

AN ESTIMATE OF WAR DAMAGES IN CROATIA

**DIRECT AND INDIRECT EXPENSES OF THE WAR FOR THE
PERIOD 1991-2005, AND A FORECAST TO 2015 IN DOMESTIC
AND INTERNATIONAL PRICES**

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INTRODUCTION

The purpose of this paper is to collect and estimate the total war damages Croatia and Croatian economy suffered due to the Homeland War. The main idea is to display the damages in two different ways. This implies, where possible, an assessment of total damages in domestic prices and on the basis of Croatian living standard. On the other hand, the paper presents an estimate of the total damages in terms of the prices of the most developed countries in order to achieve internationally comparable standard, and, consequently, provides the real magnitude of the losses.

The paper is divided in two sections. The first section discusses direct damages incurred as a consequence of war-related activities, while the second section reports indirect damages incurred due to foregone economic activity. Direct damages, therefore, include material destruction of property, valuation of human losses, military expenses, refugee accommodation expenses, mine clearance expenses, and health care expenses. On the other hand, indirect damages include losses incurred due to foregone economic activity caused by the war. The potential growth rate of GDP, or growth rates of comparable transition economies not affected by the war, serves as a comprehensive measure of indirect losses. Those growth rates are compared with Croatian growth rates, and give us total indirect loss irrespective of its cause.

This estimation method of indirect expenses is much more acceptable than any other method. The industry-specific estimation method is time-consuming, and the data would be more erroneous due to displacement of people (as important production factor) as well as all other detrimental effects induced by the war. The before mentioned imbalances vanish after we estimate the potential Croatian GDP over the 1990 GDP, given the growth rates of comparable transition countries (Slovenia, Hungary, Czech Republic, Slovakia and Poland, where the weight for each country may differ). As all negative effects of war-related activities in terms of foregone economic activity (dynamic dimension of the loss, section 2 of the paper) have been encompassed with this measurement, it is only left to estimate the static dimension of the loss – the loss of production factors, labor (L) and capital (K).

We discuss labor factor losses in section 1.1 as human losses (dead, wounded, disabled and displaced people, in addition to mental disorders and mental suffering caused by the war). Section 1.2 turns to capital losses (destroyed and stolen property, that is, direct damages in industry, agriculture, forestry, monetary system, as well as on civil property, natural resources, environment, and historical and cultural heritage). We do not deal with the losses incurred as a consequence of destruction and theft; we just measure the extent of confiscated, damaged, and destroyed private and state property. Section 1.4 discusses the issue of mine clearance, which is divided among the human (labor factor) losses, and mine clearance expenses. Again, we do not measure foregone earnings due to the unused land, since this it is covered in section 2 as one of the dynamic losses. The issue of mine clearance is discussed in a separate section due to its capital and human dimension (it wastes resources). Section 1.3 treats the total military expenses on soldiers and their equipment.

1. DIRECT WAR DAMAGES

Direct war damages are divided in three categories: human losses, property losses, mine clearance expenses and military expenses.

1.1. Casualties, disabled people, dissociated families, and freedom restrictions

This section discusses military and civilian deaths, wounded and permanently disabled, displaced persons and refugees, emigration and war-caused mental disorders.

1.1.1. Military and Civilian Deaths

Table 1: Measurement for dead and missing persons

Category	Number of persons	Estimate under scenario C (\$)	Estimate under scenario B (\$)	Estimate under scenario E (\$)
Deaths	12,131	2,426,200,000	36,393,000,000	3,032,750,000
Imprisoned and missing	2,251	450,200,000	6,753,000,000	562,750,000
Total	14,382	2,876,400,000	43,146,000,000	3,595,500,000

In Table 1 we sum the number of dead and imprisoned and missing persons since those in the latter category are not only found alive, but their bodies are usually exhumed from the mass graves.

