ECONOMICS & Sociology

Kalinowski, S. (2014), Impact of Investment Activity on European Regional Airports Performance, *Economics and Sociology*, Vol. 7, No 3, pp. 40-50. **DOI: 10.14254/2071-789X.2014/7-3/3**

IMPACT OF INVESTMENT ACTIVITY ON EUROPEAN REGIONAL AIRPORTS PERFORMANCE

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Received: May, 2014
1st Revision: July, 2014
Accepted: October, 2014

DOI: 10.14254/2071-789X.2014/7-3/3

ABSTRACT. The accession of ten new countries into the structures of the European Union in May 2004 resulted in their airspaces being covered by the Open Skies agreements. Deregulation and the entry of low cost carriers into these markets contributed to dynamic growth in the air traffic, which most strongly influenced the operations of regional airports. Growing passenger air transport market resulted in an investment projects which enlarged the capacity of the airports. The theory states that after the investment projects have been introduced, there should appear a fall in airports efficiency in a short term perspective. The scale of airport projects oversize the demand just after the project (a new terminal or a new runway). The principal aim of this paper is to examine the impact of investment projects on the efficiency of regional airports in Poland, Czech Republic and Slovakia. The German airports' projects were analysed as the benchmark.

JEL Classification: L25

Keywords: airport performance, airport investment projects, deregulation of the air transport.

Introduction

The studies on the economic effect of the Open Skies agreements are based on the theory of trade and investment. This implies that a full liberalisation of the international air transport services market will increase the efficiency of airports and airlines. An additional effect is benefits to the other market participants. The key factors of these changes include expansion of the aviation market, the use of economies of scale to reduce unit costs, as well as a replacement of less efficient organisations by more efficient ones (Brattle Group, 2002; Alford, Champley, 2007).

First of all, the positive effects of liberalisation emerge from increased competition and the appearance of new products which opens new market segments. In this way Low Cost Carriers (LCC) created a demand for air services in a segment which was not previously covered by Full Service Carriers (FSC). European experience shows that after the market deregulation there has been only a slight increase in competition between full service carriers. The entry of low cost carriers into the market triggered a rapid increase in the demand for passenger transport and the development of airports (Forsyth, King, Rodolfo, 2006; Franke, 2004). Empirical studies produced arguments for the hypothesis that increasing competition in the aviation market favourably influences the efficiency of airports. Among others, such

conclusions were reached by a study conducted on a group of airports in the Baltic region during the period 2003-2007 (Pavlyuk, 2009).

The implementation of the Open Skies agreements and the expansion of LCC airlines have a positive impact on airports' efficiency, mostly by the increase of demand. However, growing share of low cost carriers decreases unit revenues per one passenger (*R/PAX*). Naturally, an increased volume of passengers allows an operator to increase also the revenue from non-aviation services. At the same time airports have to face a considerable pressure to reduce unit charges for aviation services as well as the risk of routes being discontinued if a carrier decides that the charges are too high. Declining unit revenues from aviation sources force airport managers to invest in the expansion of commercial areas which can become new sources of revenue (Francis, Fidato, Humphreys, 2003). An increase in activity by LCCs results in expanding the catchment area of an airport. It is also assumed that because low cost airlines do not offer free meals, their passengers are more likely to use the dining facilities at airports. This generates an even greater increase in revenues from non-aviation sources (*Fig. 1*).

