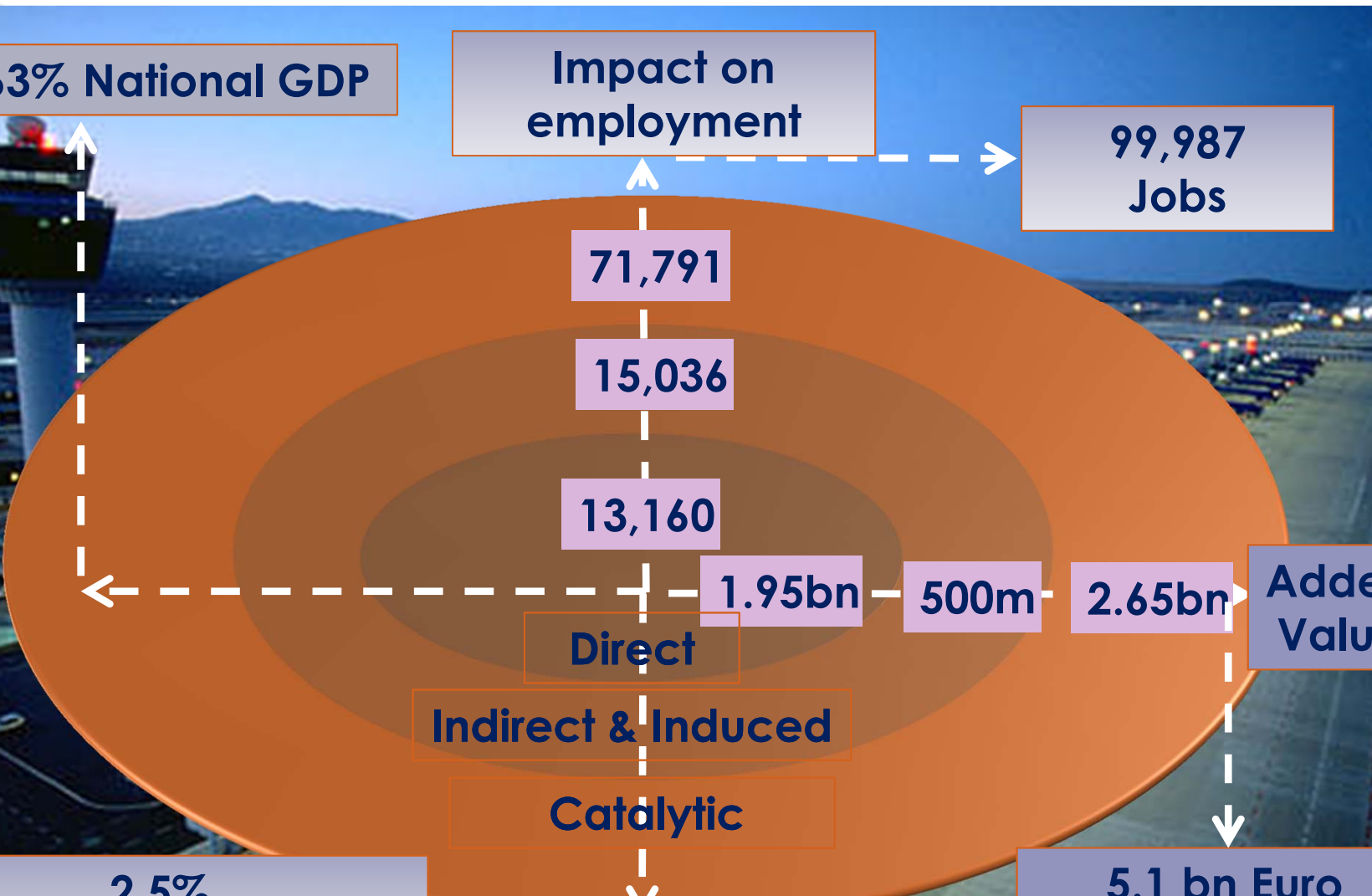
Direct

Indirect & Induced

Catalytic

2.5%

5.1 bn Euro



COST BENEFIT ANALYSIS - NEW AIRPORT IN CRETE



Reallocation of a regional tourist airport that has reached its capacity



AIRPORT INFRASTRUCTURE	EXISTING AIRPORT	NEW AIRPORT
Terminal area (sq. meters)	41.800	70.000
Number of runways	1	1
Length of runway (meters)	2,680	3,800
Aircraft parking spots	10	44