There are several different methods of estimating the value of human life. Some authors include foregone earnings and investments in education in addition to expenses coming from the fact that the human life is not an asset or investment. Other authors value the human life according to the average value of life insurance schemes, while the third group measures the subjective value of human life. Irrespective of the method used in the valuation of human life, human casualties and sufferings are strongly reflected on the society's future earnings potential since people produce and create on the basis of their time-consuming investment in skills. The following is the list of some estimates of the human life:

- A. The Copenhagen Consensus estimates the value of human life at \$100,000¹.
- B. According to the research on automobile safety, the human life is worth approximately \$3,000,000². The paper estimates the implicit value of human life from \$2.6 to \$3.7 million.
- C. A General Motors engineer Edward C. Ivey measures expenses of a fatal traffic accident caused by fire. His cost-benefit analysis, involving discounting all future earnings of a victim of the average age and the average monthly salary, estimates the value of human life at \$200,000.
- D. The average life-insurance compensations amount from \$20,000 for car accident victims to \$1,000,000 for railroad accidents victims.

¹ "The Economist special report," Copenhagen Consensus, June 5th 2004, pp. 64-65.

² Mark K. Dreyfus and W. Kip Viscusi, Rates of Time Preference and Consumer Valuations of Automobile Safety and Fuel Efficiency, J. Law & Econ. 38, pp. 79-102 (1995).

E. In the U.S., a National Guard soldier is subject to \$250,000 life insurance benefits. This estimate is the most reliable.

The measurement of the value of life according to foregone earnings in Croatia would give us unrealistically small figure. Thus, we have to use one of the five mentioned scenarios. Table 1 presents measurements according to scenarios B, C, and E. Since only scenario E provides an estimate of the value of life of a military services member (in that case the U.S. National Guard member), we believe scenario E provides the best possible estimate.

1.1.2. Military and Civilians Wounded, and Permanently Disabled

Table 2: Expenses of wounded and permanently disabled in the Homeland War

Category	Number of persons	Expenses (in 2003 domestic prices in \$)	Expenses (in 2003 German prices in \$)
Permanently disabled in the Homeland War	32,249 ³	23,176,710,300	30,959,040,000
Number of wounded	48,677 ⁴	40,398,694	212,389,112
Total	-	23,217,108 994	31,171,429,100

Analysis of the figures in Table 2:

The first column presents expenses of permanently disabled persons in the Homeland War in domestic prices. The average retirement compensation of a Croatian Homeland War veteran in 2003 is HRK 5,076.70, with the average age at the time of disability of 29⁵. Therefore, if the life expectancy of the average male in Croatia is 72 years, the average permanently disabled male will receive $(72 - 29) \times 12 \times \text{HRK } 5,076.70 = \text{HRK } 2,619,577 = \$415,800$. If we include all foregone earnings (given the average monthly salary in September 2005 of HRK 4,417), we obtain $(65 - 29) \times 4,417 \times 12 = \text{HRK } 1,908,144 = \$302,880$. Thus, the total expenses per permanently disabled person are \$718,680. Multiplying the latter figure with the number of registered Homeland War veterans (retirees), we get the total of **\$23,176,710,300**.

In the second column we use the U.S. insurance companies' estimate of the total expense of permanent disability of a person between 25 and 30 years old. The analysis was made for life insurance services providers, and the figure states the expense of \$960,000 per disabled person. Then, the total amounts to **\$30,959,040,000**.

The expenses of wounded persons are calculated in the following way. The Professor Hebrang's paper provides the baseline data that allow us to estimate the total number of hospitalization days of Croatian soldiers. The price of one hospitalization day is obtained in the following way: using the total number of hospitalization days for all patients during the year, and the total hospital expenses (including equipment, accommodation, food expenses, and employees' salaries, which indirectly represent the total expenses of all services provided

³ In "The Current State of the Pay-As-You-Go Retirement Scheme" (Stanje sustava mirovinskog osiguranja temeljenog na generacijskoj solidarnosti), The Annual Report of the Croatian Pension Insurance Institute (HZMO), Table 7, the average retirement compensation is HRK 5,076.70.

⁴ Professor Andrija Hebrang: "An Effectiveness Analysis of the Wartime Health System" (Analiza učinkovitosti ratnog zdravstva) (preliminary report), Zagreb, October 2003, p. 2.

⁵ Ibid, p. 11.

by hospitals in terms of baseline health care, surgery, specialist treatment, therapy, etc.), we obtain the price per one patient. The figure is obtained for Croatian and German hospitals.

