Economic Viability and Macroeconomic Impact of the Burgas-Alexandroupolis Pipeline

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***Abstract*-This paper is a condensed version of an actual study commissioned in 2010 to the authors by the Administrative District of East Macedonia and Thrace. The proposed investment plan for the construction of the Burgas-Alexandroupolis Pipeline (BAP) is a significant energy transportation project for South-East Europe and for the local economies in Greece and Bulgaria. The BAP is designed to serve as a complimentary channel to the maritime route of transportation of crude oil from the Black and Caspian Sea to the international markets. The construction and operation of the pipeline is expected to have a significant direct and indirect impact on the national and local economies in terms of increased direct demand for goods and services and employment. In this paper, we thoroughly examine the financial viability of the BAP using an exhaustive number of alternative scenarios as it is a prerequisite for any favorable macroeconomic effects. In doing so, we employ the use of Cash flow analysis, the IRR, the NPV and Break-Even-Point analysis. Finally, after we establish the viability of the investment plan, we investigate its macroeconomic impaction local and national unemployment, GDP and local government revenue that appear to be significant especially on the local level.**

Keywords*-*Economic Viability; Impact Study; Financial Planning; Macroeconomic Impact

I. INTRODUCTION

In this paper we study the microeconomic viability and macroeconomic impact of the proposed investment plan for the construction and operation of the Burgas-Alexandroupolis Pipeline (BAP). The proposed pipeline route is depicted in Map 1. The proposed investment plan was at the epicenter of heated discussions and political procedures for a couple of decades now in both Greece and Bulgaria. This paper is a condensed version of the actual study commissioned in 2010 to the authors by the Administrative District of East Macedonia and Thrace aiming to investigate the economic impact of the proposed investment plan on the local economy and this is why it is mainly focused on the Greek side of the venture. The proposed investment was the object of controversy and many public discussions especially within the region of the Evros prefecture in north-east Greece where the pipeline is scheduled to be built. The proposed pipeline will transport crude oil that is produced in the North Caspian Sea and in Russia. This oil is transported to international markets in Europe and elsewhere. Currently, the crude oil produced in the above region is transported with tankers through the Straits of the Dardanelles or via the BTC (Baku-Tbilisi-Ceyhan) pipeline and the Mediterranean Sea. Future global economic growth will lead to an inevitable increase in the demand for energy and therefore oil. By extension, the production, export and transportation of oil from the North Caspian sea and Russia is expected to increase rapidly. The BAP, therefore, aims to serve as a complimentary channel to the maritime transport of crude oil through the Straits of the Dardanelles that is physically limited for safety reasons. Thus, the operation of the BAP will help maintaining a sustainable level of tanker traffic through the straits insuring uninterrupted supply of crude oil from the Black and Caspian sea to the international markets. The pipeline is designed to be part of an integrated combined transportation scheme that incorporates both sea and land transportation. Tankers will transport crude oil from Black Sea ports to the port of Burgas in Bulgaria and from there through the pipeline the oil will be forwarded to a sea platform off the port of Alexandroupolis for transshipment to tankers and delivery to the final destination. The construction of the pipeline is scheduled to be completed in two years. After that, it will operate at maximum capacity of 35 MTA (million tons per annum) for the first three years and full capacity of 50 MTA after that. The total service life of the pipeline will be thirty years. The total length is 259 km and the diameter is 42 inches. The investment project is expected to have a dual impact in the local and national economy: first, the direct investment expenditures are expected to be significant and produce multiplicative effects to total demand and employment. Second, the Implementing Organization (IO) of the project has offered an offset payment to the local economies for the right of passage through the land equal to \$1 per transported ton of crude oil. Therefore, the cumulative macroeconomic impact to the local and national economy is expected to be high. Thus, it is important to study the economic viability of the proposed investment project as a prerequisite for a positive macroeconomic impact.

In section 2 we examine the economic viability of the proposed investment using an extensive Cash Flow analysis that covers a very wide range of plausible and even some extreme case scenarios. We perform a detailed Cash Flow analysis for the two year construction period and the thirty years of operation of the pipeline. We estimate the respective Internal Rate of Return (IRR) and Net Present Value (NPV) for each one of the forty eight, in total, scenarios considered. In section 3 we perform a Break-Even-Point analysis for a wide range of scenarios and produce the corresponding elasticities of profits with respect to alternative values for the key variables of the project. In section 4, we investigate the macroeconomic impact of the BAP to the local and national economy and finally section 5 concludes the study.

II. ECONOMIC VIABILITY OF THE BURGAS-ALEXANDROUPOLIS PIPELINE

In this section we analyze the economic viability of the proposed project. Financial viability, In terms of profitability and liquidity, is a prerequisite for any imacroeconomic impact that the pipeline may have in the area. For this reason, we perform a detailed cash-flow analysis with the use of a large number of alternative scenarios to the basic one and a dynamic analysis of the sensitivity of the results to a wide range of important parameters. This sensitivity analysis is necessary to examine the degree of the dependence of the results to the basic scenario assumptions.

A. Specification of Alternative Scenarios

The alternative scenarios for the study are created by changes in the four fundamental variables that significantly affect the financial results of the project's Implementing Organization (IO). These fundamental variables are, the traffic volume (M), the transportation fee (T), the USD/EUR exchange rate (I) and the construction cost (K).

1) Traffic Volume Scenarios

The IO's own study for the pipeline, estimates a maximum capacity for the first three years of operation equal to 35 MTA (millions of tons annually) that from the fourth year and until the thirtieth will increase to the full capacity of 50 MTA. Thus, in our basic scenario we assume that the traffic volume (M) throughout the life of the pipeline (with the exception of the first three years) will be 35 MTA, equivalent to an operating capacity of 70%. In the optimistic scenario we assume a full capacity of 50 MTA or 100%. The IO forecasts that the demand for transportation through the BAP will be high enough to operate in full capacity as traffic through the Straits of Bosporus will be dense, resulting in delays that will increase the maritime cost of transportation making the BAP a secure and competitively priced alternative of combined sea and pipeline transportation. Finally, in the pessimistic scenario we assume that the BAP fails to attract, for any reason, a transport volume that comes anywhere close to full capacity. In this scenario the transportation volume is assumed to be 25 MTA or 50% of capacity.

2) Transportation Fee Scenarios

The transportation fee (T) in the basic scenario is set on the basis of international standards on similar projects in the pipeline industry and with proper adjustment for the BAP's total length and transportation capacity. The prices in this market are set in US dollars. In the basic scenario we use a transportation fee for a ton of crude oil from Burgas to Alexandroupolis equal to $10. In the optimistic scenario the fee is set to $12 and is justified in the case of increased volumes transported through the Straits of Bosporus resulting in delays that increase the maritime transportation cost. In the pessimistic scenario the fee is set to $8 per ton of crude oil.

3) Exchange Rate Scenarios

In this study of the expected cash flows for the IO of the BAP, the USD/EUR exchange rate plays a significant role. This happens because while the company's revenues from the operation of the pipeline are measured in US dollars, the overheads and most other expenses and costs are paid in euros. This creates an exchange rate risk for the IO. We have to stress at this point that the main cost variable for the IO operating the BAP is the annual offset payments to the local government in exchange for the right of passage. These offset payments are $1 per ton and thus they do not add to the exchange rate risk. In the Basic Scenario the USD/EUR exchange rate is set at $1.25 per euro and in the Optimistic and Pessimistic scenarios at $1.10 and $1.40 respectively.

4) Construction Cost Scenarios

It is estimated by the IO that the total construction cost (K) will be between €1 and €1.5 billion. Thus, for our scenarios we use the value of €1.25 for the Basic Scenario and €1 and €1.5 billion for the Optimistic and Pessimistic Scenarios respectively. In Table 1 we summarize the range of values that are used in our three initial scenarios.

TABLE 1 INITIAL SCENARIOS: ALTERNATIVE PARAMETER VALUES

	Basic Scenario	Optimistic Scenario	Pessimistic Scenario
Traffic Volume (tons)	35,000,000	50,000,000	25,000,000
Transportation Fee ($/ton)	11.00	13.00	9.00
Exchange Rate($/€)	1.25	1.10	1.40
Construction Cost (€)	1,250,000,000	1,000,000,000	1,500,000,000

5) Other Variables and Assumptions

In addition to the above mentioned fundamental variables, the detailed analysis of the cash flows that the BAP project will create during its economic life requires several assumptions for many aspects of the project's operation:

The operating life of the BAP is set to thirty years.

Employees' salaries: according to the IO, 140 employees on the Greek and 160 on the Bulgarian side are expected to be directly employed in the operating phase of the BAP. The country break-down is significant as wage differentials between the two countries are significant. The total number of employees is further divided as follows: 100 workers, 20 supervisors and 20 administrative staff. The average cost to the IO is calculated at €2000 per month per worker, which leads to an annual cost of €2,800,000. For the supervisors the monthly cost per person is €4000, for an annual cost of €784,000. Finally, for the administrative staff the monthly cost per person is calculated at €3000, which adds an annual cost of €588,000. The salaries for the staff in the Bulgarian side are calculated using a dynamic labor cost coefficient. This coefficient comes from the ratio of Bulgarian to Greek salaries that start from 0.25 and gradually increases to 0.55 as the Bulgarian economy is expected to converge to the Greek economy and this is reflected in the increasing labor cost coefficient. This convergence, although real, is nonetheless relatively slow.

General supplies estimated at €500,000 per year.

Offsets to the local government for the right of passage through Greece and Bulgaria are calculated at $1 per ton.

Administrative costs: these include the salaries of the administrative staff € 588,000, for public relations an average of €50,000, costs of vehicles and office rentals € 40,000, insurance premiums at €100,000, miscellaneous administrative supplies € 50,000 and other provisions €100,000.

B. Cash Flow Results

Based on the values for the three scenarios presented above, in Table 2 we report the Cash Flow results for the three initial scenarios. The full tables of Cash Flows for each one of the three initial scenarios and for thirty years are included in Appendix A. In Table 3 we present the thirty year cumulative results of the project's Cash Flow. According to these results, total revenues per year in the three scenarios range from €308,000,000 in the base scenario to €590,909,091 and €160,714,286 in the optimistic and pessimistic scenarios respectively. Total operating costs range from €61,908,000 in the base scenario to €96,817,091 and €41,622,286 in the optimistic and pessimistic scenarios. These results translate to net profit after tax equal to €153,319,000, €345,569,000 and €51,819,000 for the basic, optimistic and pessimistic scenarios respectively.

TABLE 2 CASH FLOW RESULTS IN ALTERNATIVE SCENARIOS

	SCENARIO		
	BASIC	OPTIMISTIC	PESSIMISTIC
Trafic Volume (tons)	35,000,000	50,000,000	25,000,000
Transportation Fee (€/ton)	8.80	11.82	6.43
Total Revenue	308,000,000	590,909,091	160,714,286
Operating Cost of the Pipeline			
Wage Ratio GRE/BUL	0.25	0.25	0.25
Wages Workers Greece	2,800,000	2,800,000	2,800,000
Wages Supervisors Greece	784,000	784,000	784,000
Wages Workers Bulgaria	700,000	700,000	700,000
Wages Supervisors Bulgaria	196,000	196,000	196,000
Supplies	500,000	500,000	500,000
Total	4,980,000	4,980,000	4,980,000
Offsets to Local Governments	56,000,000	90,909,091	35,714,286
Total Production Cost	60,980,000	95,889,091	40,694,286
Administrative Expenses			
Salaries	588,000	588,000	588,000
Public relation	50,000	50,000	50,000
Vehicles-Office Rents	40,000	40,000	40,000
Insurance Premiums	100,000	100,000	100,000
Supplies	50,000	50,000	50,000
Total Admonistrative Cost	828,000	828,000	828,000
Total Cost	61,808,000	96,717,091	41,522,286
Provisions	100,000	100,000	100,000
Total Operating Cost	61,908,000	96,817,091	41,622,286
Gross Profit Before Tax-Depreciation	246,092,000	494,092,000	119,092,000
Minus Derpeciation	41,666,667	33,333,333	50,000,000
Taxable Income	204,425,333	460,758,667	69,092,000
Taxes Payable	51,106,333	115,189,667	17,273,000
Net Profit	153,319,000	345,569,000	51,819,000
Net Cash Flow After Tax	194,985,667	378,902,333	101,819,000
Cummulative Cash Flow After Tax	194,985,667	378,902,333	101,819,000
Net Cash Flow before Tax	246,092,000	494,092,000	119,092,000
Cummulative Cash Flow before Tax	246,092,000	494,092,000	119,092,000

The Internal rate of Return (IRR) for the three scenarios is calculated from the standard

$$\sum_{t=0}^{n} \frac{CF_t}{(1+IRR)^t} = 0 \qquad (1)$$

And is 15.37% for the basic, 37.88% for the optimistic and 5.35% for the Pessimistic Scenario. The Net Present Value of the investment with a discount rate of 5% is calculated using

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+i)^t} \qquad (2)$$

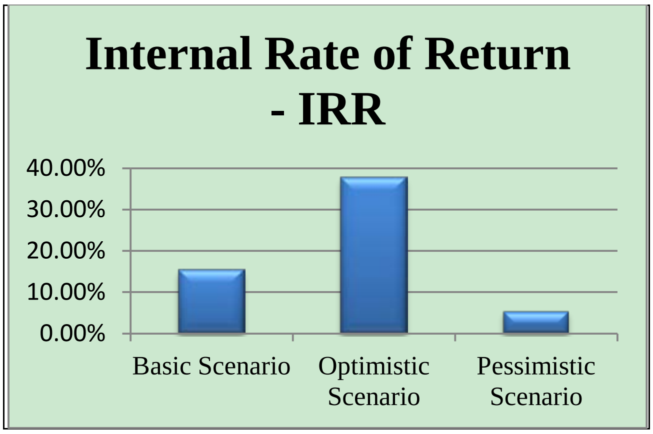


Figure 1 Estimated IRRs for the Initial Scenarios

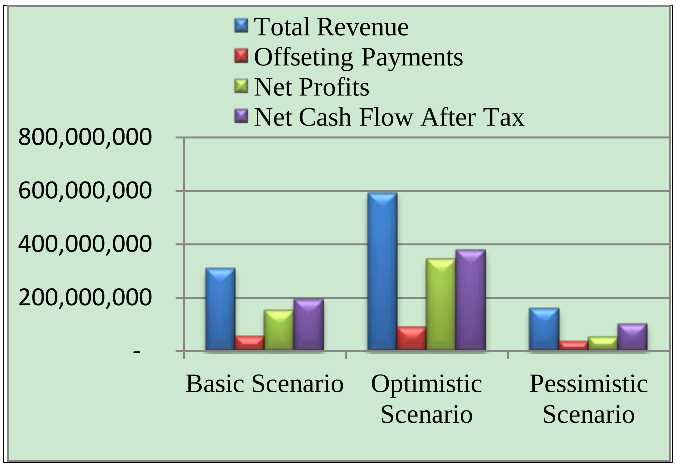


Figure 2 Basic Cash Flow Results for the Initial Scenarios

At € 1,659,650,404.33 at the basic scenario, € 4,590,364,643.72 at the optimistic and €57,555,146.54 at the pessimistic one. Figures 1-3 summarize the results.