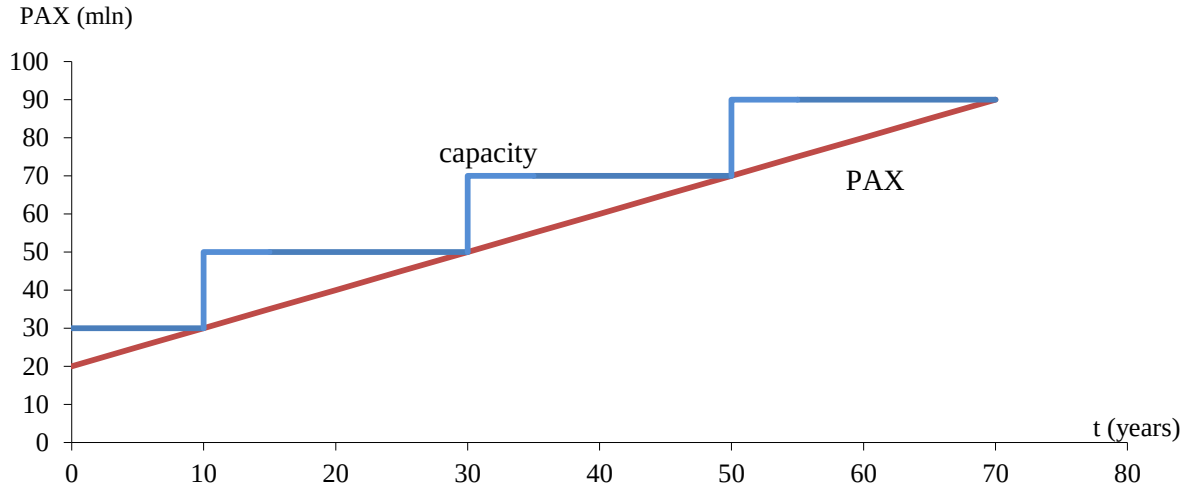

Figure 1. Airport capacity and the number of passengers
Source: own study.

It is agreed, that implementation of the Open Skies agreements and the liberalisation of the air transport market improve the efficiency of airports. It should be also emphasized that a rapidly growing market creates the inevitability of the investment projects increasing the capacity of the airports. An airport as an economic entity realizes investments of special character. Contrary to other branches, airport projects stand out by their indivisibility. Generally, one can't increase the capacity by 10% or 20%. Building a new terminal or a new runway (in this case the effect is greater) is a project that very often doubles the airport capacity. On the other hand, *PAX* quantity growth rate is much more stable (look at *Fig. 1*).

Each capacity enlargement produces large surplus over demand, current and expected for a couple of consecutive years. This causes a need for external financing. Costs of depreciation and interest grow rapidly. Simultaneously, revenues increase with the stable long-term growth rate. The efficiency of the airport suffers short-run worsening (Doganis, Graham, 1987, pp. 45-47).

1. Background and main hypothesis

The most important aim of this article is to examine the impact of investment projects on airport efficiency in terms of market liberalization. The research sample was divided into two parts. The first consists of six investment projects realized by Polish, Czech and Slovak airports. All these three countries implemented the Open Skies agreements in 2004, just in the year of the accession to the European Union. The second subsample comes from the four German airports which completed investment projects more or less at the same time. Of course, the German air transport market was the subject of liberalization significantly earlier. The research sample is presented in *Table 1*. For every airport there is an equal number of years examined before and after the investments. All the analysed investment projects consisted in terminal area expansion, raising the number of gates and the number of check-in points.

It should be emphasized, that average passengers quantity growth rate is significantly higher in the first subsample (avg. 25.3%) than in the second one (avg. 3.4%). Mann-Whitney U-test supported the relationship as statistically significant (p=0.0000). The same thing happens with the employment growth rate. Airports in the new accession EU countries on average increased the number of employees by 9.4%, for the German airports it was 1.5% (p=0.0000). These two differences show the impact of liberalization within the first subsample.

Table 1. Research sample

	Airport	IATA code	Years before project	Years after project
1	**Poznań**	**POZ**	**2005-2007**	**2008-2010**
2	**Gdańsk**	**GDN**	**2003-2006**	**2007-2010**
3	**Katowice**	**KTW**	**2003-2006**	**2007-2010**
4	**Wrocław**	**WRO**	**2005-2007**	**2008-2010**
5	**Bratislava**	**BRT**	**2003-2006**	**2007-2010**
6	**Brno**	**BRQ**	**2003-2006**	**2007-2010**
7	Hamburg	HAM	2000-2003	2004-2007
8	München	MUC	2000-2002	2003-2005
9	Nürnberg	NUE	2001-2005	2006-2010
10	Stuttgart	STR	2000-2003	2004-2007

Source: own study.

The research hypothesis states that a positive influence of the liberalization overcame the negative short-run effects of the investment projects in the first subsample. This will not appear in the German airports.

2. Empirical study

The efficiency of airports has been measured with The Partial Factor Productivity method. The analysis has been divided into two areas: technical and financial. The technical productivity measures were based on two proposals. The initial three come from a study by TaeHoon, Chunyan, Xiaowen (2003, p. 290). The remaining ones come from an earlier publication by the author (Augustyniak, Kalinowski, 2011, pp. 245-246). Technical productivity has been determined using the following measures:

1. *PAX/emp* – number of passengers per one employee,
2. *PAX/gate* – number of passengers per one gate,

3. *PAX/TA* – number of passengers per one m^2 of terminal,
4. *PAX/check* – number of passengers per one check-in counter,
5. *ATM/emp* – number of air traffic operations per one employee,
6. *carg/emp* – tonnes of freight per one employee.