These data are available for only 27,532 wounded persons in the Homeland War⁶. However, on the basis of this sample, we are able to estimate the data for the whole population of hospitalized wounded persons (due to the large sample of 27,532 hospitalized persons, representing 90.2% ($27,532 \div 30,520 = 0.9020$) of the population, there is no need for any statistical adjustments). The rest of the wounded persons not included in this source ($48,677 - 30,520 = 18,157$) were not hospitalized, therefore, we assign them 1 hospitalization day. Using the data from the former analysis we obtain the following estimates:

Table 3: The total number of hospitalization days for wounded persons

Duration	Average of the category (in days)	Number of wounded (for 90.2% in the sample)	Relative frequency (%)	Number of hospitalized wounded (in the population)	Number of wounded not included in the source	All wounded	Total number of days
Not hospitalized	1	18	0.07	20	18,157	18,177	18,177
More than 2 months	90 ⁷	969	3.51	1,072	0	1,072	96,524
1-2 months	45	1,232	4.48	1,367	0	1,367	61,507
1 month	30	2,264	8.23	2,510	0	2,510	75,311
15-21 days	18	2,984	10.84	3,309	0	3,309	59,558
8-14 days	11	5,930	21.54	6,574	0	6,574	72,310
1-7 days	4	14,135	51.34	15,668	0	15,668	62,671
Total	-	27,532	100.00	30,520	18,157	48,677	446,058

Table 3 shows estimates of 48,677 wounded persons and 446,058 hospitalization days. Using the price of one hospitalization day (including all hospital services) we can easily obtain the total expenses of wounded persons.

The Financial Report of the Croatian Pension Insurance Institute (HZZO) states the price of one hospitalization day in 2003 of HRK 570.58⁸. This figure covers all expenses, including accommodation and medication expenses, surgery treatments, and employees' salaries. The total expense can be calculated as follows: $446,058 \times \text{HRK } 570.58 = \text{HRK } 254,511,773.60 = \text{\$40,398,694}$. However, we should not undermine severe conditions of wounded persons as well as the fact that such circumstances require more surgery treatments than the ones at the time of peace. Moreover, the expenses should be evaluated in internationally comparable prices.

Therefore, we perform an analysis of the medical expenses in Germany in 2003. The total expenses of German hospitals amounted to €64,688 billion, or \$73,097,440,000 (using 2003 Euro/dollar exchange rate of 1.13). In the same year, as patients used 153,518,000 hospitalization days, it is easy to calculate that the price of one hospitalization day amounted to $73,097,440,000 \div 153,518,000 = \476.15 . Thus, in German prices the total expense for wounded persons in the Homeland War is $446,058 \times \$467.15 = \text{\$212,389,112}$.

⁶ Table 3 uses the data from Professor Andrija Hebrang: "An Effectiveness Analysis of the Wartime Health System" (Analiza učinkovitosti ratnog zdravstva) (preliminary report), Zagreb, October 2003, p. 68.

⁷ The author's estimate (average duration of hospitalization is assumed to be 3 months).

⁸ The Croatian Pension Insurance Institute (HZMO), The Financial Report of the Croatian Pension Insurance Institute (HZMO) in 2003.

1.1.3. Displaced Persons and Refugees

Table 4 presents either direct or indirect evaluation of the support for displaced persons and refugees on the basis of German estimates of the support expenses.