We can investigate how the results from the Cash Flow analysis of the project change in the Basic Scenario when the transportation fee –and only that- may follow the optimistic (T2) or the pessimistic scenario (T3). We generate in this way twenty four alternative Cash Flow tables like the one presented in Appendix A and Tables 2 and 3. In Table 4 we present a summary of the sensitivity results for the asymmetric changes. In Figures 4-6 we depict the sensitivity of the economic results of the BAP for the Basic Scenario with asymmetric changes. In Figures 7-9 and Figures 10-12, the sensitivity of the economic results of the BAP with asymmetric changes for the Optimistic and Pessimistic Scenarios are presented respectively. From Table 4 and Figures 4-12 we construct Table 5 that reports the specific fundamental variable value that produces the minimum and maximum values of the economic variables of the Cash Flow for each scenario. In Table 6 we present the results of these sensitivity tests as percentage changes from the original scenario. These are also depicted in Figures 13-21.

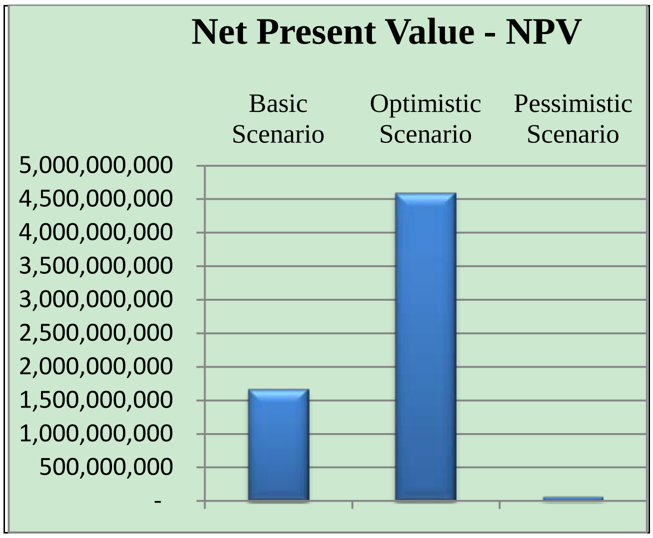


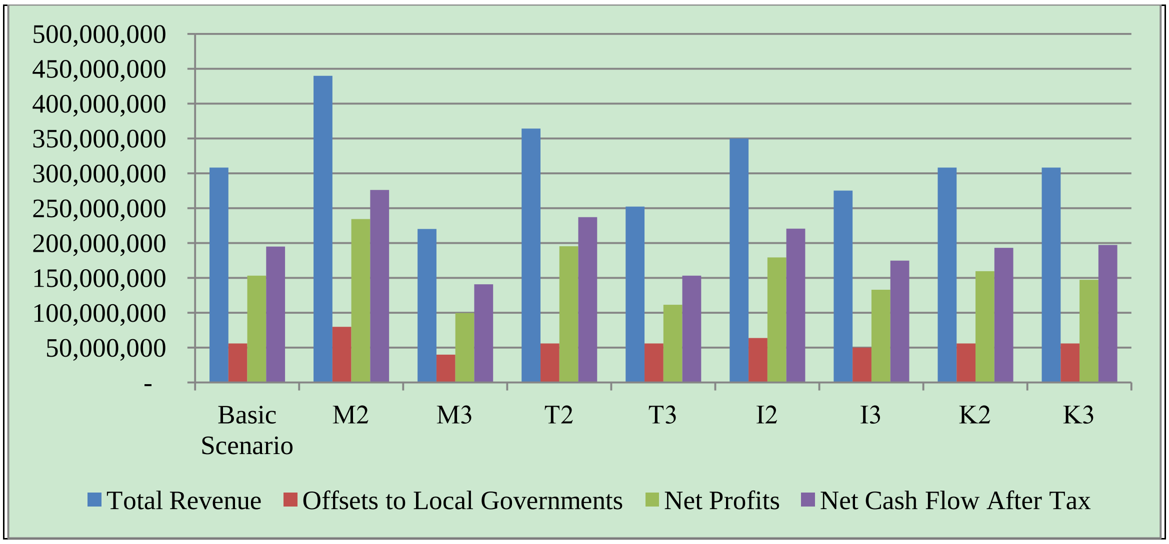
Figure 3 NPV Results for the Initial Scenarios

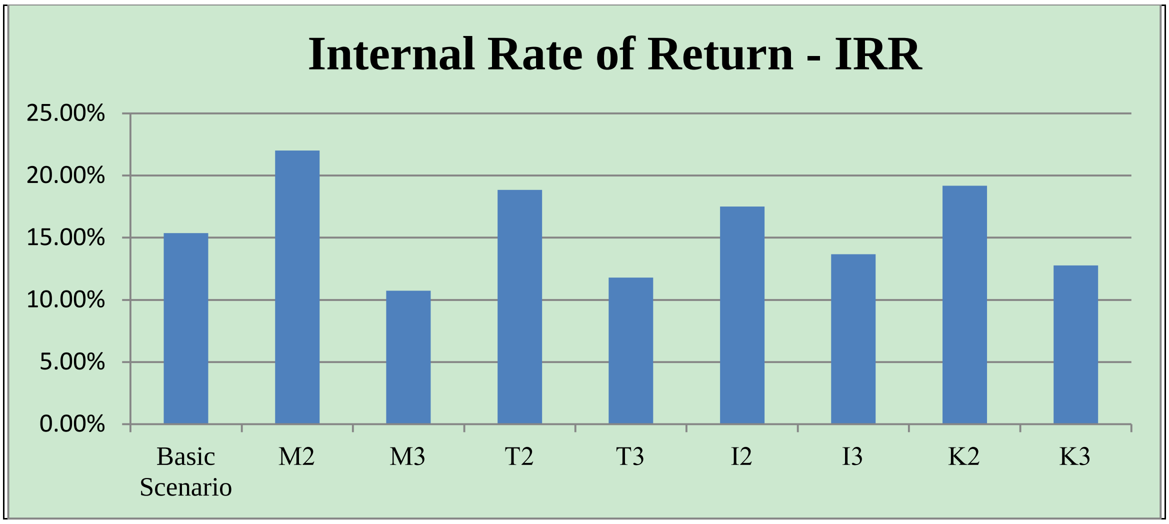
From the above analysis of the sensitivity of the initial scenarios to the asymmetric changes in the four fundamental variables of the cash flow analysis we conclude the following:

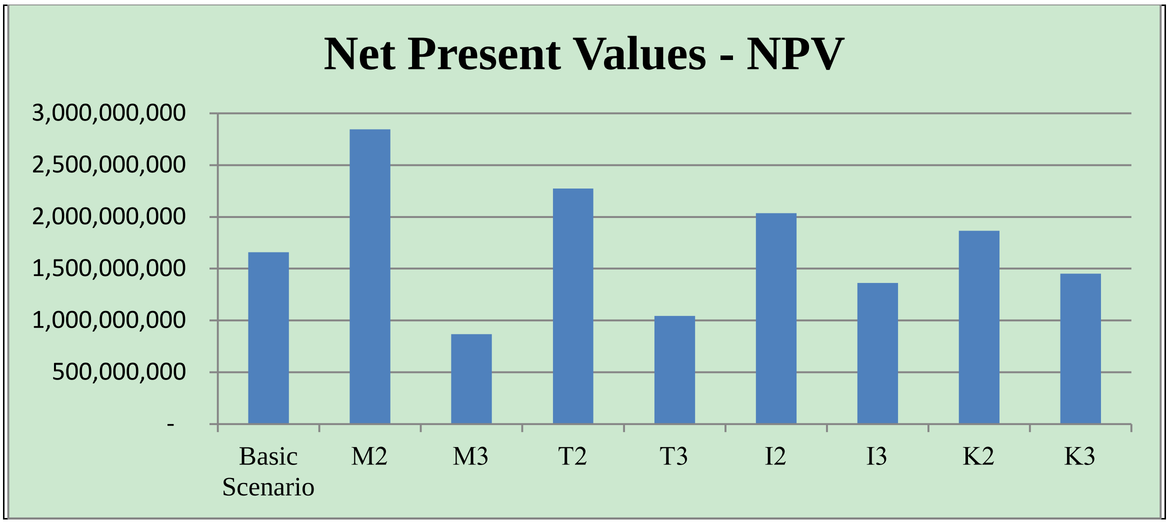
Basic Scenario: changes in the traffic volume from 25 MTA to 50 MTA have the most significant impact on the projected figures of the Cash Flow of the project. The change in net profit ranges from -35.22% to +52.83%. These translate into €99.319.000 net profit for the pessimistic M3 to €234.319.000 for the optimistic M2 traffic volume, compared to the Basic Scenario's €153.319.000 net profit for no asymmetric changes. The IRR, as expected, is very sensitive to changes in the traffic volume, the transportation fee and the construction cost with minimum and maximum values -4.64% for M3 and 6.64% for M2. For the NPV we observe high sensitivity to the traffic volume and to a lesser extent to the transportation fee with values ranging from -47.64% for M3 to 71.45% for M2.

Optimistic Scenario: the changes in the traffic volume produce the highest in absolute and percentage terms changes in the project's financial results followed by the transportation fee and the exchange rate. The construction cost has only a marginal influence in the results with the exception of the IRR that in the case of K1 and K3 (basic and pessimistic construction cost) is reduced by 7.42 to 12.38 percentage points respectively. Net profit reduction ranges in all asymmetric changes from -1.81% to -54.26% in the case of K1 and M3 respectively. The figures in all the alternative scenarios are as expected lower, with the exception of the Net

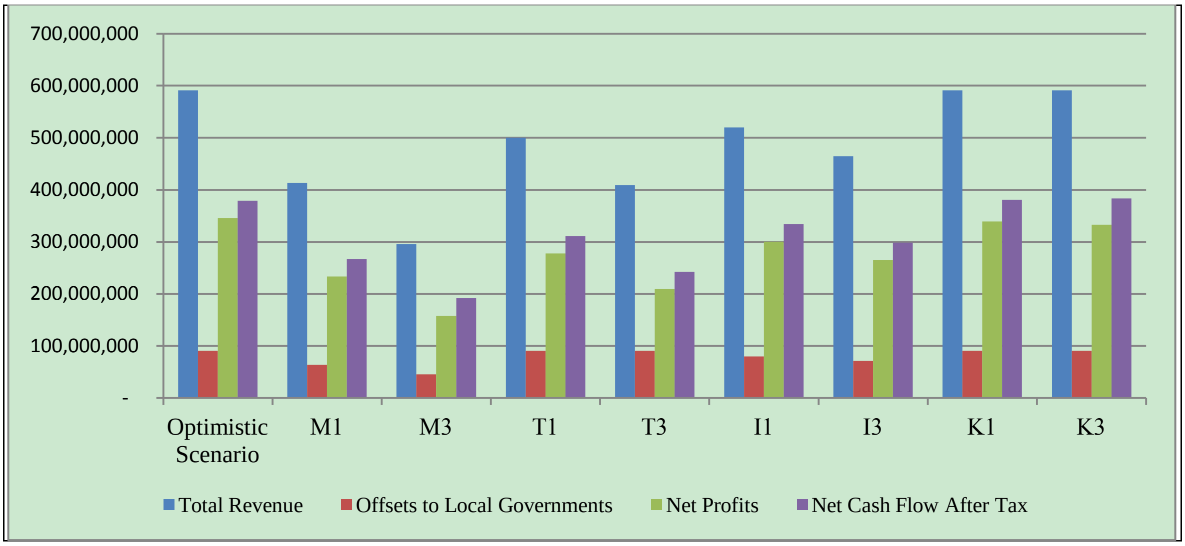
Cash Flow after Tax that shows an increase from 0.55% to 1.10% for the cases of K1 and K3 respectively. This comes as