COST BENEFIT ANALYSIS-NEW AIRPORT IN CRETE

Identify reallocation of the airport objectives

Reduce delays associated with airport Congestion, Improve Airport Efficiency

Specify assumptions about future demand conditions

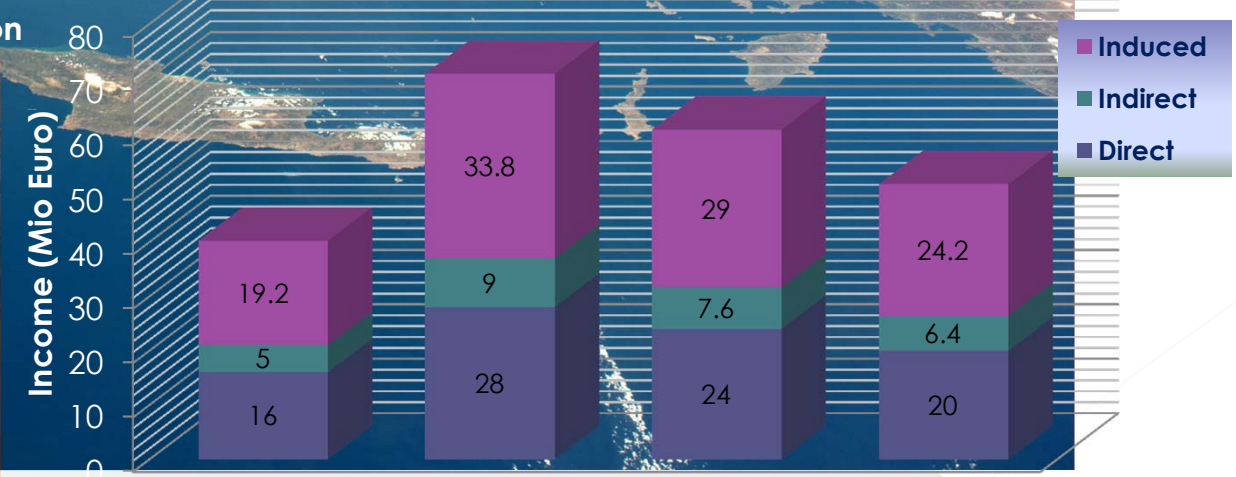
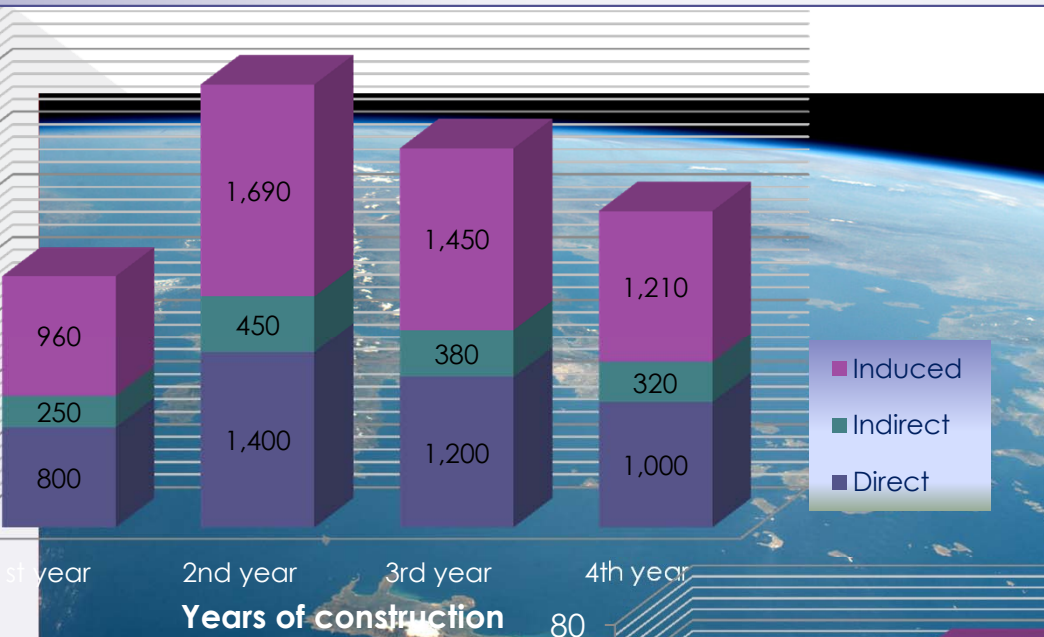
Projected growth in demand for airport services, changes in facility and capacity

Identify the Base case

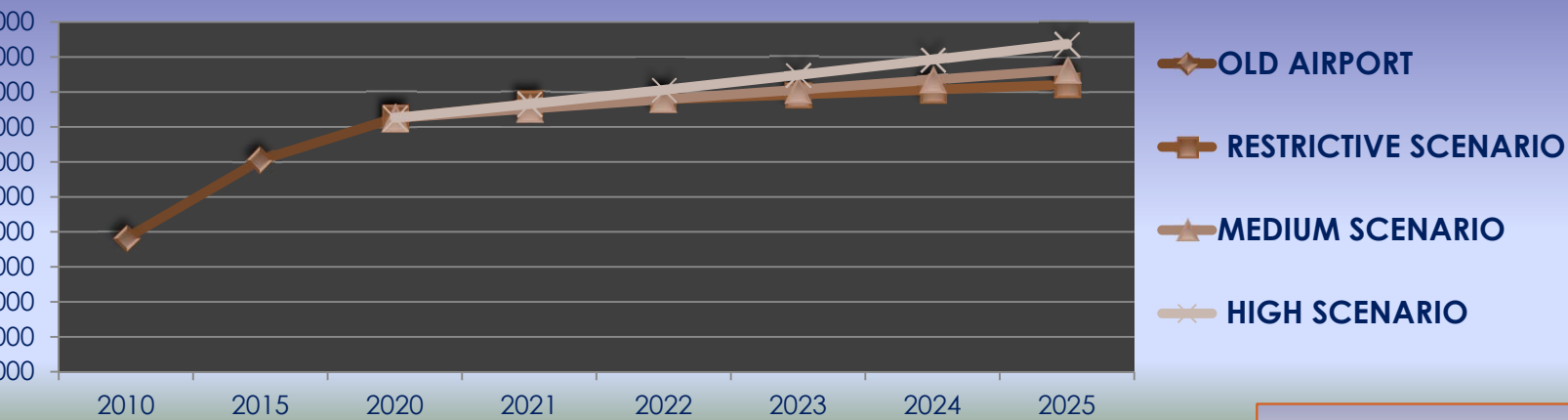
With the reallocation and without the reallocation scenario