Table 4⁹: Expenses for displaced persons and refugees

Month	Displaced persons	Refugees	No. of persons × no. of months	Estimate A (\$)	Estimate B (\$)
1991.12	550,000	0	550,000	535,839,040.09	478,427,714.37
1992.1	324,238	872	325,110	316,739,327.86	282,802,971.31
1992.2	330,787	1,276	332,063	323,513,307.58	288,851,167.48
1992.3	356,627	16,579	373,206	363,596,990.54	324,640,170.13
1992.4	247,278	193,415	440,693	429,346,389.27	383,344,990.42
1992.5	258,054	274,366	532,420	518,711,675.87	463,135,424.88
1992.6	269,351	299,197	568,548	553,909,481.03	494,562,036.64
1992.7	265,786	363,270	629,056	612,859,569.46	547,196,044.16
1992.8	262,690	362,306	624,996	608,904,103.10	543,664,377.76
1992.9	262,642	364,154	626,796	610,657,758.14	545,230,141.19
1992.10	263,779	367,366	631,145	614,894,783.56	549,013,199.61
1992.11	264,194	370,371	634,565	618,226,728.14	551,988,150.13
1992.12	260,705	402,768	663,473	646,390,428.09	577,134,310.79
1993.1	252,703	401,412	654,115	637,273,370.38	568,994,080.70
1993.2	253,246	399,566	652,812	636,003,918.98	567,860,641.95
1993.3	252,458	386,284	638,742	622,296,182.09	555,621,591.15
1993.4	250,325	269,005	519,330	505,958,706.71	451,748,845.28
1993.5	254,263	271,096	525,359	511,832,476.84	456,993,282.90
1993.6	254,791	272,869	527,660	514,074,232.54	458,994,850.48
1993.7	248,206	277,054	525,260	511,736,025.82	456,907,165.91
1993.8	246,985	279,049	526,034	512,490,097.48	457,580,444.18
1993.9	246,451	276,548	522,999	509,533,240.24	454,940,393.07
1993.10	246,801	278,383	525,184	511,661,982.60	456,841,055.90
1993.11	248,888	281,462	530,350	516,694,972.57	461,334,796.94
1993.12	249,972	281,318	531,290	517,610,770.20	462,152,473.40
1994.1	249,011	281,455	530,466	516,807,985.90	461,435,701.69
1994.2	248,352	284,155	532,507	518,796,435.86	463,211,103.45
1994.3	248,244	281,817	530,061	516,413,413.51	461,083,404.92
1994.4	247,185	272,383	519,568	506,190,578.88	451,955,874.00
1994.5	247,078	267,140	514,218	500,978,326.40	447,302,077.14
1994.6	247,419	266,728	514,147	500,909,154.45	447,240,316.47
1994.7	247,068	266,056	513,124	499,912,493.83	446,350,440.92
1994.8	196,870	183,038	379,908	370,126,432.81	330,470,029.29
1994.9	197,507	184,851	382,358	372,513,352.17	332,601,207.29
1994.10	196,075	184,299	380,374	370,580,434.61	330,875,388.05
1994.11	196,512	187,188	383,700	373,820,799.43	333,768,570.92
1994.12	195,189	187,670	382,859	373,001,452.82	333,037,011.45

⁹ The monthly data on the number of displaced persons and refugees from January 1992 to November 1995 are obtained from the Office for Displaced Persons and Refugees, The Government of Republic Croatia, Zagreb, 1998. The non-starred figures are from Narodne novine No. 92, p. 2120, July 7, 1998. The starred figures are estimated using the method of linear interpolation (between two known figures, the number of displaced persons and refugees increases by the same amount every month).