Within this set of ratios, three are especially vulnerable to a negative impact of capacity extension: *PAX/gate*, *PAX/TA* and *PAX/check*. The ratios connected with labour productivity can rise after investment projects because of innovations and substitution between labour and capital. The values of the technical ratios are presented in table A1 of the appendix.

In order to measure a general level of productivity a weighted average technical productivity ratio was built (*TP*). First, every ratio was transformed into a comparable form:

$$r_t(r_a) = \frac{r_a}{\max(r_a)},$$

where:
r_t – relative, transformed value of the ratio,
r_a – nominal value of the ratio,
$max(r_a)$ – maximum of the nominal values of the ratio within the subsample.
Afterwards the weighted average was calculated according to the formula:

$$TP = 0{,}2r_t\left(\frac{PAX}{emp}\right) + 0{,}2r_t\left(\frac{PAX}{gate}\right) + 0{,}2r_t\left(\frac{PAX}{TA}\right) + 0{,}15r_t\left(\frac{PAX}{check}\right) + 0{,}15r_t\left(\frac{ATM}{emp}\right) + 0{,}1r_t\left(\frac{carg}{emp}\right).$$

The values of the *TP* index remain within the section <0;1>. The weights were assumed by the author according to the importance of the particular production factors in airport activity. Terminal area and human resources are crucial analysed production factors with the weights 0,2. The least important service is the cargo transport. Hence, the weight of the last ratio is the smallest. The higher the TP value is the higher is the technical performance of the airport.

In order to test the main hypothesis of the article, the non-parametric Wilcoxon signed-rank test has been applied (Wilcoxon, 1945). Every case of investment project embraces an equal number of yearly ratios before and after the capacity expansion. The pairs of data were matched in the following order: the first year of the pre-investment period with the first year of the post-investment period and so on. The Wilcoxon test was performed separately for the first subsample and for the second (*Table 2*). T value is the smaller sum of the ranks (attributed to the module of the positive or negative differences between after and pre-investment values for every pair). If the sum of the plus ranks is higher the performance of the airport after investment improved.

Table 2. The results of technical productivity analysis for the Polish, Czech and Slovak airports

	No. of obs.	Σ rank +	Σ rank -	T	Z	p - value
PAX/emp	22	230	23	23	3,3602	0,0008
PAX/gate	22	181	72	72	1,7694	0,0768
PAX/TA	22	188	65	65	1,9966	0,0459
PAX/check	22	192	61	61	2,1265	0,0335
ATM/emp	22	80	173	80	1,5097	0,1311
carg/emp	22	98	155	98	0,9253	0,3548
TP	**22**	**197**	**56**	**56**	**2,2888**	**0,0221**

Source: own study.

The general measure of technical productivity (*TP*) in the first subsample (just liberalized markets) was higher after the investment projects (p=0.0221). The positive effects of the liberalization overcame the negative influence of rapidly growing capacity. Three ratios remaining the most vulnerable to short-run negative investment effect (*PAX/gate*, *PAX/TA and PAX/check*) perceived its growth (last two with statistical significance). The power of the liberalization effect is also apparent in the case of the *PAX/emp* ratio. It was probably reinforced by the innovation and capital-labour substitution effects.

It is worth mentioning, that the number of air traffic movements per one employee fell. It is not the result of the growing capacity. The lack of improvement with respect to the number of air traffic operations per one employee in the case of airports from the new EU countries can be attributed to the dynamic increase in the share of LCCs in passenger transport. This expansion led in the years 2001-2010 to an increase in the load factor (from 21 to 61 *PAX/ATM* in subsample one). During the same period for the German subsample this rate increased from 64 to 84 *PAX/ATM*.

Table 3. The results of technical productivity analysis for the German airports

	No. of obs.	Σ rank +	Σ rank -	T	Z	p - value
PAX/emp	16	128	8	8	3,1025	0,0019
PAX/gate	16	3	133	3	3,3611	0,0008
PAX/TA	16	27	109	25	2,2235	0,0262
PAX/check	16	53	83	53	0,7756	0,4380
ATM/emp	16	118	18	18	2,5854	0,0097
carg/emp	16	50	86	50	0,9308	0,3520
TP	**16**	**66**	**70**	**66**	**0,1034**	**0,9176**

Source: own study.