Determine the evaluation Period

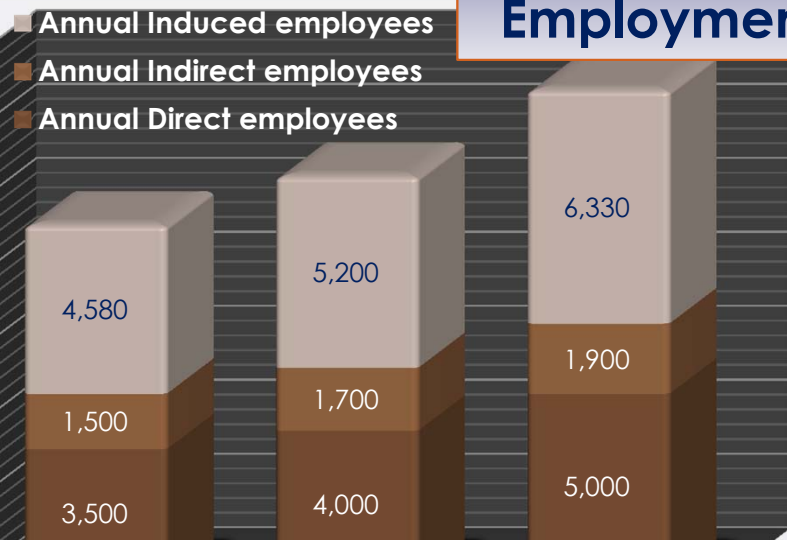
IO ANALYSIS-NEW AIRPORT IN CRETE



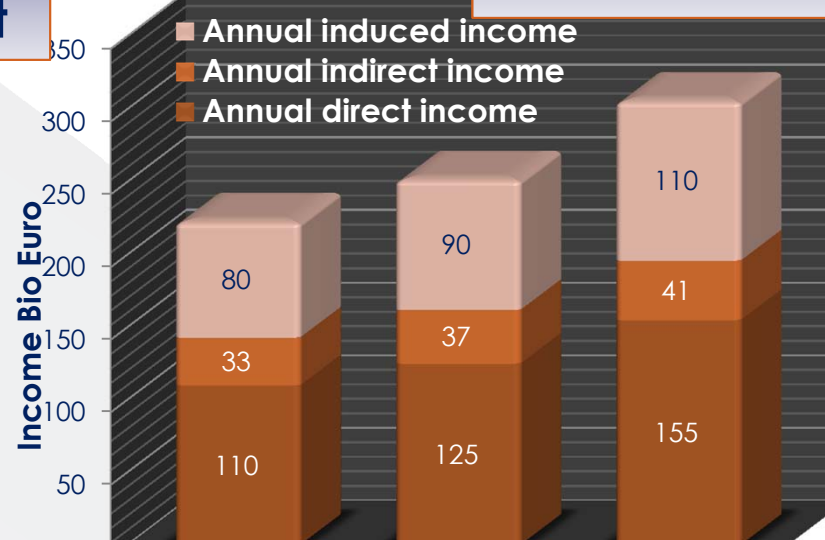