1995.1	195,255	187,784	383,039	373,176,818.32	333,193,587.79
1995.2	195,626	188,230	383,856	373,972,782.86	333,904,270.41
1995.3	195,802	188,230	384,032	374,144,251.35	334,057,367.28
1995.4	195,825	189,531	385,356	375,434,162.06	335,209,073.27
1995.5	197,592	188,672	386,264	376,318,783.60	335,998,913.93
1995.6	198,661	188,606	387,267	377,295,959.16	336,871,392.11
1995.7	200,782	188,217	388,999	378,983,365.01	338,378,004.48
1995.8	197,337	187,038	384,375	374,478,420.07	334,355,732.20
1995.9	197,510	208,646	406,156	395,698,620.31	353,302,339.56
1995.10	197,510	208,663	406,173	395,715,182.60	353,317,127.32
1995.11	198,672	214,746	413,418	402,773,644.14	359,619,325.13
1995.12	194,234*	210,432*	404,666	394,246,983.63	352,006,235.39
1996.1	189,797*	206,117*	395,914	385,720,323.13	344,393,145.65
1996.2	185,359*	201,803*	387,162	377,193,662.62	336,780,055.91
1996.3	180,922*	197,488*	378,410	368,667,002.11	329,166,966.17
1996.4	176,484*	193,174*	369,658	360,140,341.61	321,553,876.43
1996.5	172,047*	188,859*	360,906	351,613,681.10	313,940,786.69
1996.6	167,609	184,545	352,154	343,087,020.59	306,327,696.96
1996.7	162,066*	175,901*	337,967	329,265,296.12	293,986,871.53
1996.8	156,523*	167,257*	323,780	315,443,571.64	281,646,046.11
1996.9	150,980*	158,613*	309,593	301,621,847.16	269,305,220.68
1996.10	145,437*	149,969*	295,406	287,800,122.69	256,964,395.26
1996.11	139,893*	141,326*	281,219	273,978,398.21	244,623,569.83
1996.12	134,350*	132,682*	267,032	260,156,673.74	232,282,744.41
1997.1	128,807*	124,038*	252,845	246,334,949.26	219,941,918.98
1997.2	123,264*	115,394*	238,658	232,513,224.78	207,601,093.56
1997.3	117,721	106,750	224,471	218,691,500.31	195,260,268.13
1997.4	115,958*	101,415*	217,373	211,776,178.99	189,085,874.10
1997.5	114,194*	96,081*	210,275	204,860,857.67	182,911,480.06
1997.6	112,431*	90,746*	203,177	197,945,536.35	176,737,086.03
1997.7	110,667*	85,412*	196,079	191,030,215.03	170,562,692.00
1997.8	108,904*	80,077*	188,981	184,114,893.72	164,388,297.96
1997.9	107,140*	74,742*	181,883	177,199,572.40	158,213,903.93
1997.10	105,377*	69,408*	174,784	170,284,251.08	152,039,509.89
1997.11	103,613*	64,073*	167,686	163,368,929.76	145,865,115.86
1997.12	101,850*	58,738*	160,588	156,453,608.44	139,690,721.82
1998.1	100,086*	53,404*	153,490	149,538,287.13	133,516,327.79
1998.2	98,323*	48,069*	146,392	142,622,965.81	127,341,933.76
1998.3	96,559*	42,735*	139,294	135,707,644.49	121,167,539.72
1998.4	94,796	37,400	132,196	128,792,323.17	114,993,145.69
1998.5	93,033*	32,065*	125,098	121,877,001.85	108,818,751.65
1998.6	91,269*	26,731*	118,000	114,961,680.54	102,644,357.62
1998.7	89,506*	21,396*	110,902	108,046,359.22	96,469,963.59
1998.8	87,742*	16,062*	103,804	101,131,037.90	90,295,569.55
1998.9	85,979*	10,727*	96,706	94,215,716.58	84,121,175.52
1998.10	84,215*	5,392*	89,608	87,300,395.26	77,946,781.48
1998.11	82,452*	58*	82,509	80,385,073.94	71,772,387.45
1998.12	80,688*	0*	80,688	78,610,809.71	70,188,222.96
Total	-	-	31,742,784	30,925,496,347.09	27,612,050,309.90

Source: Narodne novine, July 7, 1998, no. 92, p. 2120, The Office for Displaced Persons and Refugees, The Government of Republic Croatia, Zagreb 1998, www.emz-berlin.de.

The figures in Table 4 are obtained either from official sources or derived from a regression model for the months for which the data are unavailable. According to the “Kralj Zvonimir

Fund” data, while supporting displaced persons and refugees, Croatia incurred over \$2 million in refugee-related expenses, including \$1,133 million for food and accommodation expenses. However, in order to put the analysis in the worldwide perspective, we make use of German monthly refugee-related expenses. Estimate A uses the monthly expense per person in 1995 of DM 1,400¹⁰. Estimate B uses the expense of DM 1,250 per month per refugee¹¹. We sum the number of displaced persons and the number refugees for each month, and calculate two series of estimates. As we do not have intention to inflate the figures, we proceed with the lower figure of **\$27,612,050,309.90**.