The results for the German airports reflect the short-run negative investment effects. The most important ratios with this respect: *PAX/gate*, *PAX/TA* and *PAX/check* fell for the first two with statistical significance. The positive liberalization effect did not reverse it as for the first subsample. The general measure of technical productivity (*TP*) decreased but the change was not statistically significant. The only two improved aspects of technical productivity of the German airports were connected with labour. Both *PAX/emp* and *ATM/emp* increase after stepwise growth of capacity. One can explain it with the innovation and capital-labour substitution effects.

The research hypothesis found strong support in the results of the analysis of the technical productivity. For the first subsample the positive liberalization effects overcame the negative short-run investment effects. The reference subsample of the German airports did not showed the effects present in the first subsample, just because the absence of the liberalization effects. German airports had experienced them significantly earlier.

Another area for assessing the impact of the liberalization and stepwise growth of airport capacity was financial productivity. This was measured by the means of the PFP method using the following indicators:

1. *EBIT/R* – earnings before interest and taxes to revenue,
2. *EBITDA/R* – earnings before interest, taxes, depreciation and amortisation to revenue,
3. *R/TLC* – revenue to total labour cost,
4. *R/emp* – revenue per one employee,
5. *R/CC* – revenue to cost of capital,
6. *R/TA* – revenue per one m^2 of terminal,

7. *R/WLU* – total revenue per WLU (Work Load Unit),
8. *TOC/WLU* – total operating cost per WLU,
9. *AER/WLU* – aeronautical revenue per WLU,
10. *NAR/TA* – non-aeronautical revenue from one m^2 of terminal.

Some of the indicators have been adopted from a comprehensive list proposed by Doganis (1992, pp. 170-187), the remaining ones are author's proposal. The financial indicators include ground handling activities. Three ratios include the specific measure for the air transport output – work load unit (WLU). It was designed to embrace passenger and cargo transfers in one volume. WLU is one passenger or 100 kg of cargo (Francis, Humphreys, Fry, 2002, p. 240).

In order to measure a general level of financial productivity a weighted average financial productivity index was built (*FP*). The idea of building relative values of the ratios is the same as in case of technical analysis, with the exception of *TOC/WLU*:

$$r_t(r_a) = \frac{\min(r_a)}{r_a}.$$

The *FP* index was built as follows:

$$\mathrm{FP} = 0{,}2\mathrm{r_t}\,\frac{\mathrm{EBIT}}{\mathrm{R}} + 0{,}05\mathrm{r_t}\,\frac{\mathrm{EBITDA}}{\mathrm{R}} + 0{,}05\mathrm{r_t}\,\frac{\mathrm{R}}{\mathrm{TLC}} + 0{,}15\mathrm{r_t}\,\frac{\mathrm{R}}{\mathrm{emp}} + 0{,}05\mathrm{r_t}\,\frac{\mathrm{R}}{\mathrm{CC}} +$$
$$0{,}15r_t\left(\frac{R}{TA}\right) + 0{,}15r_t\left(\frac{R}{WLU}\right) + 0{,}05r_t\left(\frac{TOC}{WLU}\right) + 0{,}05r_t\left(\frac{AER}{WLU}\right) + 0{,}10r_t\left(\frac{NAR}{TA}\right).$$

Operating margin, as the most important measure of the financial efficiency, was attributed with the highest weight. Operating activity is the core of the enterprise activity. Hence, operating profit (EBIT) is the foundation of the firm's profitability. That's why operating margin has the highest weight. Slightly lower weights were granted to the revenues per one employee, revenues per one square meter of the terminal area and the revenues per one WLU. Terminal and employees are the crucial production factors. The ratio R/WLU was attributed with the highest weight because of its special importance. It's negatively influenced by the liberalization. Multiplying R/WLU by the highest weight makes the Wilcoxon test harder for the FP variable.

Table 4. The results of financial productivity analysis for the Polish, Czech and Slovak airports

	No. of obs.	Σ rank +	Σ rank -	T	Z	p - value
EBIT/R	21	171	60	60	1,9290	0,0537
EBITDA/R	21	175	56	56	2,0681	0,0386
R/TLC	21	136	95	95	0,7125	0,4761
R/emp	21	205	26	26	3,1108	0,0019
R/CC	21	103	128	103	0,4345	0,6639
R/TA	21	161	70	70	1,5815	0,1138
R/WLU	21	41	190	41	2,5894	0,0096
TOC/WLU	21	28	203	28	3,0413	0,0024
AER/WLU	21	39	192	39	2,6590	0,0078
NAR/TA	21	168	63	69	1,6162	0,1060
FP	**21**	**153**	**78**	**68**	**1,6510**	**0,0987**

Source: own study.