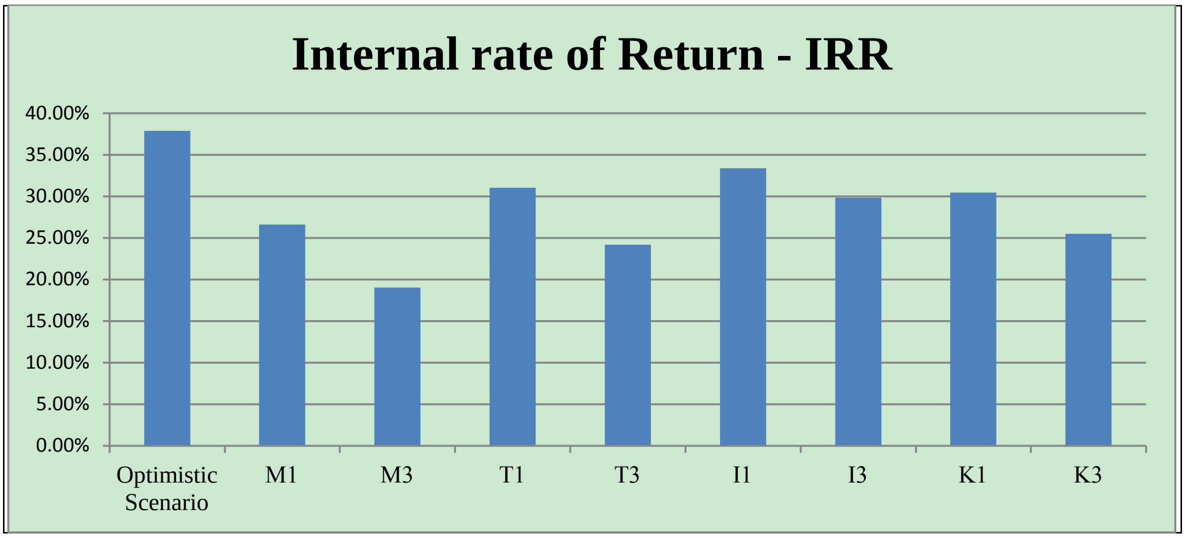


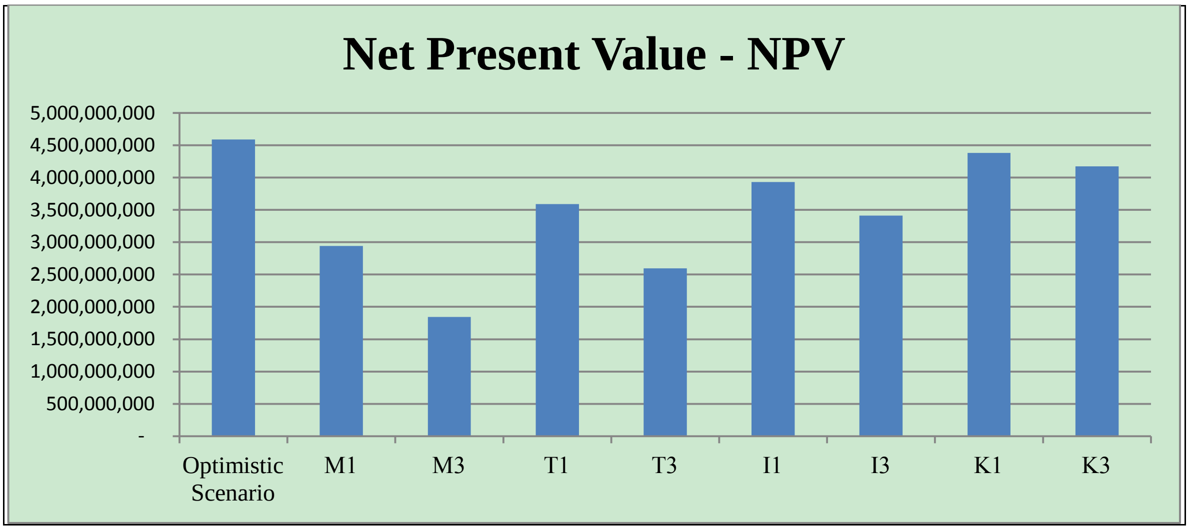




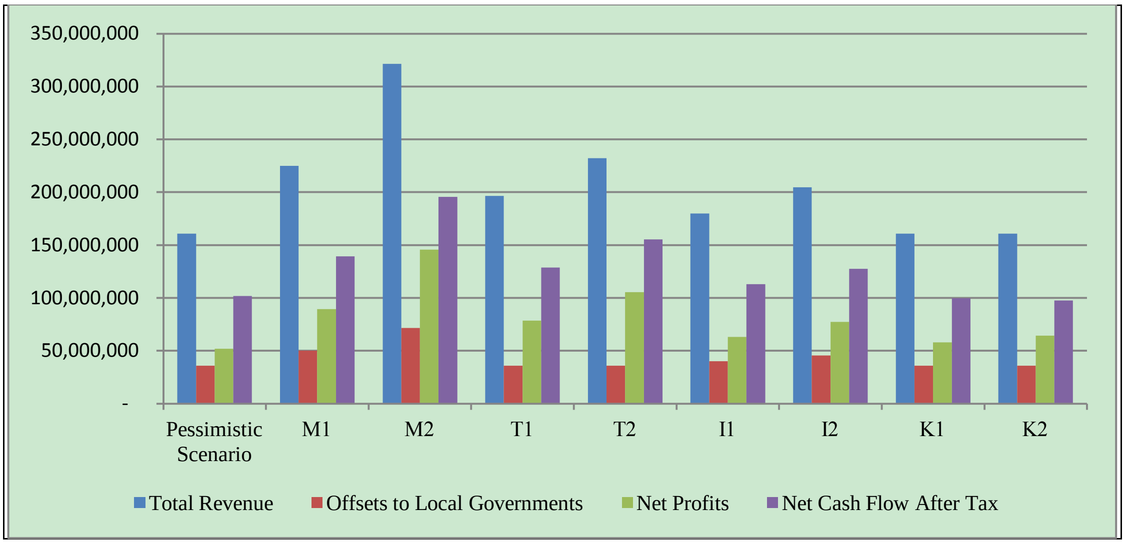
Figures 4-6 Sensitivity of the Results in the Basic Scenario with Asymmetric Changes

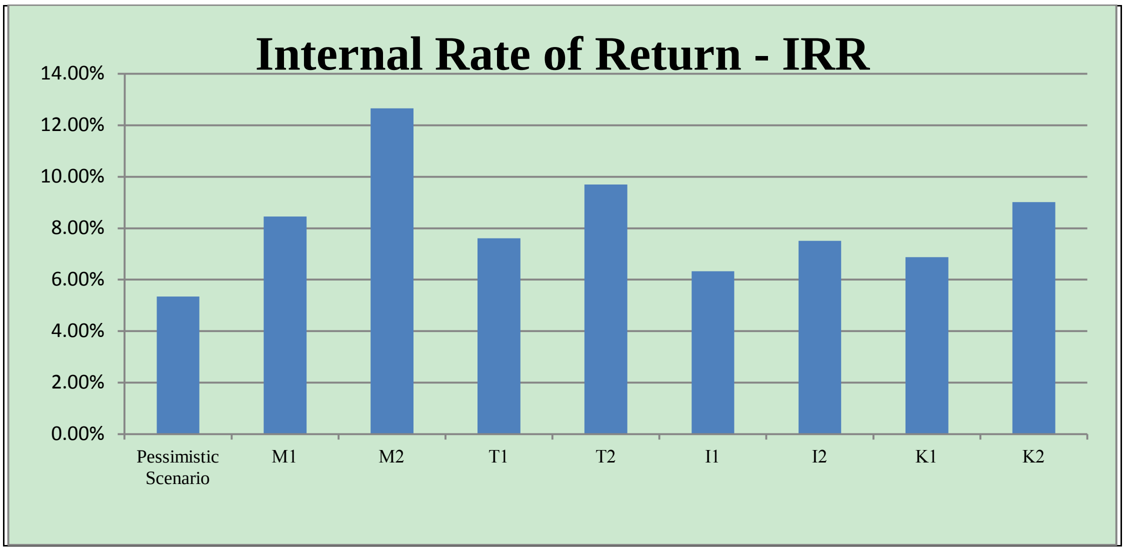


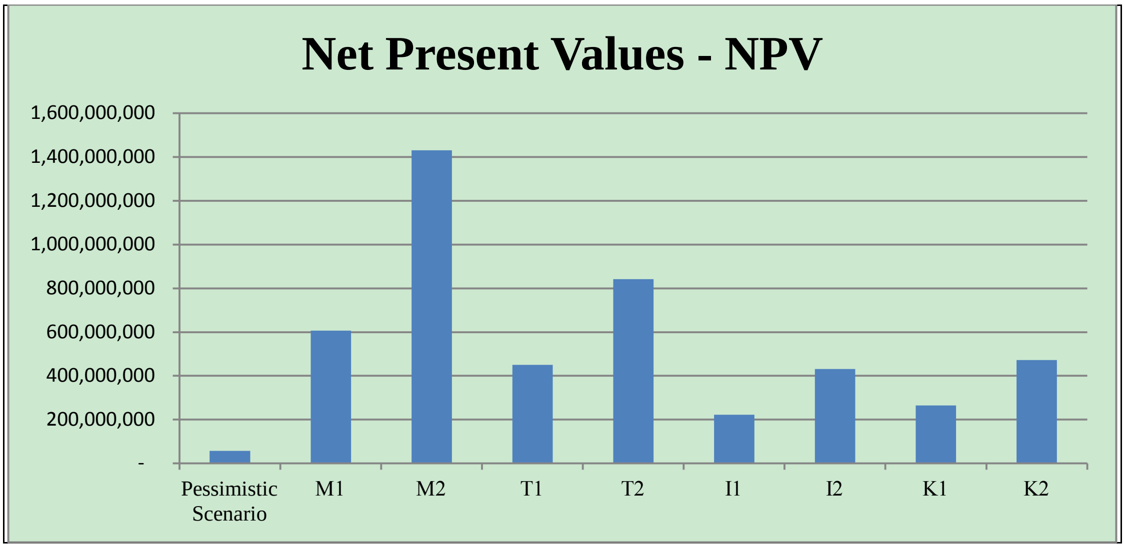




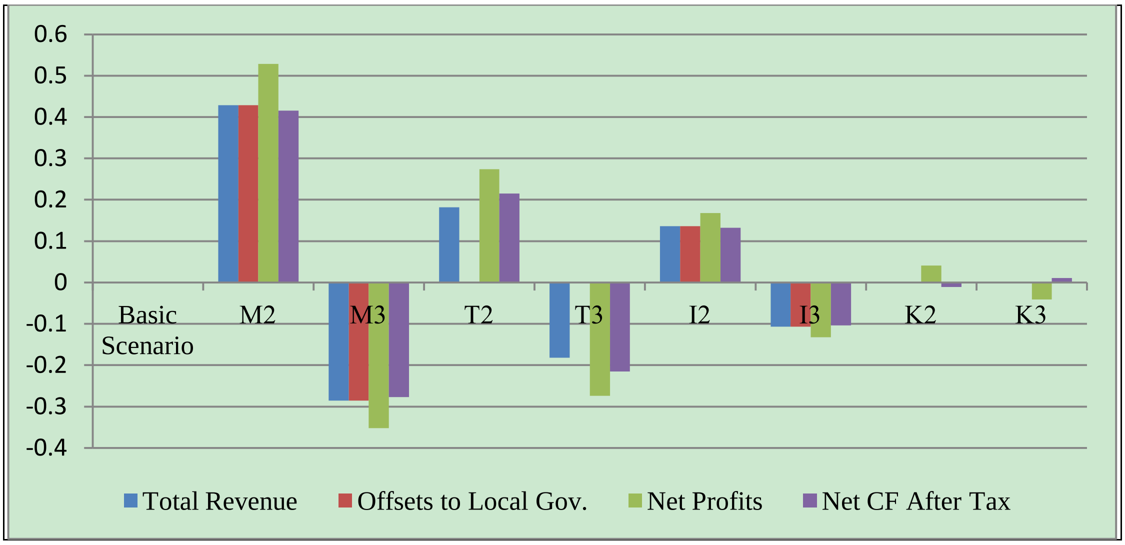
Figures 7-9 Sensitivity of the Results in the Optimistic Scenario with Asymmetric Changes

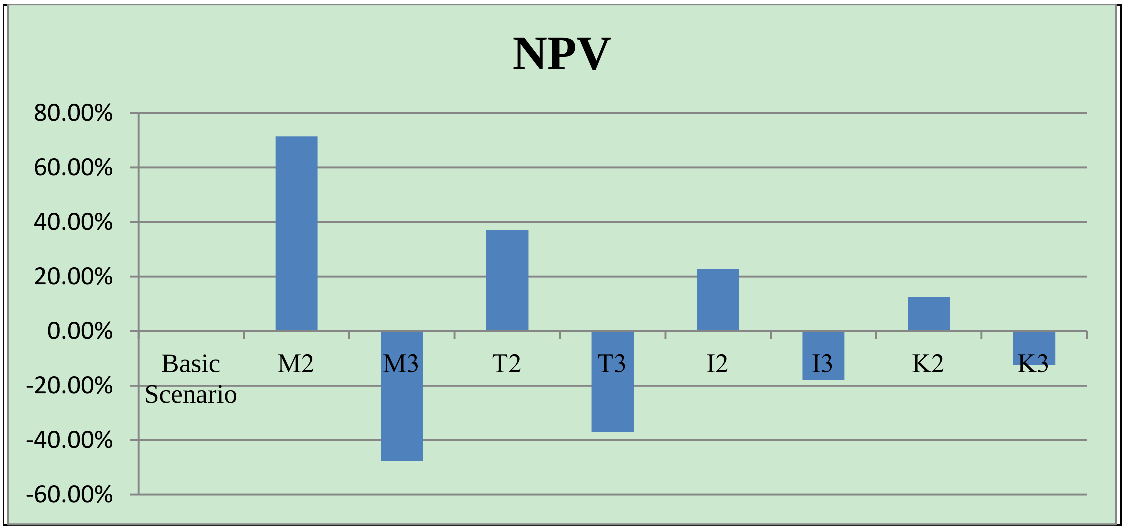




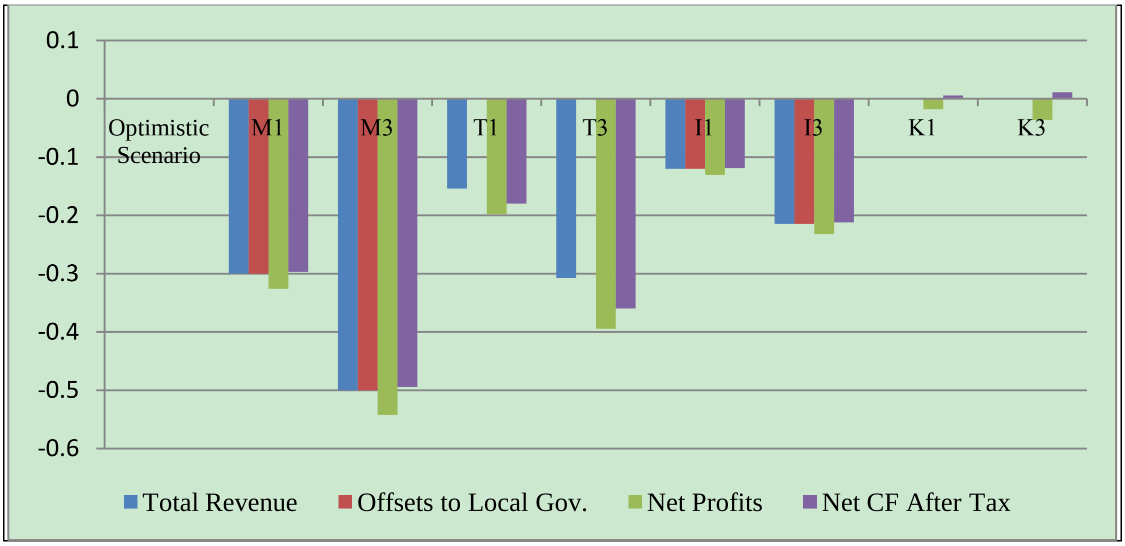


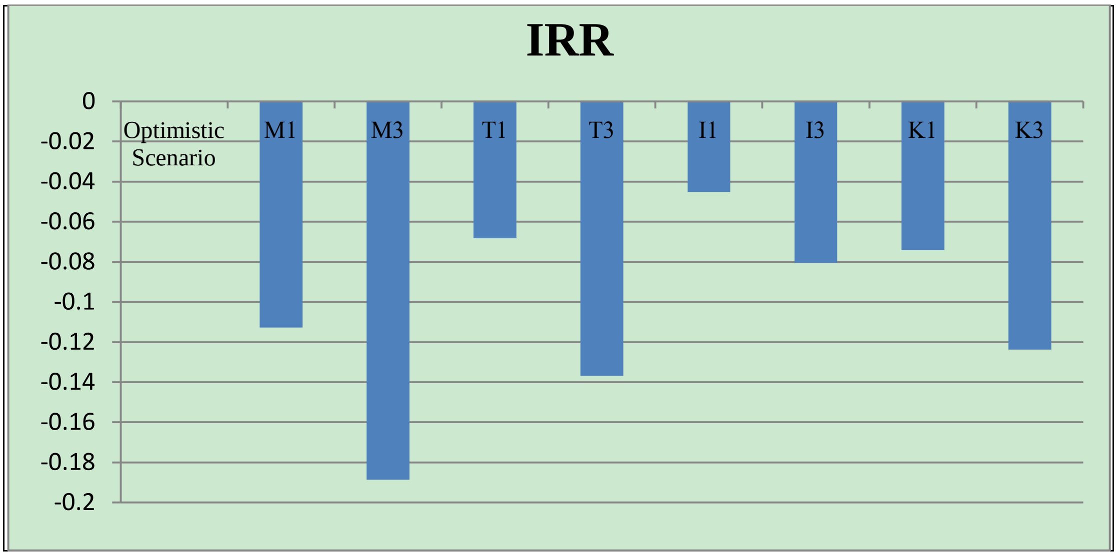
Figures 10-12 Sensitivity of the Results in the Pessimistic Scenario with Asymmetric Changes