IO ANALYSIS-NEW AIRPORT IN CRETE



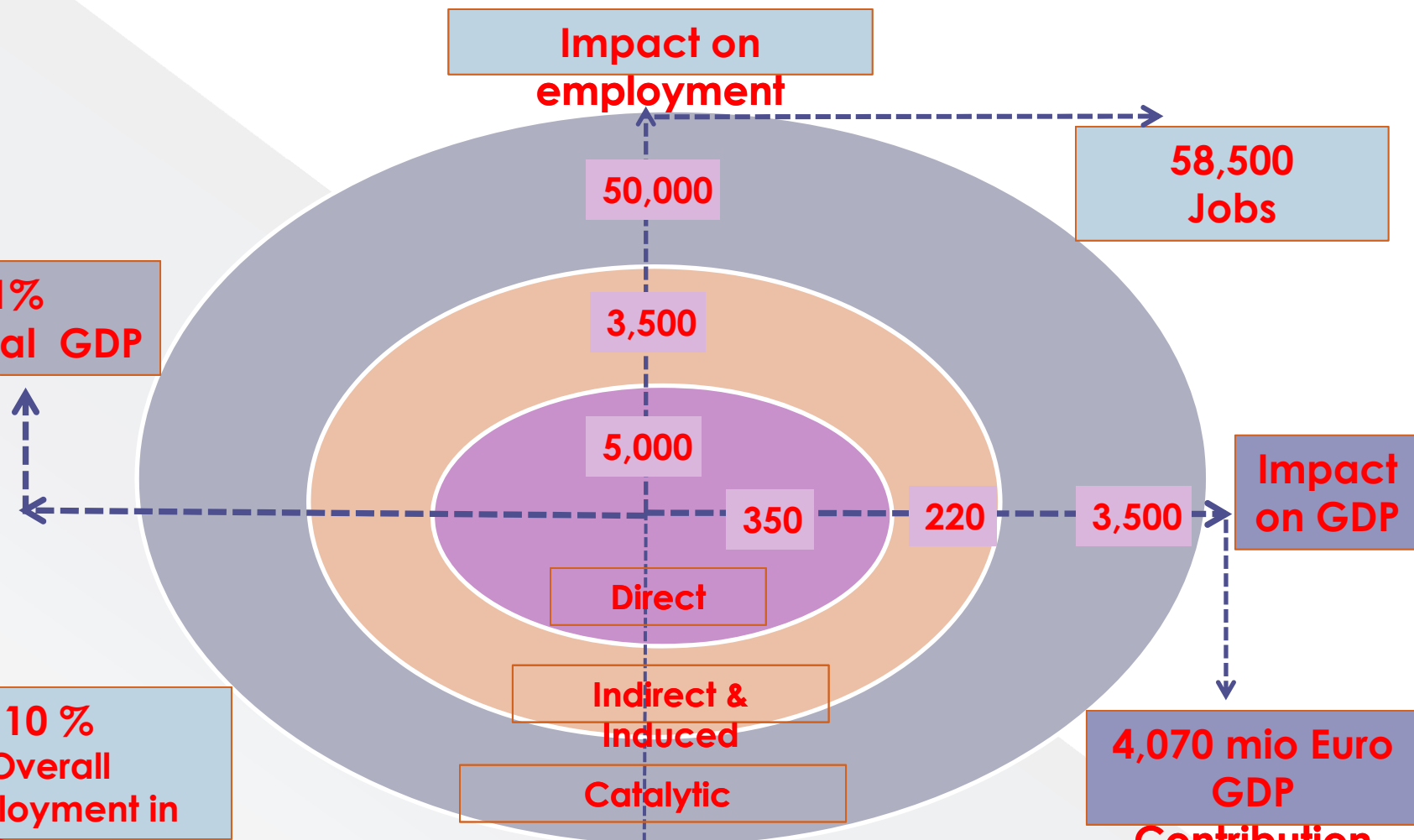
Employment



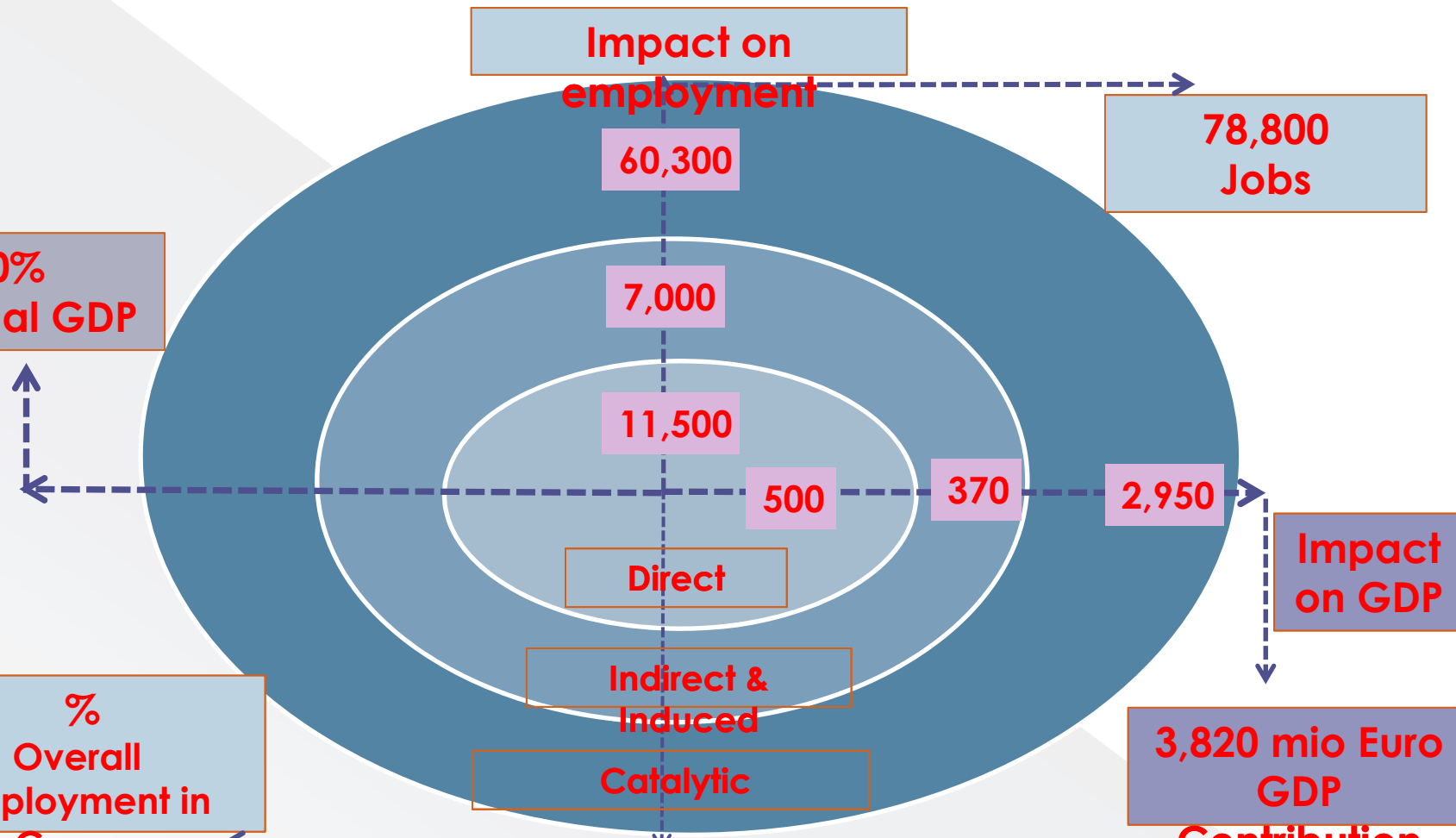
Income