Seven out of ten financial analysis ratios improved its values, as far as the Polish, Czech and Slovak airports are concerned. The general index of financial performance (*FP*) was higher after the investment projects. Unfortunately, only at the significance level α=0.1. The same is with the most important profitability ratio *EBIT/R*. The growth of the *EBITDA/R* is higher because of the stepwise increase of depreciation costs after the capacity expansion. The same cause made *R/CC* fall.

The results for the labour performance were the same as in the case of technical analysis. Both ratios *R/TLC* and R/emp grew. The second one with the statistical significance. The growing market share of the LCCs caused the fall of unit revenue and operating cost per one WLU. *R/WLU*, *TOC/WLU* and *AER/WLU* decreased with the statistical significance, but it did not pulled *FP* index down.

Table 5. The results of financial productivity analysis for the German airports

	No. of obs.	Σ rank +	Σ rank -	T	Z	p - value
EBIT/R	16	88	48	48	1,0342	0,3011
EBITDA/R	16	65	71	65	0,1551	0,8767
R/TLC	16	118	18	18	2,5854	0,0097
R/emp	16	127	9	9	3,0508	0,0023
R/CC	16	101	35	35	1,7064	0,0879
R/TA	16	19	117	19	2,5337	0,0113
R/WLU	16	32	104	32	1,8615	0,0627
TOC/WLU	16	71	65	65	0,1551	0,8767
AER/WLU	16	25	111	25	2,2235	0,0262
NAR/TA	16	17	119	10	2,9991	0,0027
FP	**16**	**72**	**64**	**64**	**0,2068**	**0,8361**

Source: own study.

For the German airports only five out of ten financial ratios improved their values. One can reject the hypothesis of the increasing *FP* index after the investment projects with p=0.8361. Only the labour performance measures survived short term negative influence of the stepwise increase of the capacity. The most appealing evidence of the impact of the investment project on the financial situation of the German airports were the significant falls of *R/TA* and *NAR/TA* (p<0.05). In the case of the first subsample there were growths close to the significance level α=0.1.

The support for the main hypothesis from the results of the financial performance analysis is slightly weaker than from the technical productivity analysis. Anyway, according to the financial situation analysis, the positive effects of deregulation and liberalization of air transport exceeded the negative short-term impact on the airport performance in the new EU countries.

Conclusions

In 2004 ten Central and East European countries joined the European Union. The accession into the EU meant that these countries were included in the EU directives relating to air transport as well as the Open Skies agreements. As a result of deregulating the market there was a dynamic growth of air traffic in these countries, which strongly affected regional airports. The rapid growth of the air transport market implied the first wave of capacity expansion projects in the years 2007-2008. According to the theoretical expectation, these projects should decrease the airport efficiency in the short-run. The main hypothesis of the

article was that the contradictory influence of the liberalization and of the investment projects increasing capacity will lead to the improvement of airports performance in the new EU countries.

A statistically significant increase in the majority of technical productivity indicators for Polish, Czech and Slovak airports after stepwise growth of the capacity, together with decrease of five out of seven ratios of the German airports, support the research hypothesis. The support from the results of the financial performance analysis was not so strong, but they led in the same direction.

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Annex 1.