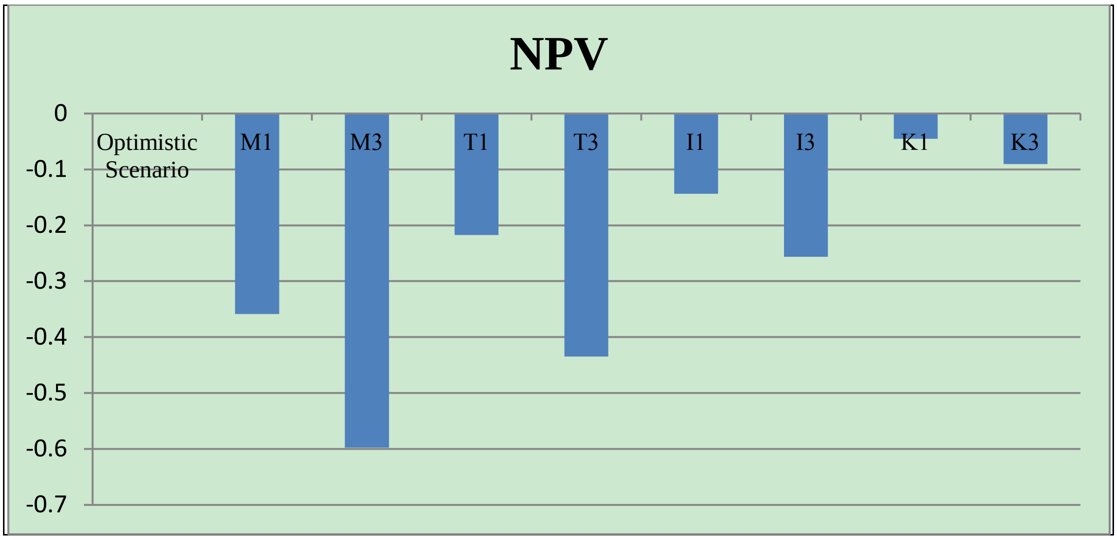




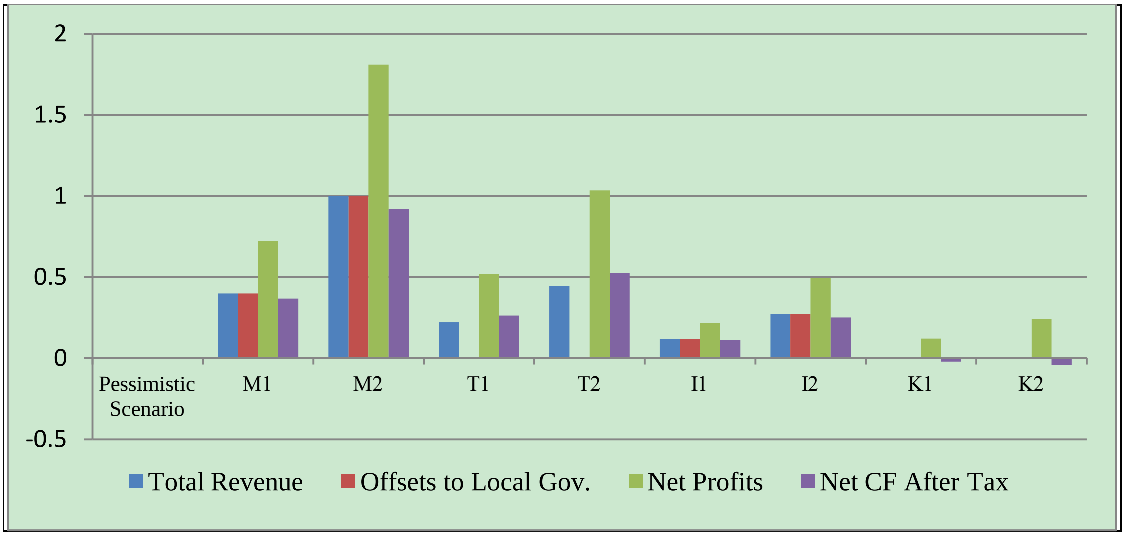
Figures 13-15 Sensitivity of the Results in the Basic Scenario with Asymmetric Changes (Percentage Changes)

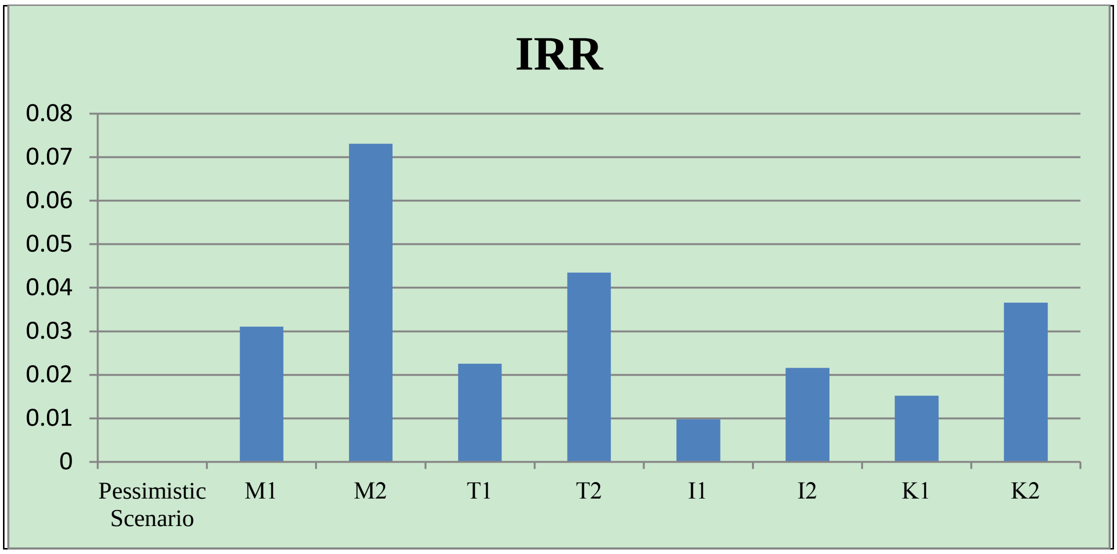


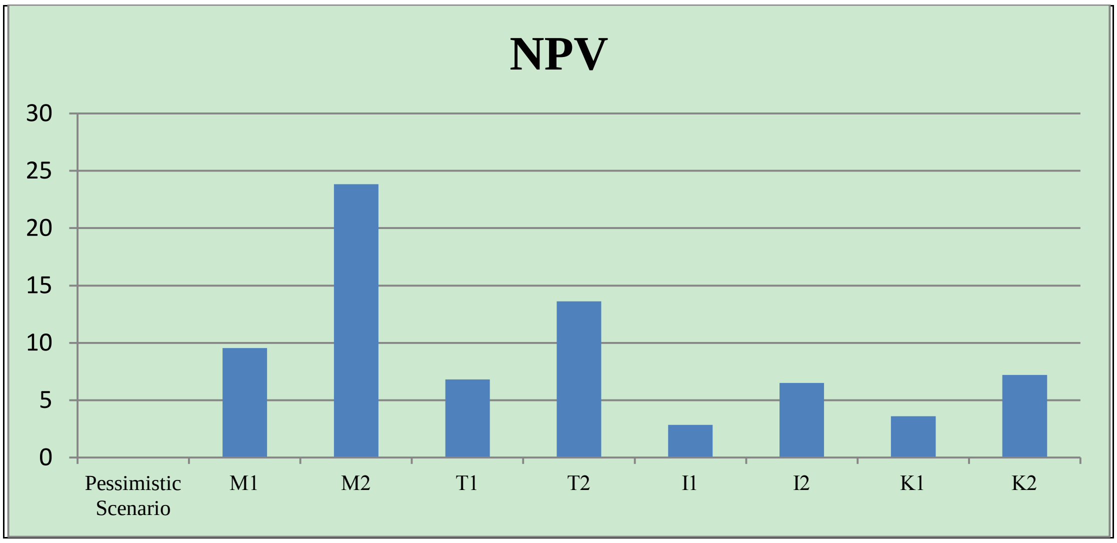




Figures 16-18 Sensitivity of the Results in the Optimistic Scenario with Asymmetric Changes (Percentage Changes)







Figures 19-21 Sensitivity of the Results in the Pessimistic Scenario with Asymmetric Changes (Percentage Changes)

TABLE 3 CUMULATIVE 30-YEAR CASH FLOW RESULTS IN ALTERNATIVE SCENARIOS

	SCENARIO		
	BASIC	OPTIMISTIC	PESSIMISTIC
Trafic Volume (tons)	1,050,000,000	1,500,000,000	750,000,000
Transportation Fee (€/ton)			
Total Revenue	9,240,000,000	17,727,272,727	4,821,428,571
Operating Cost of the Pipeline			
Wage Ratio GRE/BUL			
Wages Workers Greece	84,000,000	84,000,000	84,000,000
Wages Supervisors Greece	23,520,000	23,520,000	23,520,000
Wages Workers Bulgaria	34,300,000	34,300,000	34,300,000
Wages Supervisors Bulgaria	9,604,000	9,604,000	9,604,000
Supplies	15,000,000	15,000,000	15,000,000
Total	166,424,000	166,424,000	166,424,000
Offsets to Local Governments	1,680,000,000	2,727,272,727	1,071,428,571
Total Production Cost	1,846,424,000	2,893,696,727	1,237,852,571
Administrative Expenses			
Salaries	17,640,000	17,640,000	17,640,000
Public relation	1,500,000	1,500,000	1,500,000
Vehicles-Office Rents	1,200,000	1,200,000	1,200,000
Insurance Premiums	3,000,000	3,000,000	3,000,000
Supplies	1,500,000	1,500,000	1,500,000
Total Admonistrative Cost	24,840,000	24,840,000	24,840,000
Total Cost	1,871,264,000	2,918,536,727	1,262,692,571
Provisions	3,000,000	3,000,000	3,000,000
Total Operating Cost	1,874,264,000	2,921,536,727	1,265,692,571
Gross Profit Before Tax-Depreciation	7,365,736,000	14,805,736,000	3,555,736,000
Minus Derpeciation	1,250,000,000	1,000,000,000	1,500,000,000
Taxable Income	6,115,736,000	13,805,736,000	2,055,736,000
Taxes Payable	1,528,934,000	3,451,434,000	513,934,000
Net Profit	4,586,802,000	10,354,302,000	1,541,802,000
Net Cash Flow After Tax	5,836,802,000	11,354,302,000	3,041,802,000
Cummulative Cash Flow After Tax	90,542,671,000	176,063,921,000	47,220,171,000
Net Cash Flow before Tax	7,365,736,000	14,805,736,000	3,555,736,000
Cummulative Cash Flow before Tax	114,265,228,000	229,585,228,000	55,210,228,000

TABLE 4 SUMMARY OF THE SENSITIVITY RESULTS TO ASYMMETRIC CHANGES IN THE FUNDAMENTAL VARIABLES

	Total Revenue	Offsets to Local Gov	Net Profits	Net CF After Tax	IRR	NPV
Basic Scenario	308,000,000	56,000,000	153,319,000	194,985,667	15.37%	1,659,650,404
M2	440,000,000	80,000,000	234,319,000	275,985,667	22.01%	2,845,525,198
M3	220,000,000	40,000,000	99,319,000	140,985,667	10.73%	869,067,209
T2	364,000,000	56,000,000	195,319,000	236,985,667	18.84%	2,274,548,445
T3	252,000,000	56,000,000	111,319,000	152,985,667	11.79%	1,044,752,363
I2	350,000,000	63,636,364	179,091,727	220,758,394	17.51%	2,036,974,202
I3	275,000,000	50,000,000	133,069,000	174,735,667	13.67%	1,363,181,706
K2	308,000,000	56,000,000	159,569,000	192,902,333	19.18%	1,867,244,748
K3	308,000,000	56,000,000	147,069,000	197,069,000	12.77%	1,452,056,061

Optimistic Scenario	590,909,091	90,909,091	345,569,000	378,902,333	37.88%	4,590,364,644
M1	413,636,364	63,636,364	233,069,000	266,402,333	26.61%	2,943,316,319
M3	295,454,545	45,454,545	158,069,000	191,402,333	19.03%	1,845,284,103
T1	500,000,000	90,909,091	277,387,182	310,720,515	31.06%	3,592,153,538
T3	409,090,909	90,909,091	209,205,364	242,538,697	24.21%	2,593,942,432
I1	520,000,000	80,000,000	300,569,000	333,902,333	33.38%	3,931,545,314
I3	464,285,714	71,428,571	265,211,857	298,545,190	29.84%	3,413,901,555
K1	590,909,091	90,909,091	339,319,000	380,985,667	30.46%	4,382,770,301
K3	590,909,091	90,909,091	333,069,000	383,069,000	25.50%	4,175,175,957
Pessimistic Scenario	160,714,286	35,714,286	51,819,000	101,819,000	5.35%	57,555,147
M1	225,000,000	50,000,000	89,319,000	139,319,000	8.46%	606,571,255
M2	321,428,571	71,428,571	145,569,000	195,569,000	12.66%	1,430,095,417
T1	196,428,571	35,714,286	78,604,714	128,604,714	7.61%	449,709,509
T2	232,142,857	35,714,286	105,390,429	155,390,429	9.70%	841,863,872
I1	180,000,000	40,000,000	63,069,000	113,069,000	6.32%	222,259,979
I2	204,545,455	45,454,545	77,387,182	127,387,182	7.51%	431,884,311
K1	160,714,286	35,714,286	58,069,000	99,735,667	6.87%	265,149,490
K2	160,714,286	35,714,286	64,319,000	97,652,333	9.01%	472,743,833

TABLE 5 EXTREME SENSITIVITY VALUES

Basic Scenario	Maximum	Minimum
Total Revenue	M2	M3
Offset Payments	M2	M3
Net Profits	M2	M3
Net Cash Flow After Tax	M2	M3
Internal rate of Return - IRR	M2	M3
Net Present value - NPV	M2	M3
Optimistic Scenario		
Total Revenue	K1, K3	M3
Offset Payments	K1, K3	M3
Net Profits	K1	M3
Net Cash Flow After Tax	K3	M3
Internal rate of Return - IRR	I1	M3
Net Present value - NPV	K1	M3
Pessimistic Scenario		
Total Revenue	M2	K1, K2
Offset Payments	M2	T1, T2, K1, K2
Net Profits	M2	K1, K2
Net Cash Flow After Tax	M2	K2
Internal rate of Return - IRR	M2	I1
Net Present value - NPV	M2	I1

a result of the increased depreciation due to the higher construction costs K1 and K3 which are subtracted from the project's taxable income.

Pessimistic Scenario: in this scenario again the traffic volume is by comparison the most important factor in the BAP's cash flows. Net profits are significantly affected and are increased by 72.37% in the pessimistic scenario and traffic volume M1 and by 180.92% for traffic volume M2. The second most important factor that drives the project's Net Profits is the transportation fee with percentage changes 51.69% and 103.38% for T1 and T2 respectively. The exchange rate and the construction cost have a smaller impact on Net Profits. The IRR increases the most for M2, T2 and K2 to 7.31, 4.35 and 3.66 respectively. The same three variables and with the same order of significance affect the NPV as well. The later appears to be by far the most sensitive financial figure in the Pessimistic Scenario. It is dramatically increased by the asymmetric changes ranging from 286.17% for I1 to 2384.74% for M2.

C. Extreme Values Scenarios

In this section we employ a series of extreme scenarios to analyse the sensitivity of the results to extreme and possibly implausible values. For the traffic volume we use the same range as before, for the transportation fee per ton of crude oil we focus on values significantly lower and higher than the previous scenarios. These extreme values cover a wide range of forecasted transportation fees by various sources. The range of the exchange rate is the same as before and finally for the construction costs we use a higher value for the pessimistic scenario. Table 7 summarizes these values.