IO ANALYSIS-AIR TRANSPORT IN CRETE








IO ANALYSIS – AIR TRANSPORT IN CYPRUS

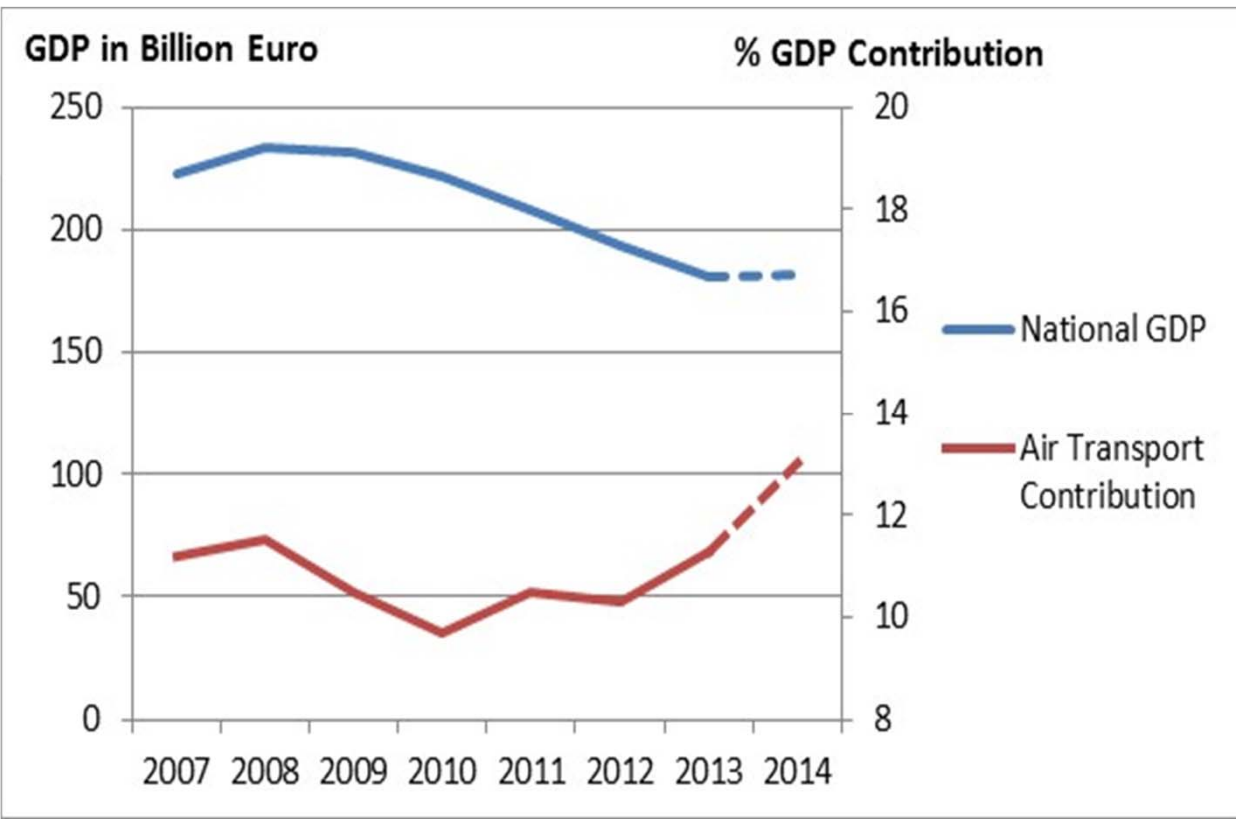
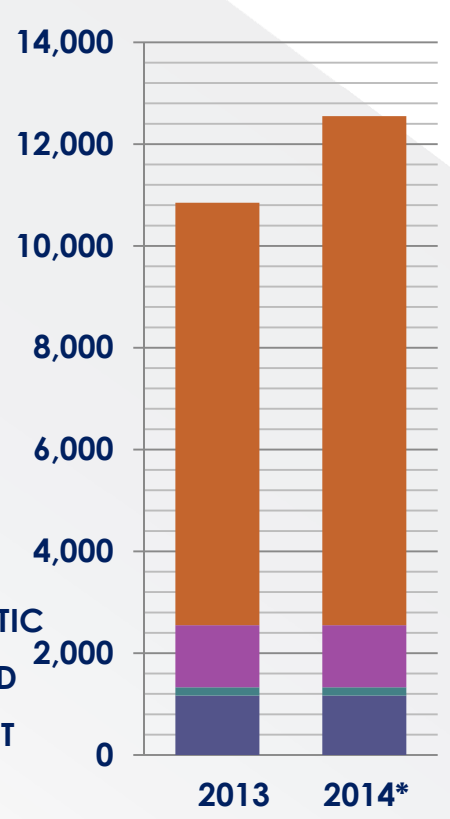