Table A1. Technical analysis ratios

After the project	PAX/ emp	PAX/ gate	PAX /TA	PAX/ check	ATM/ emp	carg/ emp	**Before the project**	PAX /emp	PAX/ gate	PAX /TA	PAX/c heck	ATM/ emp	carg emp
POZ 2010	2 833	157 680	86	83 478	47	5	**POZ 2007**	2 585	149 490	81	56 059	54	6
POZ 2009	2 718	141 306	77	74 809	49	5	**POZ 2006**	2 274	111 784	61	41 919	59	7
POZ 2008	2 995	141 631	77	74 981	55	6	**POZ 2005**	1 732	69 761	38	26 161	65	9
GDN 2010	5 337	278 951	240	117 453	76	11	**GDN 2006**	4 448	314 004	173	114 183	86	12
GDN 2009	4 870	238 834	205	100 562	75	10	**GDN 2005**	2 631	168 047	93	61 108	75	14
GDN 2008	4 985	244 272	210	114 952	79	12	**GDN 2004**	2 003	116 673	64	42 426	75	13
GDN 2007	5 149	214 470	185	107 235	85	14	**GDN 2003**	1 642	91 259	50	33 185	65	12
KTW 2010	3 142	150 203	113	68 664	35	15	**KTW 2006**	3 499	364 603	192	85 789	50	15
KTW 2009	3 472	157 641	111	67 560	38	10	**KTW 2005**	3 211	273 096	144	64 258	48	17
KTW 2008	3 711	161 796	114	69 341	41	19	**KTW 2004**	2 010	311 306	132	77 827	45	16
KTW 2007	3 717	210 096	138	76 766	46	15	**KTW 2003**	1 045	128 996	55	32 249	38	14
WRO 2010	3 411	236 341	187	103 399	49	2	**WRO 2007**	3 281	213 419	185	116 410	69	4
WRO 2009	3 036	195 065	154	85 341	57	2	**WRO 2006**	2 673	144 322	125	78 721	77	5
WRO 2008	3 504	212 349	168	92 903	75	3	**WRO 2005**	1 633	77 588	72	42 321	72	5
BTS 2010	2 772	185 078	54	57 438	45	29	**BTS 2006**	3 090	215 294	108	107 647	50	8
BTS 2009	2 714	190 002	91	95 001	47	19	**BTS 2005**	2 484	147 388	74	73 694	57	7
BTS 2008	3 192	246 505	118	123 253	50	10	**BTS 2004**	1 995	148 936	50	63 830	61	18
BTS 2007	3 012	224 905	108	112 452	47	3	**BTS 2003**	1 308	80 002	27	34 287	58	30
BRQ 2010	3 166	143 510	78	53 816	186	38	**BRQ 2006**	3 314	131 454	131	98 590	186	27
BRQ 2009	3 201	141 921	77	53 221	218	79	**BRQ 2005**	3 560	116 297	116	87 223	156	32
BRQ 2008	3 883	163 099	89	61 162	243	47	**BRQ 2004**	2 177	62 397	62	46 798	212	53
BRQ 2007	3 653	146 107	80	54 790	202	30	**BRQ 2003**	2 090	55 024	55	41 268	222	61
HAM 2007	7 889	232 375	141	118 339	93	27	**HAM 2003**	5 580	221 626	116	88 240	74	21
HAM 2006	7 249	217 348	132	110 686	88	23	**HAM 2002**	5 043	208 058	109	93 193	71	23
HAM 2005	6 660	194 109	118	98 852	84	20	**HAM 2001**	5 003	220 708	115	98 859	70	23
HAM 2004	5 762	179 885	109	91 608	76	22	**HAM 2000**	6 801	231 378	121	103 638	94	33
MUC 2005	5 976	131 282	57	92 024	81	47	**MUC 2002**	5 071	222 728	95	123 870	72	41
MUC 2004	5 421	123 002	53	86 220	75	40	**MUC 2001**	5 288	227 374	97	126 454	72	35
MUC 2003	4 946	110 978	48	77 792	70	36	**MUC 2000**	5 717	222 364	95	123 668	75	39
NUE 2010	4 208	116 251	80	99 239	58	10	**NUE 2005**	2 835	174 714	91	93 749	44	9
NUE 2009	3 899	113 307	78	96 725	55	10	**NUE 2004**	2 697	165 845	86	88 990	42	10
NUE 2008	4 198	121 989	84	104 137	59	13	**NUE 2003**	2 575	149 559	78	80 251	44	14
NUE 2007	4 200	121 094	83	103 373	63	15	**NUE 2002**	2 518	145 831	76	78 251	47	16
NUE 2006	3 950	113 185	78	96 621	62	14	**NUE 2001**	3 535	145 264	82	77 947	72	25
STR 2007	9 207	147 449	85	88 978	130	27	**STR 2003**	6 589	199 592	117	99 796	107	25
STR 2006	8 644	144 357	84	87 112	124	26	**STR 2002**	5 977	191 425	112	95 712	100	27
STR 2005	8 265	134 370	78	81 085	123	23	**STR 2001**	6 101	200 850	118	100 425	100	26
STR 2004	7 752	126 022	73	76 048	120	24	**STR 2000**	6 677	214 018	125	107 009	108	31

Source: own study.