In Table 8 we report the Cash Flow results of the first year of operation for the three scenarios A1, A2, A3 for comparison reasons. The full thirty year Cash Flow figures are available from the authors upon request. In Table 9 we present the thirty year cumulative results of the project's Cash Flow in extreme scenarios A1, A2 and A3.

According to these results, total revenues in the three scenarios range from €151,760,000 in scenario A1, to

€280,000,000 and €476,000,000 in scenarios A2 and A3 respectively for the first year of operation. Total operating costs are €61,908,000 in these scenarios. These figures translate to net profit after tax equal to €36,139,000, €132,319,000and €279,319,000 for scenarios A1, A2 and A3 respectively. The Internal Rate of Return (IRR) for the three scenarios is 4.58% for A1, 13.60% for A2 and 25.65% for A3. The Net Present Value of the investment with a discount rate of 5% is -€55,915,130.27 for scenario A1, €1,352,201,383.79 for scenario A2 and €3,504,344,627.55 for A3. Table 10 summarizes the sensitivity of the results to the three extreme scenarios.

D. *Sensitivity Analysis of the Extreme Values Scenarios*

Next, we test the sensitivity of the extreme scenarios A1, A2 and A3 to asymmetric changes in the fundamental variables Traffic Volume (M), Exchange Rate (I) and Construction Cost (K). For this, we follow the same procedure as in the case of the base scenarios and for each of the extreme scenarios A1, A2 and A3 we create six different sub-scenarios by allowing one of the above fundamental variables at a time to take the two values from the other scenarios. As a result we create eighteen new Cash Flow tables that are summarized here in Table 11. In Figures 22-24 we depict the sensitivity of the economic results of the BAP for the Scenario A1 with asymmetric changes. In Figures 25-27 and Figures 28-30 the sensitivity of the economic results of the BAP with asymmetric changes for the Scenarios A2 and A3 are presented respectively. In Table 12 we present the results of these sensitivity tests as percentage changes from the original scenario.

III. BREAK-EVEN POINT ANALYSIS

Break-even Point (BEP) analysis is an important tool for the efficient control of a business and for setting sales and profitability goals. The Break-Even point is the volume of sales or alternatively the amount of sales for which a company's total revenue equalsit's total cost. With this analysis a firm can estimate the minimum level of sales that make it profitable. Underlying this significant threshold is the behaviour of cost. The project's total cost is distinguished between fixed and variable cost. Fixed cost is independent of the volume of production and sales. Such costs are for example property rentals, administrative expenses, depreciation of production facilities and equipment, research and development expenses, various financial expenses, etc. Variable cost is a function of the units of production. An increase in sales implies a proportional increase to variable cost. We know that:

$$R = FC + TVC + \Pi \tag{3}$$

Where, R is the total value of sales or revenue, FC represents the fixed costs, TVC is the total variable cost and Πrepresents net profit (before interest and tax). At the BEP total profit is zero so that equation (3) becomes:

$$R = FC + TVC \tag{4}$$

This implies:

$$P \times Q = FC + VC \times Q \tag{5}$$

Where, VC = per unit variable cost, and solving for Q we get:

$$Q = \frac{FC}{P - VC} \tag{6}$$

Thus, equation (6) gives the level of production, in our case tons of transported crude oil from Burgas to Alexandroupolis that produce zero profits. Next, for each one of our Initial Scenarios (Basic, Optimistic and Pessimistic) we estimate the Break-Even-Point for the project and we calculate the relative elasticities of the BEP with respect to the fundamental variables: traffic volume (M), transportation fee (T) and construction cost (K).

A. *Break-Even-Point with Respect to the Traffic Volume*

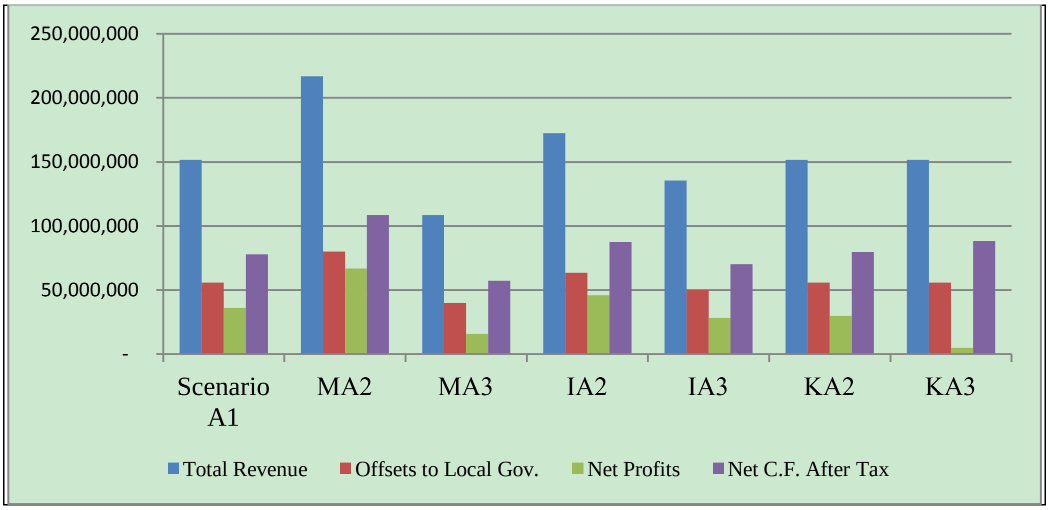
The BEP for the project with respect to the traffic volume in tons per year is presented in Table 13. In the Basic Scenario, the Traffic Volume is 35,000,000 tons and the BEP is calculated at 6,607,593 tons. At this level of crude oil transportation through the BAP the project has no profit or loss. This implies an elasticity of units of sale with respect to the BEP equal to 81.12%. Thus, the traffic volume can fall even by 81.92% before the implementing organization reports any losses. In the Optimistic Scenario the Traffic Volume is 50,000,000 tons per year. The BEP in this case is 3,924,133 tons implying an elasticity of the BEP with respect to the Traffic Volume equal to 92.15%. Thus, in the Optimistic Scenario the volume of sales can drop by 92.15% before the project becoming non-profitable. In the Pessimistic Scenario the volume of sales is 25,000,000 tons per year and the BEP is estimated at 11,181,600 tons of crude oil. The elasticity of the profits to the Traffic Volume is in the Pessimistic Scenario 55.27%.

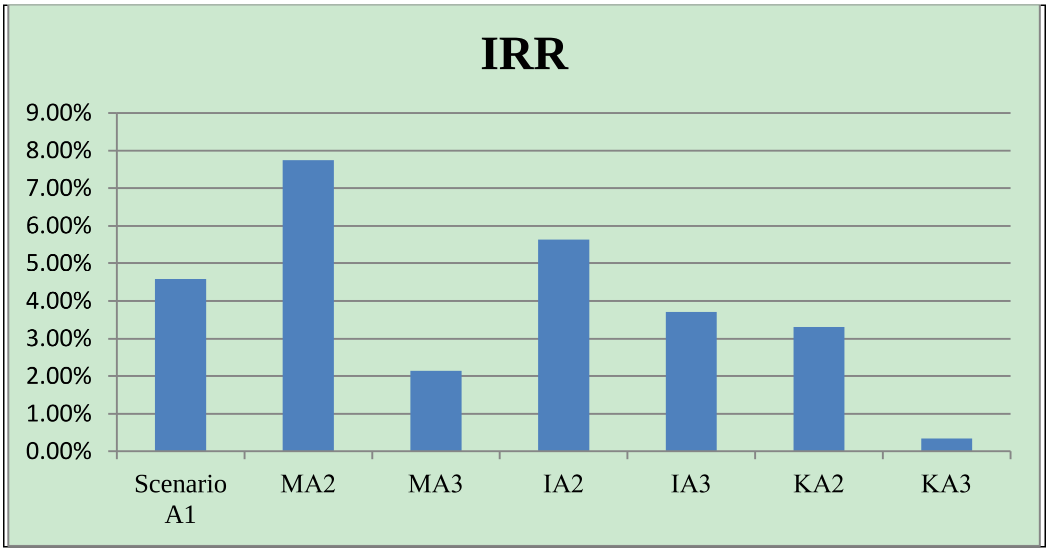
B. *Break-Even-Point with Respect to the Transportation Fee*

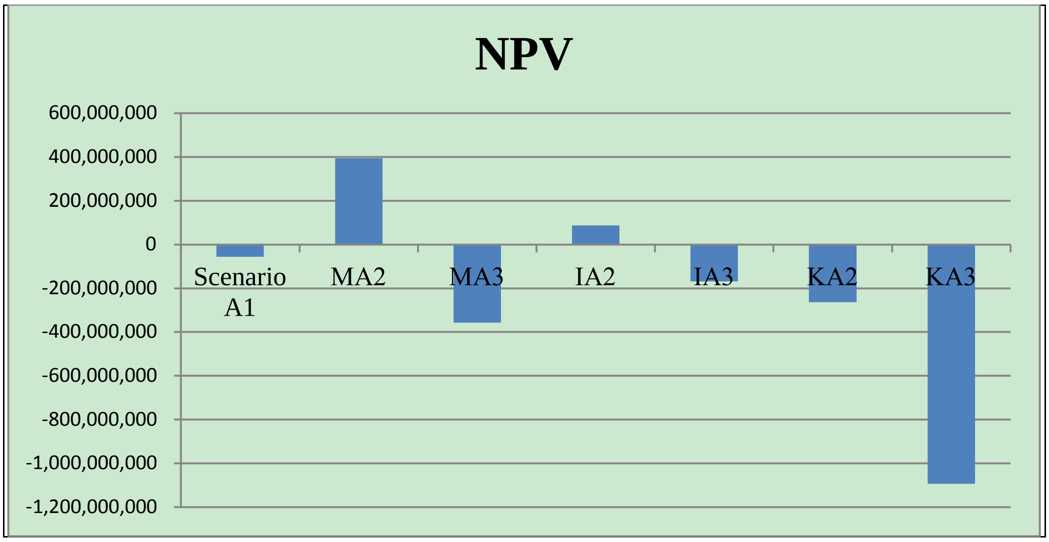
Next, we estimate the BEP for the project with respect to the transportation fee in US dollars and it is presented in Table 14. In the Basic Scenario, this fee is set to \$11 and the BEP is at \$3.70. At this price for the transportation of crude oil through the BAP the project has no profit or loss. This implies an elasticity of the transportation fee with respect to the BEP equal to 66.36%. Thus, the price can fall even by 66.36% before the implementing organization reports any losses. In the Optimistic Scenario the Transportation Fee is \$13 per ton. The BEP in this case is at \$2.86 implying an elasticity of the BEP with respect to the price equal to 78%. In the Optimistic Scenario the price can drop by 78% before the project becomes non-profitable. Finally, in the Pessimistic Scenario the price is set to \$9 and the BEP is estimated at \$5.13. The elasticity of the profits to the transportation fee is in the Pessimistic Scenario 43%.

C. *Break-Even-Point with Respect to the Construction Cost*

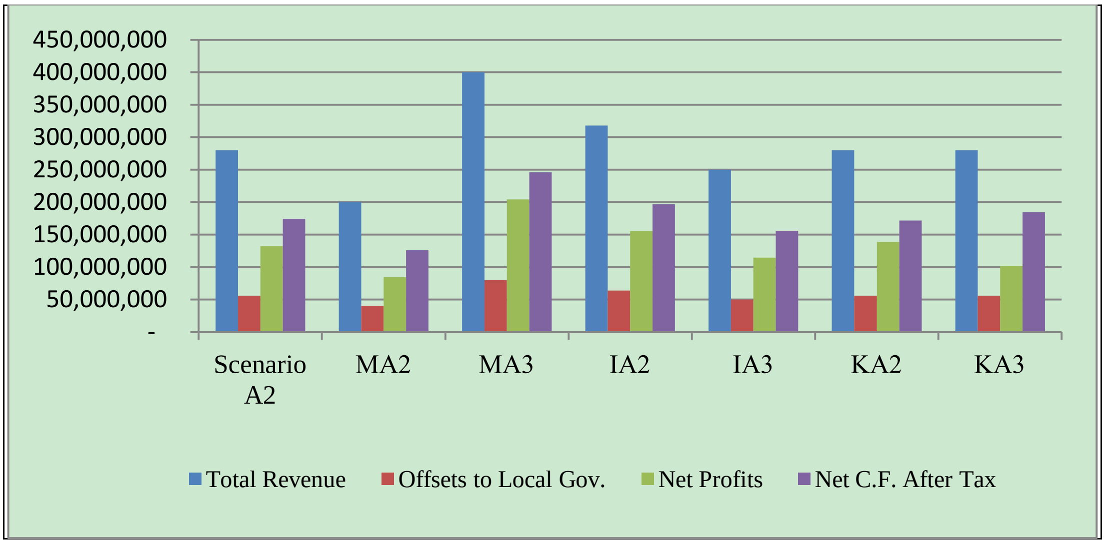
Finally, we estimate the BEP for the project with respect to the construction cost of the Burgas-Alexandroupolis pipeline and the results are presented in Table 15. For the Basic Scenario, the Construction Cost is €1,250,000,000 and the