SECTOR IMPACT ANALYSIS – CRETE ISLAND

Economic sectors with the higher multipliers

Sectors	Multipliers	
Products of agriculture, hunting and related services	1,65	
Extraction of petroleum and natural gas; services oil and gas extraction	1,66	
Food products and beverages	1,55	
Crude, refined petroleum products	2,05	
Chemicals, chemical products and man-made fibres	1,75	
Non-ferrous metals	1,55	
Electricity, gas, steam and hot water	2,10	
Construction work	1,50	
Wholesale trade, commission trade services, vehicles, motorcycles	2,05	
Accommodation and restaurant services	1,85	
Internal – regional transport services (public transports, taxi, etc)	1,55	
Information and Telecommunication services	1,55	
Real Estate	2,10	
Financial services (agents, etc)	2,20	

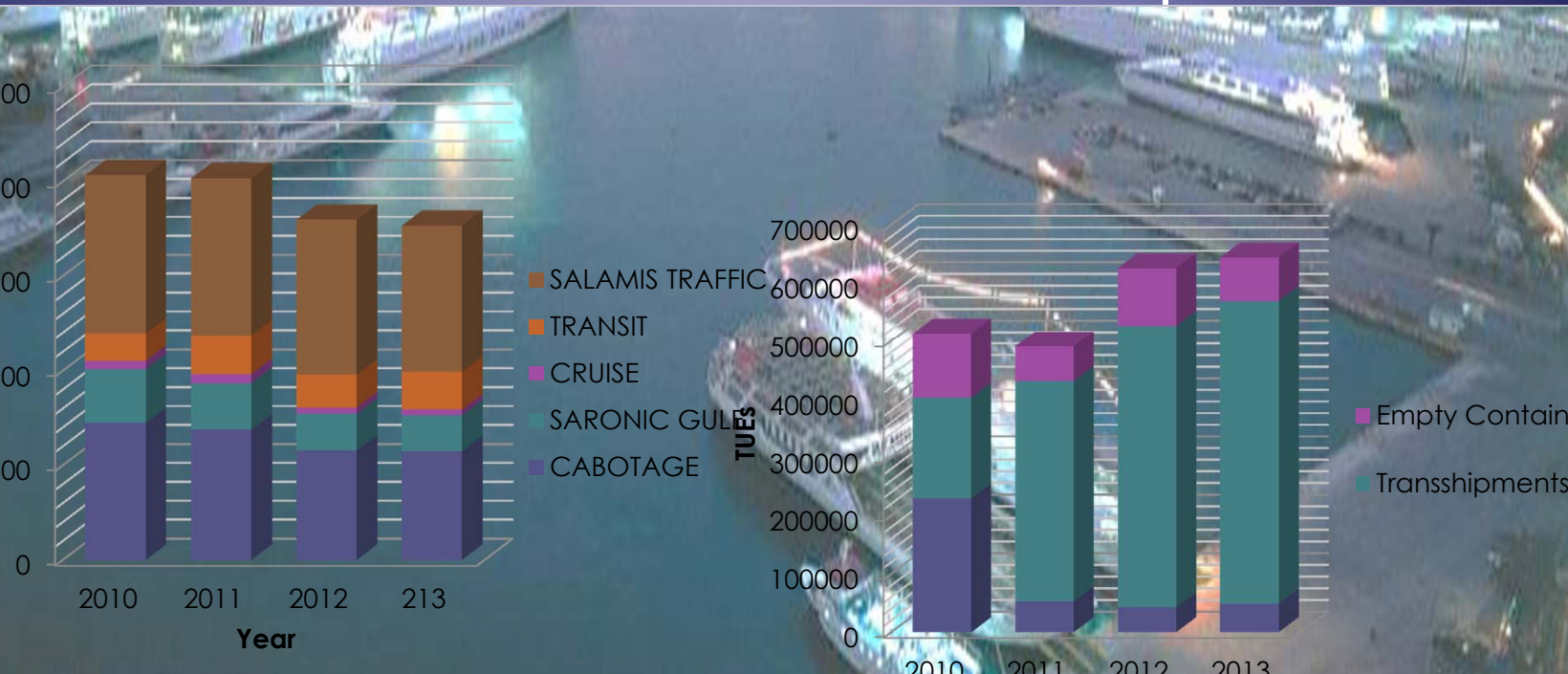
AVIATION ECONOMIC IMPACT IN GREECE (2007-2014)