Table A2. Financial analysis ratios

After the project	EBIT /R	EBITDA/ R	R/TLC	R/emp	R/CC	R/TA	R/WLU	TOC/WLU	AER/WLU	NAR/TA
POZ 2010	0,06	0,24	1,91	38 510	5,67	1 171	13,36	12,81	10,76	228
POZ 2009	0,06	0,24	1,88	34 693	5,51	985	12,52	12,31	10,08	192
POZ 2008	0,09	0,25	2,02	41 825	6,23	1 081	13,68	14,14	11,31	187
GDN 2010	0,21	0,30	3,65	61 314	11,18	2 757	11,26	8,97	9,05	541
GDN 2009	0,18	0,31	3,30	51 936	7,73	2 191	10,45	8,74	8,45	418
GDN 2008	0,21	0,35	3,29	61 669	7,47	2 600	12,09	9,73	9,87	477
GDN 2007	0,26	0,39	3,59	59 595	8,02	2 136	11,26	8,48	9,39	354
KTW 2010	0,13	0,29	2,78	44 609	6,48	1 602	13,57	12,21	10,40	374
KTW 2009	0,16	0,34	3,12	43 171	5,60	1 380	12,10	10,86	9,31	318
KTW 2008	0,22	0,40	3,01	49 053	5,73	1 506	12,56	10,86	9,38	381
KTW 2007	0,29	0,46	3,25	43 910	5,66	1 632	11,37	9,39	8,69	384
WRO 2010	0,09	0,15	4,97	62 695	18,01	3 431	18,28	16,79	11,61	1 252
WRO 2009	0,08	0,15	3,99	50 357	13,06	2 556	16,46	15,25	9,95	1 011
WRO 2008	0,08	0,13	4,77	83 702	18,80	4 007	23,71	21,95	15,20	1 439
BTS 2008	0,01	0,40	3,24	50 101	2,57	1 850	15,22	16,13	11,62	438
BTS 2007	0,03	0,49	2,92	39 404	2,17	1 407	12,96	13,72	10,11	309
BTS 2006	0,03	0,33	3,56	43 345	3,33	1 515	13,67	13,39	9,41	472
BRQ 2010	0,06	0,21	2,97	56 446	6,55	1 396	15,91	15,21	10,61	465
BRQ 2009	0,16	0,28	4,03	72 637	9,03	1 756	18,19	15,25	12,13	585
BRQ 2008	0,18	0,36	4,30	85 876	5,57	1 967	19,70	16,53	13,14	655
BRQ 2007	0,25	0,38	3,06	63 302	7,85	1 381	16,02	13,21	10,68	460
HAM 2007	0,24	0,36	3,33	154 642	8,80	2 764	18,94	12,15	12,69	913
HAM 2006	0,22	0,33	3,00	148 872	8,53	2 709	19,90	13,28	13,14	921
HAM 2005	0,19	0,31	2,72	139 497	8,36	2 467	20,32	14,12	13,03	885
HAM 2004	0,20	0,30	2,74	124 467	9,61	2 358	20,82	14,50	13,25	858
MUC 2005	0,02	0,16	3,03	149 604	7,50	1 422	23,22	19,60	12,87	633
MUC 2004	0,03	0,17	2,97	139 405	6,74	1 368	23,94	19,78	12,98	626
MUC 2003	0,01	0,17	2,83	135 280	6,35	1 313	25,47	21,14	13,39	623
NUE 2010	0,05	0,20	2,61	105 295	6,61	2 004	24,44	19,56	14,78	792
NUE 2009	0,02	0,19	2,38	91 616	5,96	1 834	22,88	18,53	14,33	685
NUE 2008	0,06	0,22	2,50	96 567	6,30	1 933	22,32	17,35	14,30	694
NUE 2007	0,10	0,26	2,64	97 790	6,47	1 942	22,48	16,69	14,18	717
NUE 2006	0,09	0,25	2,41	93 956	6,25	1 855	22,96	17,19	14,49	684
STR 2007	0,20	0,36	4,43	201 707	6,10	1 870	21,29	13,63	14,05	636
STR 2006	0,17	0,35	4,36	197 386	5,58	1 909	22,17	14,38	14,17	689
STR 2005	0,13	0,34	3,94	190 759	4,90	1 796	22,44	14,87	14,54	632
STR 2004	-0,04	0,18	3,71	179 967	4,65	1 694	22,53	18,51	14,51	603

Source: own study.