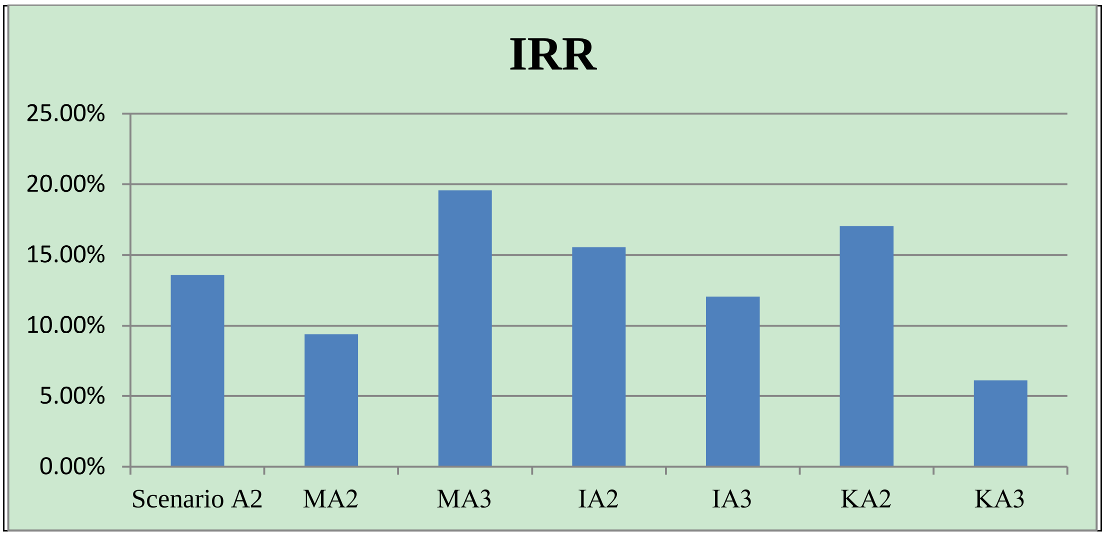


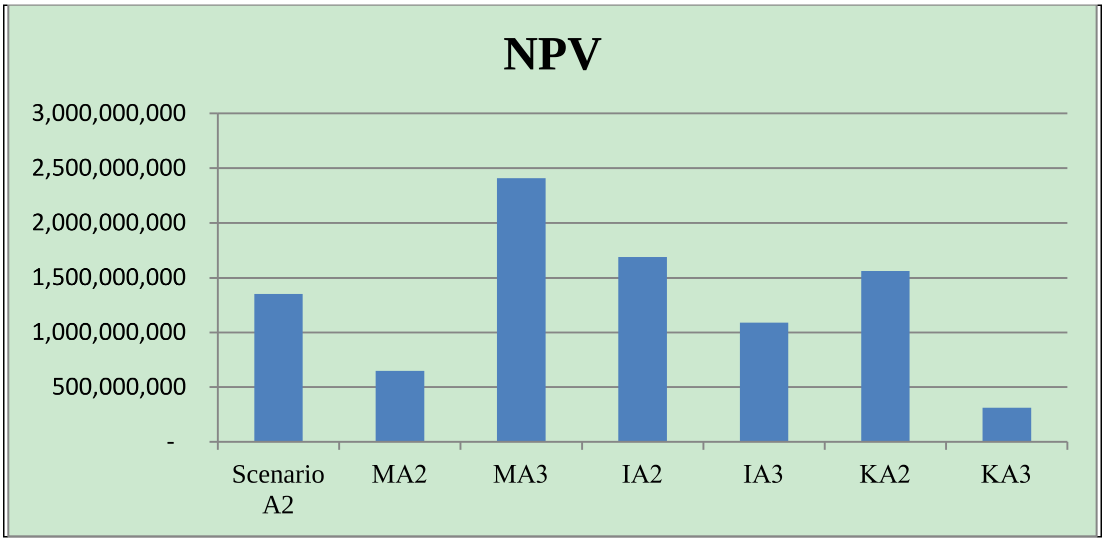




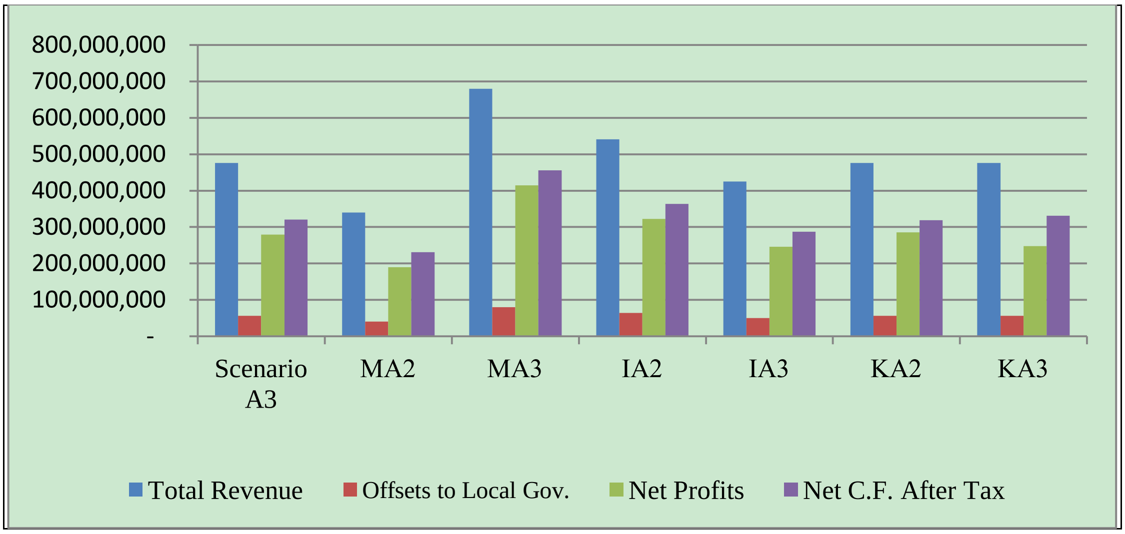
Figures 22-24 Sensitivity of the Results in Scenario A1with Asymmetric Changes

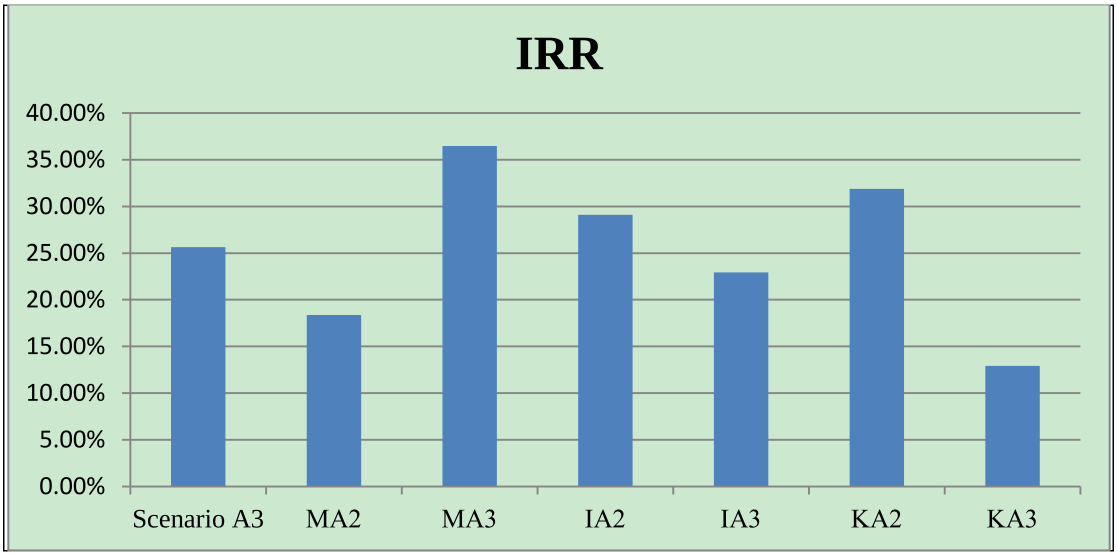


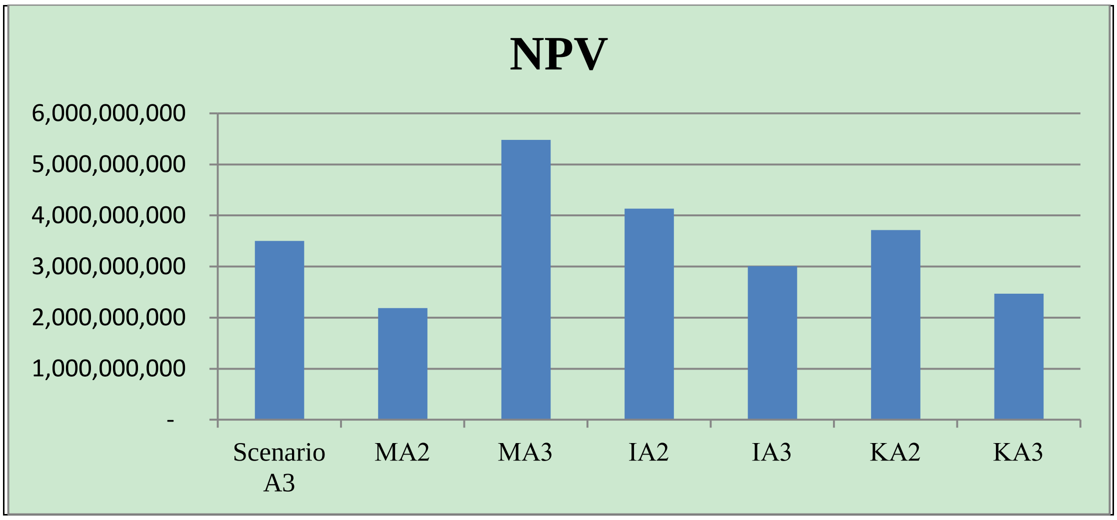




Figures 25-27 Sensitivity of the Results in Scenario A2 with Asymmetric Changes







Figures 28-30 Sensitivity of the Results in Scenario A3with Asymmetric Changes

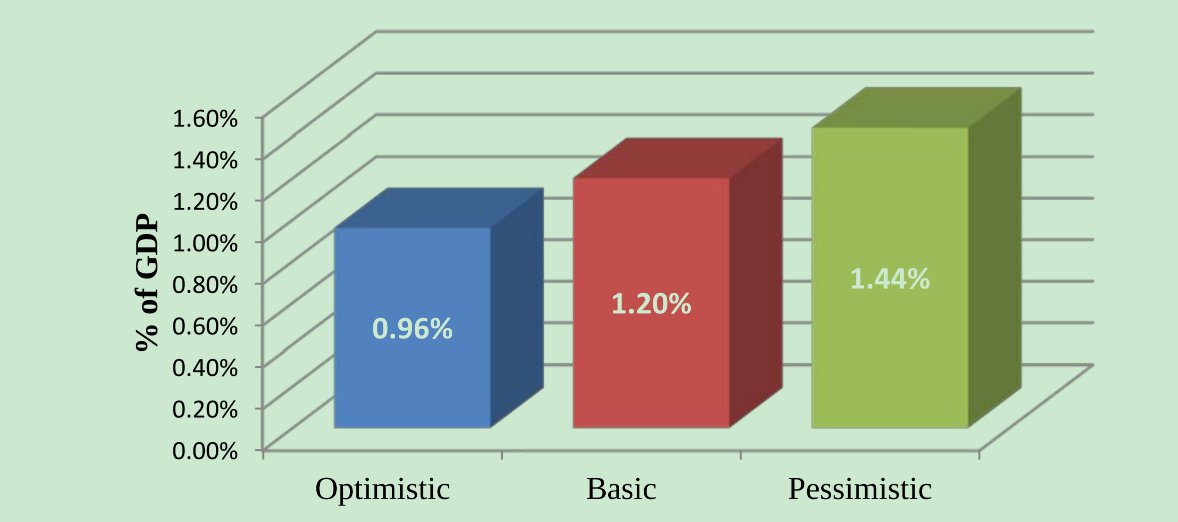


Figure 31 Multiplicative Effects to National Economy - GDP

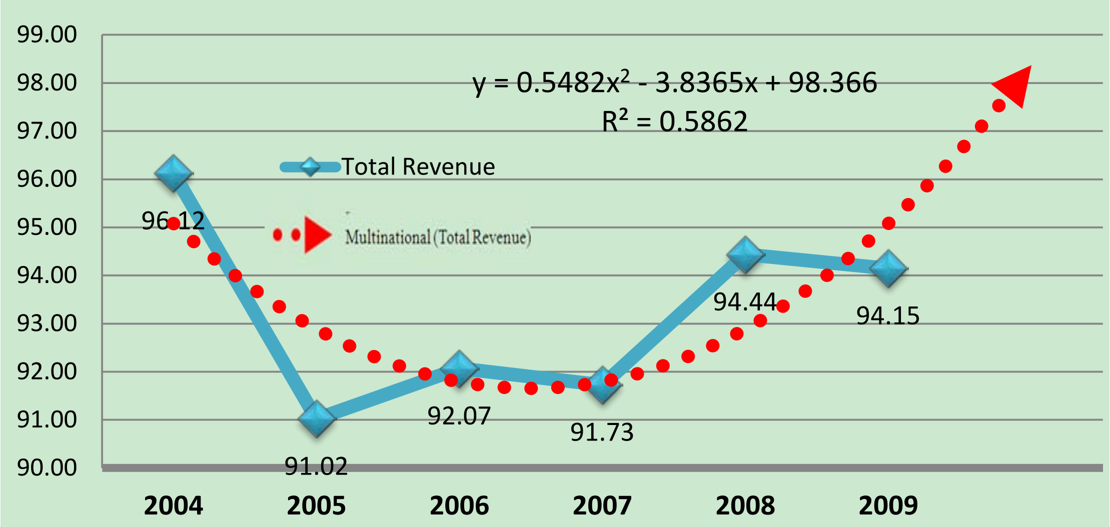


Figure 32 Total Local Government Revenue: Optimistic Scenario Projection (constant prices 2005 - millions. €)

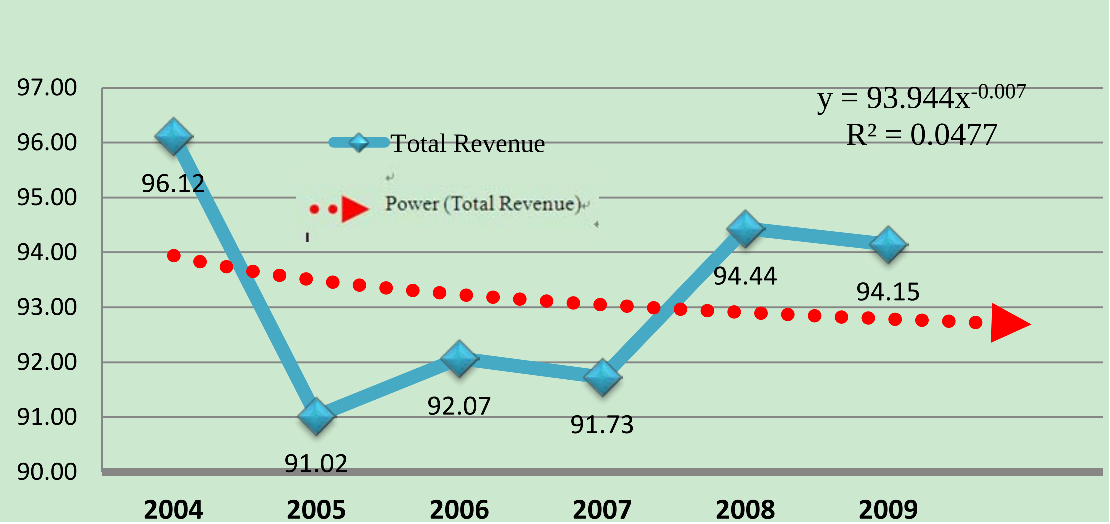


Figure 33 Total Local Government Revenue: Pessimistic Scenario Projection (constant prices 2005 - millions. €)

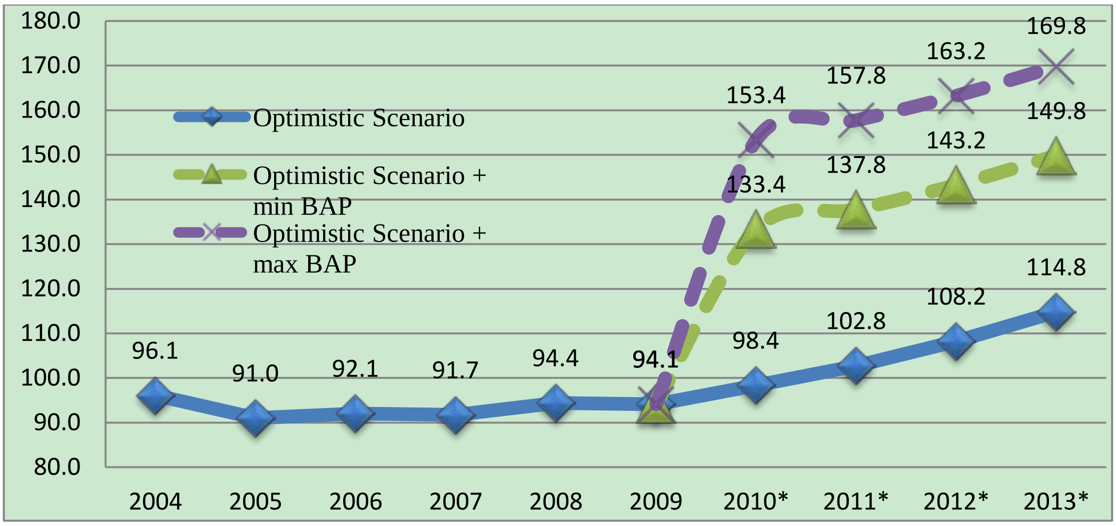


Figure 34 Total Local Government Revenue: Optimistic Scenario with and without the BAP (constant prices 2005 - millions. €)