Financials – Major Greek Ports-Piraeus Port

FINANCIALS

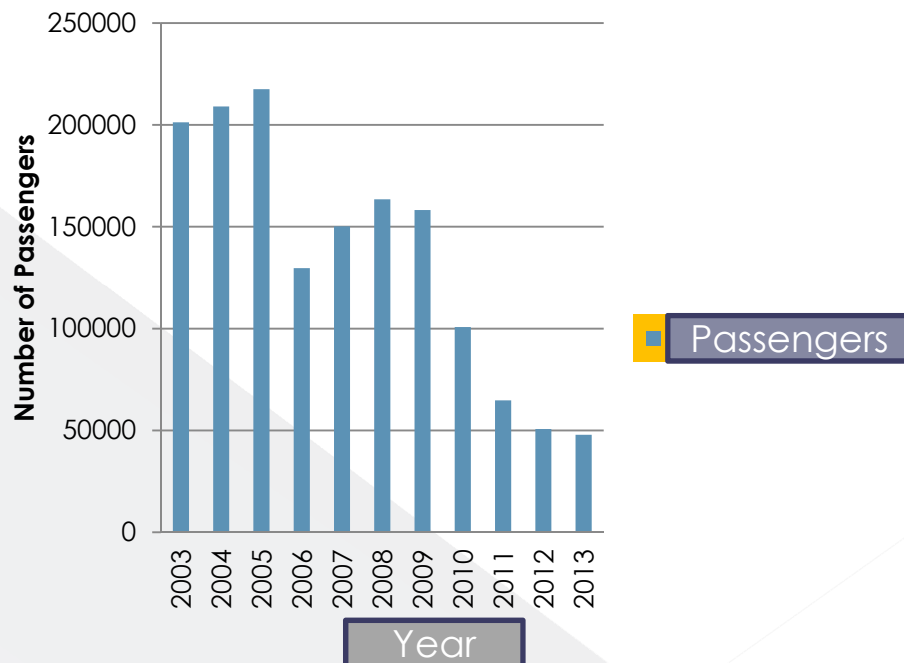
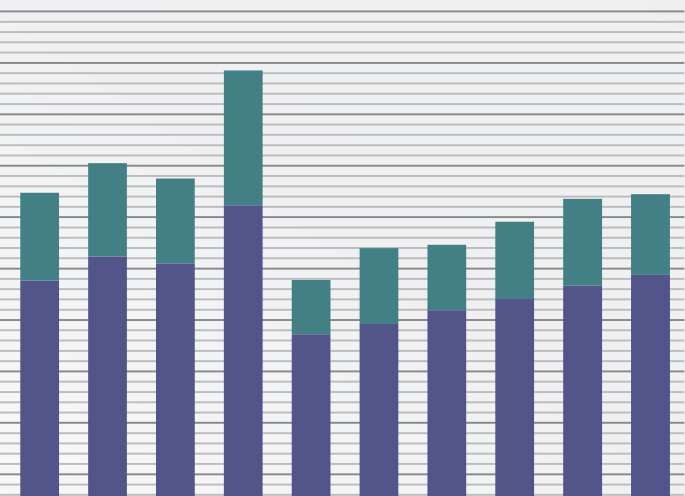
Revenue	106.8 Mio Euro
Operating Costs	56.4 Mio Euro
Other costs (except staff costs) in the “Third party” and Utilities”	19.0 Mio Euro
Fixed assets	386.5 Mio Euro



for Greek Ports – Thessaloniki Port

FINANCIALS (2013)

Revenue	51.56 Mio Euro
Operating Costs	18.4 Mio Euro
Other costs (except staff costs) in the “Third party” and Utilities”	8.4 Mio Euro
Assets	164 Mio Euro



Impact Port Thessaloniki

	Direct	Indirect	Induced	Catalytic	Total Impact	%Regional	%Greece
es	627	547	547	1174	2348	0,92%	0,07%
–	26,7 Mio €	12,7 Mio €	12,7Mio€	39 Mio €	78Mio €	GDP 0,45%	GDP .05%
ed						GVA 0,52%	GVA .04%

	(TYPE I MULTIPLIER)	(TYPE II MULTIPLIER)
TOTAL-INDUCED	TOTAL-INDUCED/DIRECT EFFECTS	TOTAL/DIRECT
1.174	2,15	4,29
	NO INDUCED EFFECTS EMPLOYEES	ALL INDUCED EFFECTS EMPLOYEES
	925	1.850

	(TYPE I MULTIPLIER)	(TYPE II MULTIPLIER)
TOTAL-INDUCED	TOTAL-INDUCED/DIRECT EFFECTS	TOTAL/DIRECT
38928825,7	1,45	2,91
	NO INDUCED EFFECTS	ALL INDUCED EFFECTS

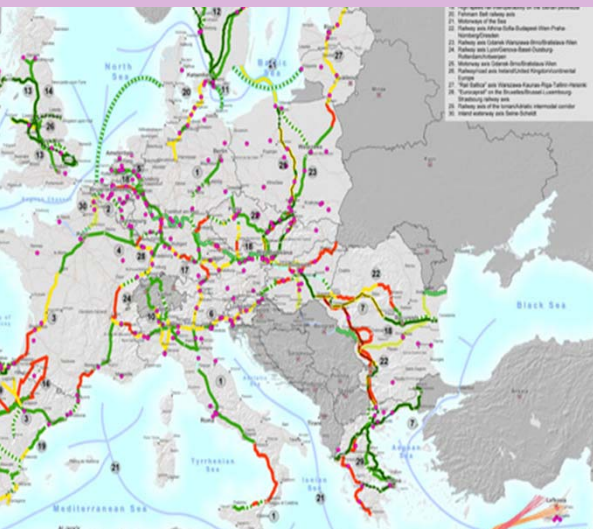
Impact Port Piraeus

	Direct	Indirect	Induced	Catalytic	Total Impact	%Regional	%Greece
Jobs	2.096	5.913	8.009	497.167	513.185	17,5%	12,3%
Value added	101 Mio€	132 Mio €	232 Mio €	3.590 Mio €	4.055 Mio €	GDP 4,3% GVA 4.6%	GDP 2,2% GVA 2.6%

	(TYPE I MULTIPLIER)	(TYPE II MULTIPLIER)
TOTAL-INDUCED	TOTAL-INDUCED/DIRECT EFFECTS	TOTAL/DIRECT
232 Mio €	1,76	3,53
	NO INDUCED EFFECTS INCOME	ALL INDUCED EFFECTS INCOME
	122 Mio €	244 Mio €

Case study-Application

Motorways are part of the priority of the TEN-T network, which connects Greece to the rest of the EU.