Table A2 cont. Financial analysis ratios

Before the project	EBIT/R	EBITDA/R	R/TLC	R/emp	R/CC	R/TA	R/WLU	TOC/WLU	AER/WLU	NAR/TA
POZ 2007	0,16	0,32	2,02	38 047	6,03	1 193	14,37	12,43	11,32	253
POZ 2006	0,16	0,36	2,03	37 150	5,14	990	15,83	13,21	12,12	232
POZ 2005	0,09	0,35	1,67	31 630	3,80	691	17,36	16,36	12,38	198
GDN 2006	0,21	0,35	3,44	54 476	7,16	2 119	11,93	9,53	10,04	336
GDN 2005	0,13	0,28	2,63	39 062	6,53	1 374	14,12	12,47	11,58	247
GDN 2004	0,09	0,26	2,61	31 641	5,88	1 015	14,81	13,60	11,64	217
GDN 2003	0,09	0,29	2,53	29 962	5,13	918	17,00	15,84	12,94	219
KTW 2006	0,12	0,31	3,00	44 981	5,39	2 467	12,34	10,95	9,72	524
KTW 2005	0,13	0,34	3,08	47 963	4,88	2 147	14,21	12,56	11,28	443
KTW 2004	0,13	0,38	2,97	36 944	4,02	2 420	17,00	15,55	13,95	435
KTW 2003	0,09	0,27	2,60	27 776	5,53	1 450	23,37	22,98	17,78	347
WRO 2007	0,11	0,16	4,62	67 149	19,57	3 779	20,24	18,20	11,92	1 552
WRO 2006	0,09	0,15	4,12	55 792	16,53	2 607	20,51	18,76	18,15	300
WRO 2005	0,01	0,10	2,92	37 479	11,03	1 644	22,26	22,26	19,07	236
BTS 2003	0,09	0,26	4,84	29 683	6,00	607	18,50	18,07	10,50	263
BTS 2002	0,01	0,22	4,72	24 059	4,83	479	20,62	20,44	11,71	58
BTS 2001	0,00	0,21	4,65	23 467	4,78	472	26,06	26,11	14,79	58
BRQ 2006	0,08	0,17	3,89	61 698	10,29	2 447	17,24	16,27	11,50	815
BRQ 2005	0,06	0,15	3,42	53 272	12,11	1 740	13,73	13,15	9,16	580
BRQ 2004	0,11	0,20	3,01	42 974	11,68	1 232	15,89	15,06	10,60	410
BRQ 2003	0,09	0,19	3,08	43 578	10,39	1 148	16,15	15,04	10,77	382
HAM 2003	0,14	0,24	2,43	121 284	10,18	2 517	20,95	15,95	13,09	944
HAM 2002	0,17	0,28	2,50	114 635	9,12	2 471	21,74	15,67	13,66	918
HAM 2001	0,13	0,23	2,45	111 644	9,65	2 573	21,35	16,36	13,89	899
HAM 2000	0,22	0,31	2,56	150 205	10,99	2 670	21,06	14,44	14,41	843
MUC 2002	0,09	0,28	2,96	134 331	5,42	2 515	24,50	17,72	13,99	1 079
MUC 2001	0,12	0,30	3,09	137 856	5,48	2 527	24,44	17,11	14,16	1 063
MUC 2000	0,10	0,31	3,24	146 770	4,92	2 433	24,04	16,64	14,22	994
NUE 2005	0,09	0,25	2,50	67 497	6,23	2 163	23,09	17,23	14,35	819
NUE 2004	0,04	0,21	2,41	64 901	5,72	2 075	23,18	16,79	14,22	802
NUE 2003	-0,02	0,16	2,29	62 028	5,45	1 873	22,87	17,31	13,95	731
NUE 2002	0,08	0,26	2,41	60 421	5,75	1 819	22,53	16,74	14,10	681
NUE 2001	0,06	0,24	2,40	83 800	5,69	1 945	22,13	16,82	13,80	732
STR 2003	0,04	0,28	3,31	160 664	4,25	2 850	23,50	17,02	15,00	1 030
STR 2002	0,02	0,28	3,24	147 869	3,82	2 773	23,66	17,05	15,38	970
STR 2001	0,01	0,29	3,35	145 042	3,59	2 796	22,79	16,15	15,06	948
STR 2000	0,01	0,32	3,49	157 393	3,33	2 954	22,53	15,43	14,49	1 054

Source: own study.