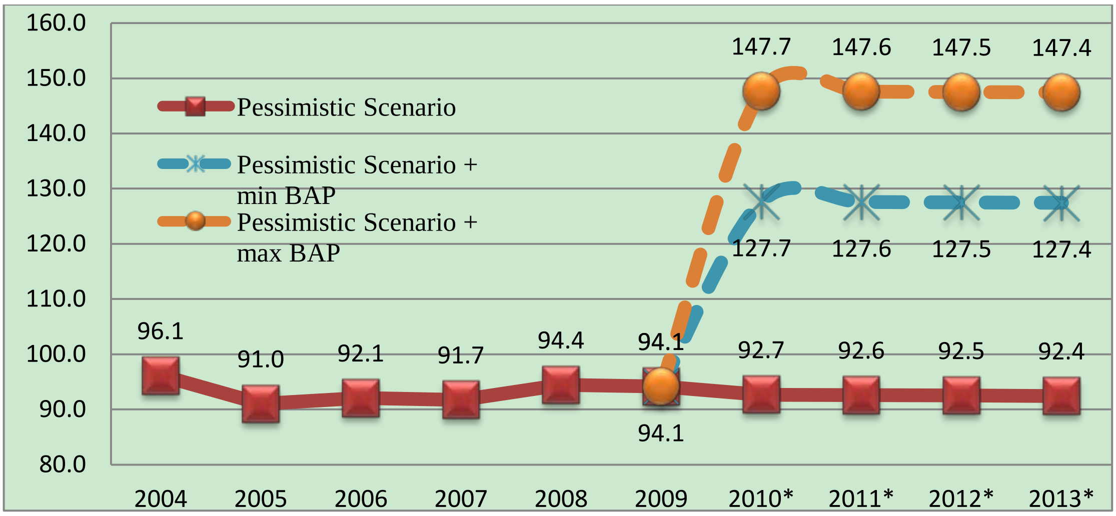


Figure 35 Total Local Government Revenue: Pessimistic Scenario with and without the BAP (constant prices 2005 - millions. €)

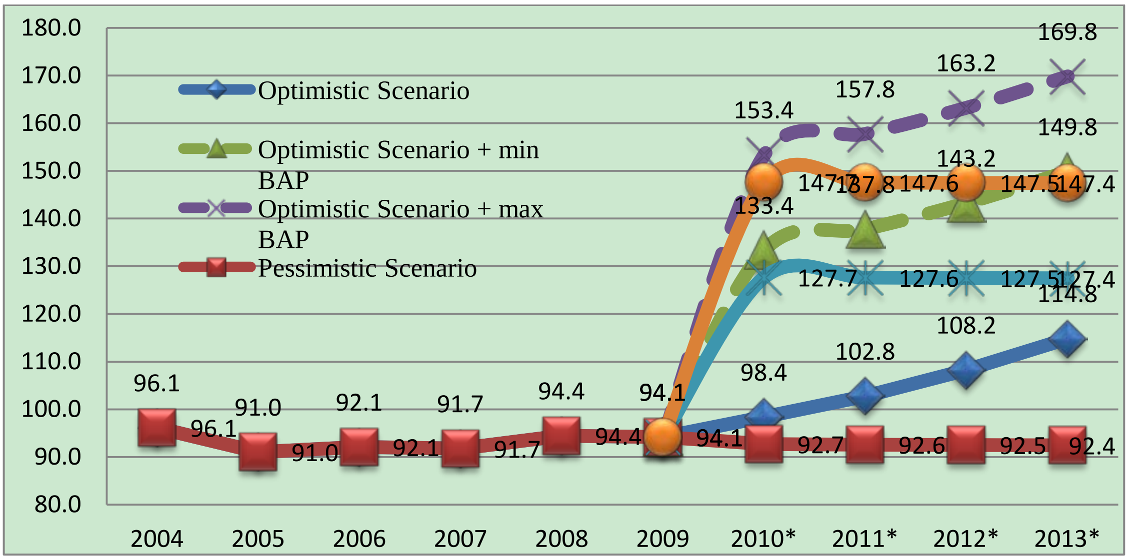


Figure 36 Total Local Government Revenue: Optimistic and Pessimistic Scenarios: no BAP, min BAP, max BAP (constant prices 2005 - millions. €)

BEP is at €7,382,760,000. At this construction cost the project has no profit or loss. This implies, with respect to the BEP, elasticity equal to -490.62%. Thus, the construction cost can increase even by 490.62% before the implementing organization reports any losses. In the Optimistic Scenario the Construction Cost is €1,000,000,000. The BEP in this case is at €14,822,760,000 implying an elasticity of the BEP with respect to the cost equal to -1382.28%. Thus, in the Optimistic Scenario the cost can increase by that percentage before the project becomes non-profitable. Finally, in the Pessimistic Scenario the cost is €1,500,000,000 and the BEP is €3,572,760,000. The elasticity of the profits to the cost is in the Pessimistic Scenario -138.18%.

IV. MACROECONOMIC IMPACT OF THE BURGAS-ALEXANDROUPOLIS PIPELINE

In this section we investigate the macroeconomic impact of the construction and operation of the Burgas-Alexandroupolis pipeline. First, we investigate the impact of the initial investment to the total demand in both the local economy and the national economy taking into account the macroeconomic multipliers for income and employment created as a result of the implementation of the BAP project. Second, we estimate the impact of the offsetting payments to local government revenue during the period of operation of the pipeline.

A. The Investment Multiplier

The total macroeconomic impact from the implementation of the proposed investment for the BAP includes the direct increase in demand equal to the construction cost and all related expenses in the construction phase of the pipeline and also the indirect increase in total demand from the multiplicative effects to the economy of the initial demand stimulus. Employment is affected in a similar way, first by the people directly employed in the construction phase and the subsequent operation of the pipeline and second by the multiplicative effects of these positions to the employment in specific related sectors such as housing, food and beverage etc. In macroeconomics an investment as an autonomous variable (a variable that does not depend on income) has multiplicative effects to the total demand and total income in the economy. The investment multiplier is given by:

$$\Pi_{\mathrm{I}} = \frac{1}{1-\mathrm{MPC}} \tag{7}$$

Or

$$\Pi_{\mathrm{I}} = \frac{1}{\mathrm{MPS}} \tag{8}$$

Since

$$MPC + MPS = 1 \tag{9}$$

MPS is the marginal propensity to consume and it is the first derivative of the consumption function with respect to the income:

$$MPC = \frac{\partial C(Y,...)}{\partial Y} \tag{10}$$

or

$$MPC = \frac{\Delta \mathrm{C}}{\Delta \mathrm{Y}} \tag{11}$$

where Y is the income and C is the consumption. The final change in total income as a result of a change in the investment is given by:

$$\Delta \mathrm{Y} = \Pi_{\mathrm{I}} \times \Delta \mathrm{I} \tag{12}$$

ΔY is the final change in income and ΔIrepresents the initial change in investment.

The operation of the BAP will have direct and indirect benefits to the local and national economy.

B. Multiplicative Effects to the National Economy

It is estimated that the final cost of investment for the BAP project will be between 1, 1.25 and 1.5 billion euros in the Optimistic, Basic and Pessimistic Scenarios respectively 48% of the project will take place in the Greek side of the pipeline in the prefecture of Evros. This implies that the total investment expenditure on the Greek side will be between 480 and 720 million euros. The marginal propensity to consume is estimated at 0.8 for Greece and this implies a marginal propensity to save equal to 0.2. this according to equation (7) or equation (8) implies an investment multiplier equal to 5. This multiplier takes into account the total cash flows generated in the economy from an initial investment. A €1 initial expenditure on investment creates additional multiplicative expenditures equal to €5 in the local economy. Thus, for the total actual investment scheduled to be implemented in the prefecture of Evros we estimate a multiplicative final increase in total demand equal to 2.4, 3.0 and 3.6 billions of euros for the Pessimistic, Basic and Optimistic Scenarios respectively. These multiplicative effects correspond to 0.96%, 1.20% and 1.44% of Greece’s 2010 GDP respectively. Figure 31 reports these effects to national GDP.

C. Multiplicative Effects to the Local Economy

Based on an MPC=0.8 that produces an investment multiplier equal to 5 and assuming that from the total investment cost in each of the three initial scenarios 20% will be spent directly within the Evros prefecture we estimate the total multiplicative effects to the local economy. The following estimates take into account the recent fiscal crisis in Greece and its impact on the rates of growth. The investment expenditure directly from the implementation of the BAP project will is equal to €96,000,000, €120,000,000 and €144,000,000 in the three initial scenarios. Thus, the multiplicative effects to the local economy will be €480,000,000, €600,000,000 and €720.000.000 respectively. Based on the projected cash flows of the project and the projected local GDP, Table 16 shows the projections for the local economy’s GDP without the implementation of the BAP and with the implementation according to the three initial scenarios.

TABLE 6. SUMMARY OF THE SENSITIVITY RESULTS TO ASYMMETRIC CHANGES IN THE FUNDAMENTAL VARIABLES IN % CHANGES

	Total Revenue	Offsets to Local Gov.	Net Profits	Net C.F. After Tax	IRR	NPV
Basic Scenario						
M2	42.86%	42.86%	52.83%	41.54%	6.64%	71.45%
M3	-28.57%	-28.57%	-35.22%	-27.69%	-4.64%	-47.64%
T2	18.18%	0.00%	27.39%	21.54%	3.47%	37.05%
T3	-18.18%	0.00%	-27.39%	-21.54%	-3.58%	-37.05%
I2	13.64%	13.64%	16.81%	13.22%	2.14%	22.74%
I3	-10.71%	-10.71%	-13.21%	-10.39%	-1.71%	-17.86%
K2	0.00%	0.00%	4.08%	-1.07%	3.81%	12.51%
K3	0.00%	0.00%	-4.08%	1.07%	-2.60%	-12.51%
Optimistic Scenario						
M1	-30.00%	-30.00%	-32.56%	-29.69%	-11.27%	-35.88%
M3	-50.00%	-50.00%	-54.26%	-49.49%	-18.86%	-59.80%
T1	-15.38%	0.00%	-19.73%	-17.99%	-6.83%	-21.75%
T3	-30.77%	0.00%	-39.46%	-35.99%	-13.67%	-43.49%
I1	-12.00%	-12.00%	-13.02%	-11.88%	-4.50%	-14.35%
I3	-21.43%	-21.43%	-23.25%	-21.21%	-8.05%	-25.63%
K1	0.00%	0.00%	-1.81%	0.55%	-7.42%	-4.52%
K3	0.00%	0.00%	-3.62%	1.10%	-12.38%	-9.04%
Pessimistic Scenario						
M1	40.00%	40.00%	72.37%	36.83%	3.11%	953.90%
M2	100.00%	100.00%	180.92%	92.08%	7.31%	2384.74%
T1	22.22%	0.00%	51.69%	26.31%	2.26%	681.35%
T2	44.44%	0.00%	103.38%	52.61%	4.35%	1362.71%
I1	12.00%	12.00%	21.71%	11.05%	0.97%	286.17%
I2	27.27%	27.27%	49.34%	25.11%	2.16%	650.38%
K1	0.00%	0.00%	12.06%	-2.05%	1.52%	360.69%
K2	0.00%	0.00%	24.12%	-4.09%	3.66%	721.38%

World Bank studies show that the creation of one job position in these cases leads to an indirect increase in jobs equal to 5 or 10 new jobs in businesses that support the operation of such projects. Such businesses in this case will be in clothing and housing and a range of services that includes restaurants, medical services and even banking and insurance. According to this and since it is expected that the project will employ on the Greek side 140 employees, the indirectly supported jobs positions are between 700 and 1400 for the construction and operation of the pipeline. The total work force of the prefecture is 59,000 for 2010 and the unemployment rate equal to 20% for the same year. The implementation of the project can reduce the number of unemployed by 10,400 to 11,100 persons or resulting in an unemployment rate equal to 17.6% - 18.8%.

D. Fiscal Impact to the Local Government

The implementation of the BAP project will bring significant revenue to the local government. Direct benefits through the Offset Payments from the implementing organization that are equal to $1 per ton of transported crude oil. This provides a total of $35,000,000 to $55,000,000 for the Evros prefecture depending on the scenario we use. These amounts significantly impact the fiscal status of the prefecture and can finance important public investments in developing local infrastructure, social and educational projects that cannot be implemented otherwise either by the local or the central

TABLE 7 EXTREME VALUE SCENARIOS

		A1	A2	A3
Traffic Volume (tons)	M	35,000,000	50,000,000	25,000,000
Transportation Fee ($/ton)	T	5.42	10.00	17.00
Exchange Rate($/€)	I	1.25	1.10	1.40
Construction Cost (€)	K	1,250,000,000	1,000,000,000	2,500,000,000

TABLE 8. CASH FLOW RESULTS IN EXTREME SCENARIOS

	SCENARIO		
	A1	A2	A3
Trafic Volume (tons)	35,000,000	35,000,000	35,000,000
Transportation Fee (€/ton)	4.34	8.00	13.60
Total Revenue	151,760,000	280,000,000	476,000,000
Operating Cost of the Pipeline			
Wage Ratio GRE/BUL	0.25	0.25	0.25
Wages Workers Greece	2,800,000	2,800,000	2,800,000
Wages Supervisors Greece	784,000	784,000	784,000
Wages Workers Bulgaria	700,000	700,000	700,000
Wages Supervisors Bulgaria	196,000	196,000	196,000
Supplies	500,000	500,000	500,000
Total	4,980,000	4,980,000	4,980,000
Offsets to Local Governments	56,000,000	56,000,000	56,000,000
Total Production Cost	60,980,000	60,980,000	60,980,000
Administrative Expenses			
Salaries	588,000	588,000	588,000
Public relation	50,000	50,000	50,000
Vehicles-Office Rents	40,000	40,000	40,000
Insurance Premiums	100,000	100,000	100,000
Supplies	50,000	50,000	50,000
Total Administrative Cost	828,000	828,000	828,000
Total Cost	61,808,000	61,808,000	61,808,000
Provisions	100,000	100,000	100,000
Total Operating Cost	61,908,000	61,908,000	61,908,000
Gross Profit Before Tax-Depreciation	89,852,000	218,092,000	414,092,000
Minus Derpeciation	41,666,667	41,666,667	41,666,667
Taxable Income	48,185,333	176,425,333	372,425,333
Taxes Payable	12,046,333	44,106,333	93,106,333
Net Profit	36,139,000	132,319,000	279,319,000
Net Cash Flow After Tax	77,805,667	173,985,667	320,985,667
Cumulative Cash Flow After Tax	77,805,667	173,985,667	320,985,667
Net Cash Flow before Tax	89,852,000	218,092,000	414,092,000
Cumulative Cash Flow before Tax	89,852,000	218,092,000	414,092,000