EUROPEAN TRANSPORT NETWORK



IONIAN MOTORWAYS PROJECT	Cost (billion €)	Length to be constructed	Length to be upgraded	Length to be operated
IONIA ODOS	1.00	196	172	360
CENTRAL GREECE MOTORWAY	0.95	25	205	230
IONIA ODOS	1.40	284	82	366
CENTRAL GREECE MOTORWAY (E65)	1.37	175	-	232

Assessment Outcomes (T1,T2)

Employment (in full-time equivalent jobs)			
	Year	Direct impacts	Total Impacts
Construction period-T1	Phase I	3,400	11,300
	Phase II	13,600	45,200
	Phase III	17,000	56,500
Operation period -T2	t=1	1,000	13,200
	t=2	1,000	18,200
	t=3	1,000	23,200



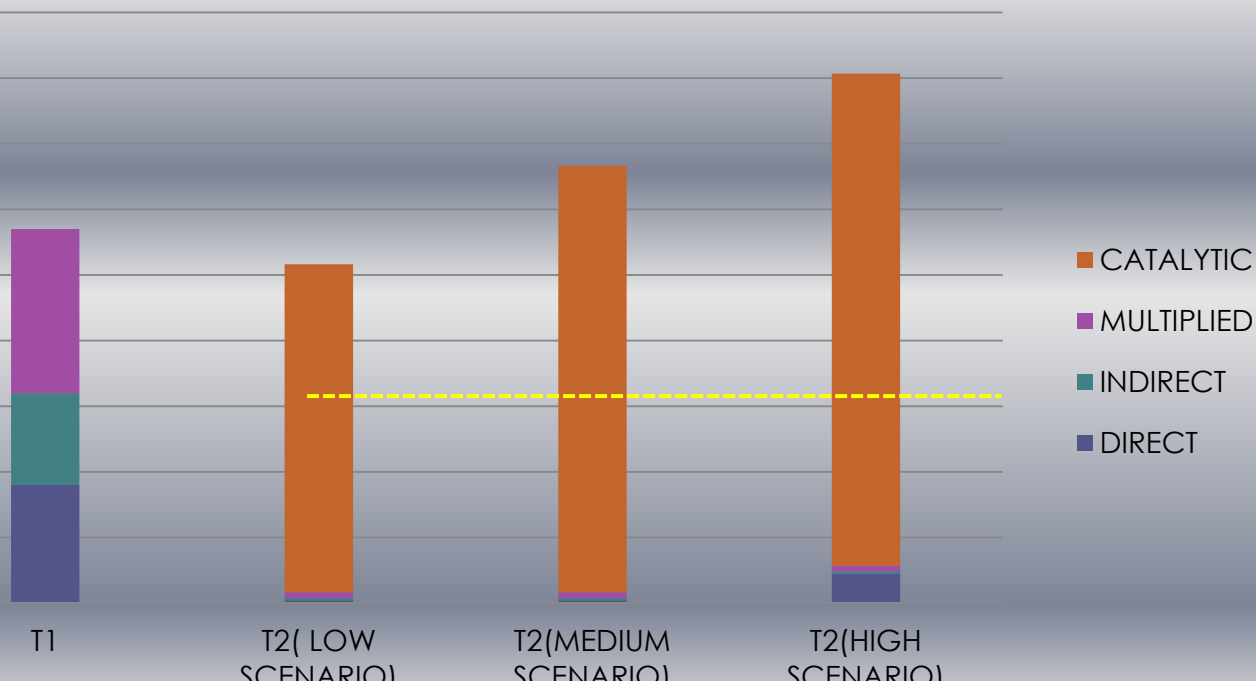
Income(in million €)			
	Year	Direct impacts	Total Impacts
Construction period-T1	Phase I	68.0	226.0
	Phase II	279.9	930.2
	Phase III	362.8	1205.7
Operation period -T2	t=1	22.0	290.4
	t=2	22.7	413.1



SCENARIOS AND MODELLING

Scenarios and Modelling Assumptions

TOTAL IMPACT ASSESSMENT (T1 & T2)



CONCLUDING REMARKS

The analysis framework depends on the research objective

CBA – Project financing

CGE – Business productivity into regional/national economy model

IO – Socioeconomic impact assessment

Support decisions on tourist regions as “demand accommodators” deals

New investments – Infrastructure expansion projects (CBA)

Productivity and competition for a sector of economy - Tourism and
Transport (CGE)

Estimate socioeconomic impact – Jobs and Income (IO)

Most of the cases need a combination of methods

Determine effects

Define relationship

WORKING AHEAD

Research

- Welfare and Social return

- Adjusting modelling assumptions

Research community

- Compare with other cases

- Compare to other investments

Professional bodies

- Feeding strategic plans

- Inform market and investors





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Please, feel free for
any question...

For more details

ddimitri@econ.duth.gr

Dimitrios J. DIMITRIOU

Assistant Professor