TABLE 9 CUMULATIVE 30-YEAR CASH FLOW RESULTS IN EXTREME SCENARIOS

	SCENARIO		
	A1	A2	A3
Trafic Volume (tons)	1,050,000,000	1,050,000,000	1,050,000,000
Transportation Fee (€/ton)			
Total Revenue	4,552,800,000	8,400,000,000	14,280,000,000
Operating Cost of the Pipeline			
Wage Ratio GRE/BUL			
Wages Workers Greece	84,000,000	84,000,000	84,000,000
Wages Supervisors Greece	23,520,000	23,520,000	23,520,000

Wages Workers Bulgaria	34,300,000	34,300,000	34,300,000
Wages Supervisors Bulgaria	9,604,000	9,604,000	9,604,000
Supplies	15,000,000	15,000,000	15,000,000
Total	166,424,000	166,424,000	166,424,000
Offsets to Local Governments	1,680,000,000	1,680,000,000	1,680,000,000
Total Production Cost	1,846,424,000	1,846,424,000	1,846,424,000
Administrative Expenses			
Salaries	17,640,000	17,640,000	17,640,000
Public relation	1,500,000	1,500,000	1,500,000
Vehicles-Office Rents	1,200,000	1,200,000	1,200,000
Insurance Premiums	3,000,000	3,000,000	3,000,000
Supplies	1,500,000	1,500,000	1,500,000
Total Admonistrative Cost	24,840,000	24,840,000	24,840,000
Total Cost	1,871,264,000	1,871,264,000	1,871,264,000
Provisions	3,000,000	3,000,000	3,000,000
Total Operating Cost	1,874,264,000	1,874,264,000	1,874,264,000
Gross Profit Before Tax-Depreciation	2,678,536,000	6,525,736,000	12,405,736,000
Minus Derpeciation	1,250,000,000	1,250,000,000	1,250,000,000
Taxable Income	1,428,536,000	5,275,736,000	11,155,736,000
Taxes Payable	357,134,000	1,318,934,000	2,788,934,000
Net Profit	1,071,402,000	3,956,802,000	8,366,802,000
Net Cash Flow After Tax	2,321,402,000	5,206,802,000	9,616,802,000
Cumulative Cash Flow After Tax	36,053,971,000	80,777,671,000	149,132,671,000
Net Cash Flow before Tax	2,678,536,000	6,525,736,000	12,405,736,000
Cumulative Cash Flow before Tax	41,613,628,000	101,245,228,000	192,385,228,000

government and especially after the recent Greek fiscal crisis. Such development projects can provide significant comparative advantages to the Evros prefecture with respect to its neighbors within Greek border and also regionally. This may render Evros a model business and social prototype for the Greek standards. Indirectly, the operation of the pipeline will produce important revenue to the local government through various local taxes and fees. This revenue will be generated both from the main operation of the BAP and also through the secondary increase in total demand and expenditure of the prefecture. In Table 17 we present the total actual local government revenues for the years 2004-2009 in 2005 fixed prices and in columns two and three we provide an optimistic and a pessimistic projection of these revenues for the years 2010-2013. These projections are also presented in Figures 32 and 33. In columns four to seven, based on the projections of columns two and three we calculate the total government revenue including for each scenario a maximum and minimum inflow to the local government from the Offset Payments from the operation of the BAP. By doing this we can see the sensitivity of total local government revenues to the operational capacity of the pipeline. Figure 34 depicts the sensitivity of the optimistic scenario for the total local government revenues to the minimum and maximum operation of the BAP. The projected revenue without the implementation of the BAP is 114.8 million euros for the year 2013 and this increases significantly to 149.8 for minimum offsetting inflows from the operation of the pipeline and to 169.8 in the case of maximum operational capacity. In Figure 35 we show that in the case of the pessimistic scenario, local government revenues are estimated at 92.4 million euros for 2013 and this figure increases to 127.4 and 147.4 million euros in the minimum and maximum offsetting inflows from the BAP. Finally, Figure 36 depicts the above optimistic and pessimistic scenarios for local government revenue and minimum and maximum offsetting payments from the BAP in the same graph to provide a better view of the sensitivity of the total revenue in all possible outcomes.

TABLE10 CASH FLOW RESULTS FOR THE EXTREME SCENARIOS

A1	151,760,000	56,000,000	36,139,000	77,805,667	4.58%	- 55,915,130
A2	280,000,000	56,000,000	132,319,000	173,985,667	13.60%	1,352,201,384
A3	476,000,000	56,000,000	279,319,000	320,985,667	25.65%	3,504,344,528

TABLE 11 SUMMARY OF THE SENSITIVITY RESULTS TO ASYMMETRIC CHANGES IN THE EXTREME SCENARIOS

	Total Revenue	Offsets to Local Gov.	Net Profits	Net C.F. After Tax	IRR	NPV
Scenario A1	151,760,000	56,000,000	36,139,000	77,805,667	4.58%	-55,915,130
MA2	216,800,000	80,000,000	66,919,000	108,585,667	7.74%	394,717,291
MA3	108,400,000	40,000,000	15,619,000	57,285,667	2.14%	-356,336,745
IA2	172,454,545	63,636,364	45,932,636	87,599,303	5.64%	87,467,913
IA3	135,500,000	50,000,000	28,444,000	70,110,667	3.71%	-168,573,236
KA2	151,760,000	56,000,000	29,889,000	79,889,000	3.30%	-263,509,473
KA3	151,760,000	56,000,000	4,889,000	88,222,333	0.34%	-1,093,886,846
Scenario A2	280,000,000	56,000,000	132,319,000	173,985,667	13.60%	1,352,201,384
MA2	200,000,000	40,000,000	84,319,000	125,985,667	9.38%	649,460,765
MA3	400,000,000	80,000,000	204,319,000	245,985,667	19.58%	2,406,312,311
IA2	318,181,818	63,636,364	155,228,091	196,894,758	15.53%	1,687,600,315
IA3	250,000,000	50,000,000	114,319,000	155,985,667	12.05%	1,088,673,652
KA2	280,000,000	56,000,000	138,569,000	171,902,333	17.02%	1,559,795,727
KA3	280,000,000	56,000,000	101,069,000	184,402,333	6.13%	314,229,668
Scenario A3	476,000,000	56,000,000	279,319,000	320,985,667	25.65%	3,504,344,528
MA2	340,000,000	40,000,000	189,319,000	230,985,667	18.35%	2,186,705,868
MA3	680,000,000	80,000,000	414,319,000	455,985,667	36.47%	5,480,802,517
IA2	540,909,091	63,636,364	322,273,545	363,940,212	29.10%	4,133,217,524
IA3	425,000,000	50,000,000	245,569,000	287,235,667	22.92%	3,010,230,030
KA2	476,000,000	56,000,000	285,569,000	318,902,333	31.88%	3,711,938,871
KA3	476,000,000	56,000,000	248,069,000	331,402,333	12.90%	2,466,372,812

TABLE 12 SUMMARY OF THE SENSITIVITY RESULTS TO ASYMMETRIC CHANGES IN THE EXTREME SCENARIOS (PERCENTAGE CHANGES)

	Total Revenue	Offsets to Local Gov.	Net Profits	Net CF After Tax	IRR	NPV
Scenario A1						
MA2	42.86%	42.86%	85.17%	39.56%	3.16%	-805.92%
MA3	-28.57%	-28.57%	-56.78%	-26.37%	-2.44%	537.28%
IA2	13.64%	13.64%	27.10%	12.59%	1.06%	-256.43%
IA3	-10.71%	-10.71%	-21.29%	-9.89%	-0.87%	201.48%
KA2	0.00%	0.00%	-17.29%	2.68%	-1.28%	371.27%
KA3	0.00%	0.00%	-86.47%	13.39%	-4.24%	1856.33%
Scenario A2						
MA2	-28.57%	-28.57%	-36.28%	-27.59%	-4.22%	-51.97%
MA3	42.86%	42.86%	54.41%	41.38%	5.98%	77.96%
IA2	13.64%	13.64%	17.31%	13.17%	1.93%	24.80%
IA3	-10.71%	-10.71%	-13.60%	-10.35%	-1.55%	-19.49%
KA2	0.00%	0.00%	4.72%	-1.20%	3.42%	15.35%
KA3	0.00%	0.00%	-23.62%	5.99%	-7.47%	-76.76%
Scenario A3						
MA2	-28.57%	-28.57%	-32.22%	-28.04%	-7.30%	-37.60%
MA3	42.86%	42.86%	48.33%	42.06%	10.82%	56.40%
IA2	13.64%	13.64%	15.38%	13.38%	3.45%	17.95%
IA3	-10.71%	-10.71%	-12.08%	-10.51%	-2.73%	-14.10%
KA2	0.00%	0.00%	2.24%	-0.65%	6.23%	5.92%
KA3	0.00%	0.00%	-11.19%	3.25%	-12.75%	-29.62%

TABLE 13 BREAK-EVEN-POINT WITH RESPECT TO THE TRAFFIC VOLUME (TONS)

Basic	6,607,593	35,000,000	81.12%
Optimistic	3,924,133	50,000,000	92.15%
Pessimistic	11,181,600	25,000,000	55.27%

TABLE 14 BREAK-EVEN-POINT WITH RESPECT TO THE TRANSPORTATION FEE

Basic	3.70	11.00	66.36%
Optimistic	2.86	13.00	78.00%
Pessimistic	5.13	9.00	43.00%

TABLE 15 BREAK-EVEN-POINT WITH RESPECT TO THE CONSTRUCTION COST

Basic	7,382,760,000	1,250,000,000	-490.62%
Optimistic	14,822,760,000	1,000,000,000	-1382.28%
Pessimistic	3,572,760,000	1,500,000,000	-138.18%

TABLE 16 MULTIPLIER EFFECTS ON LOCAL ECONOMY GDP IN ABSOLUTE VALUES

Year	GDP - no BAP	Pessimistic	Basic	Optimistic
2010	2,155,253,760	2,635,253,760	2,755,253,760	2,875,253,760
2011	2,214,069,120	2,694,069,120	2,814,069,120	2,934,069,120
2012	2,272,884,480	2,752,884,480	2,872,884,480	2,992,884,480
2013	2,355,988,380	2,835,988,380	2,955,988,380	3,075,988,380
2014	2,415,416,400	2,895,416,400	3,015,416,400	3,135,416,400
2015	2,500,358,280	2,980,358,280	3,100,358,280	3,220,358,280

IN PERCENTAGE CHANGES

Year	GDP - no BAP	Pessimistic	Basic	Optimistic
2010	2,155,253,760	22.27%	27.84%	33.41%
2011	2,214,069,120	21.68%	27.10%	32.52%
2012	2,272,884,480	21.12%	26.40%	31.68%
2013	2,355,988,380	20.37%	25.47%	30.56%
2014	2,415,416,400	19.87%	24.84%	29.81%
2015	2,500,358,280	19.20%	24.00%	28.80%

V. CONCLUSIONS

The proposed Burgas-Alexandroupolis Pipeline (BAP) will be an important investment in Greece and especially in the prefecture of Evros. Even with the most modest estimates the investment is valued at €1,000,000,000 that may rise up to €2,500,000,000. The proponents of the implementation of this project insist that the investment will have multiple direct and indirect benefits to the local and national economies of Evros and Greece. In this study we try to estimate the economic viability of the project itself and then the corresponding direct and indirect macroeconomic impact to the local and national economy. We constructed three initial scenarios for the fundamental variables that greatly affect the project's success, namely, the traffic volume, the transportation fee, the exchange rate and the construction cost to obtain the Basic, the Optimistic and the Pessimistic Scenarios. For each one of these initial scenarios and in order to measure the sensitivity of our results to the fundamental variable values, we constructed eight more by altering the value of one fundamental variable at a time for a total of twenty four additional scenarios. Next, we created three extreme scenarios with possibly implausible values for certain fundamental variables in an effort to cover even these extreme situations. From these extreme scenarios we constructed by using asymmetric changes to the fundamental variables as in the case for the initial scenarios, eighteen more scenarios. Thus, a total of forty eight different Cash Flow reports were analyzed for a period of thirty years of operation of the BAP. According to these results and the calculation of the corresponding Internal Rate of Return (IRR) and Net Present Value (NPV) for each scenario the proposed project appears to be viable in most alternative scenarios with high IRR and NPV. Only in the case of the Initial Pessimistic Scenario and Extreme Scenario A1 the IRR is 5.35% and 4.58% and the NPV is equal to €57,555,146.54 and -€55,915,130.27 respectively. The Break-Even-Point analysis provides additional evidence in support of the viability of the project as both the BEPs calculated are low enough to guarantee the profitability of the BAP in the range of transportation capacities expected in all scenarios and also the elasticities of the profits are adequately high providing an important buffer zone to adverse market situations.

As the proposed investment project according to the above analysis seems profitable we then examine the macroeconomic impact of the Burgas-Alexandroupolis Pipeline to the local and national economies. We estimate a significant direct and indirect increase of total demand equal to 2.4, 3.0 and 3.6 billions of Euros in the Pessimistic, Basic and Optimistic Scenarios respectively that translate into a sizeable total increase in national GDP equal to 0.96%, 1.20% and 1.44% respectively for the three scenarios. At the same time the implementation of the BAP is expected to create between 700 and 1400 direct and indirect job positions in the local economy. This effect can decrease the local economy's unemployment rate by 1.2 to 2.4 percentage points. Probably the most important impact of the BAP to the local and national economy stems from the offset payments promised by the implementing organization to the local government at the level of $1 per transported ton of crude oil. This translates into an estimated total revenue for the local government equal to €35,000,000 to €55,000,000 per year depending on the scenario used. We take into account two scenarios for the total future local government revenues independently from the BAP. Adding to these the offsetting payments for all plausible operational capacities of the pipeline we estimate that total local government revenues will increase from 92.4 million euros in the pessimistic scenario without the BAP to €127.4 and €147.4 million in the minimum and maximum offsetting inflows from the BAP. In the optimistic scenario for local government revenues, without the BAP the total is €114.8 million and this increases significantly to €149.8million for minimum offsetting payments and to €169.8 for maximum

TABLE 17 LOCAL GOVERNMENT REVENUES SCENARIOS

Έτος	Optimistic Scenario	Pessimistic Scenario	Optimistic Scenario + min BAP	Optimistic Scenario + max BAP	Pessimistic Scenario + min BAP	Pessimistic Scenario + max BAP
2004	96.1	96.1				
2005	91.0	91.0				
2006	92.1	92.1				
2007	91.7	91.7				
2008	94.4	94.4				
2009	94.1	94.1	94.1	94.1	94.1	94.1
2010*	98.4	92.7	133.4	153.4	127.7	147.7
2011*	102.8	92.6	137.8	157.8	127.6	147.6
2012*	108.2	92.5	143.2	163.2	127.5	147.5
2013*	114.8	92.4	149.8	169.8	127.4	147.4

Map1 The Route for the Burgas – Alexandroupolis Pipeline

such payments. It is clear from the above that the implementation of the Burgas-Alexandroupolis Pipeline with be a viable and profitable business venture that will have important macroeconomic impact in terms of GDP, employment and government revenue to both the national but mostly and most significantly to the local economy and government. Should these revenues be utilized in a manner that they will enhance the local economy's infrastructure and working force creating significant economies of scale, industrial specialization and human capital value added utilizing the expected spillover effects, they may render the region as a model of peripheral economic development.

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