1.1.4. Emigration

The Homeland War, and consequent unfavorable business environment, caused significant emigration. Until May 1998, 283,000¹² people left Croatia. Each employed citizen generates a certain surplus for the whole society. If a citizen leaves, the country loses entire benefits of its educational investment. Abstracting from the health care and pension insurance contribution, we utilize the average September 2005 monthly salary of HRK 4,417. This is the monthly amount the country loses due to emigration, since otherwise the emigrant would earn and spend this amount during her working cycle. If we take 35 years to be the average age of an emigrant (emigrants are mostly younger people, including Serbs who emigrated in Bosnia and Herzegovina and Serbia), then the expected working cycle of an emigrant is 30 years (up to age 65). Therefore, the total loss per emigrant amounts to $30 \times 12 \times \text{HRK } 4,417 = \text{HRK } 1,590,120 = \$257,300$; multiplying the latter figure with the number of emigrants we obtain

$\$257,300 \times 283,000 = \mathbf{\$72,815,900,000}$. In this measurement, however, one should include the initial decrease in income, as well as its later slower growth, both of which were under severe influence of emigration. As we estimate dynamic losses in section 2 of the paper, we do not include these losses here. On the other hand, educational costs of 283,000 emigrants are not included in our dynamic analysis.

It follows that the total emigration-related losses equal to the losses from their educational investments. Assuming the educational pattern of an average emigrant resembles the pattern of the whole population¹³, and using the average educational cost per student, we obtain the following estimates:

Table 5: Educational costs of emigrants

Education	Category average (duration)	Relative frequency	No. of emigrants	Costs of primary and secondary education (HR), in \$	Costs of tertiary education (HR), in \$	Total (HR), in \$	Costs of primary and secondary education (EU), in \$	Costs of tertiary education (EU), in \$	Total (EU), in \$
Less than 7 years	4	15.76	44,601	970.88	0.00	970.88	79,675,315.13	0.00	79,675,315.13
Primary schooling	8	21.75	61,553	1,941.76	0.00	1,941.76	109,958,001.53	0.00	109,958,001.53
Secondary schooling	12	47.06	133,180	2,912.64	0.00	2,912.64	237,913,726.52	0.00	237,913,726.52
College education	12+3	4.08	11,546	2,802,542.21	13,078,491.82	15,881,034.02	20,626,604.42	206,272,279.30	226,898,883.72
University education	12+6	7.82	22,131	5,371,539.23	25,067,109.31	30,438,648.55	39,534,325.15	395,355,201.98	434,889,527.13
Total	-	100	283,000	8,179,906.72	38,145,601.13	46,325,507.85	487,707,972.74	601,627,481.28	1,089,335,454.02

¹⁰ Cf. Kl. Anfrage Nr 1054, Ismail Kosan, September 4, 1996.

¹¹ Cf. Ausländerbeauftragte des Senats von Berlin 2000.

¹² Narodne novine, No. 92, p. 2121, July 7, 1998.

In Table 5 we use the estimate of educational costs of an average European Union student – €15,000 for a university student, and €1,500 for an elementary school student (columns in the table using these data are denoted by EU). In Croatia, a university student costs HRK 7,000 per student, while an elementary and a high school student cost HRK 1,500¹⁴ (columns denoted by HR). As we measure the costs in dollars, we use the following exchange rates: HRK/€ = 7.36, and HRK/\$ = 6.18. We obtain the total of **\$46,325,507.85** in domestic prices, and **\$1,089,335,454.02** in the EU prices. These estimates reflect the remaining emigration losses (since the dynamic analysis in section 2 encompasses the labor factor losses).

1.1.5. PTSD, Other Mental Disorders and Mental Suffering

From 15% to 40% persons involved in the war suffer from PTSD. There is no reliable figure due to the large number of those who have never registered or required some professional help. However, the most reliable data are on PTSD-caused suicides. Since 1991, 1,370 war veterans took their own lives; the average of 91.3 war veterans per year. As we estimate the war damages in Croatia up to 2015, we assume that additional 913 war veterans will commit suicide. This is the best assumption we can make due to the low quality of data, and as the derivation of the trendline is not possible. Therefore, we make use of the linear estimation method. Again, method E is implemented, and the value of life is estimated at \$250,000. The results are presented in the following table:

Table 6: Number of PTSD-caused suicides, and forecasts

Period	No. of suicides	Expenses (in \$)
1991-2005	1,370	342,500,000
2006-2015	913	228,250,000
Total	2,283	570,750,000

In this section we should discuss the second perspective of damages caused by freedom restrictions (imprisoned civilians and soldiers). Therefore, one would need the data on the duration of imprisonment of Croatian soldiers and civilians who were later released (emphasizing *released* because a number of prisoners were killed in concentration camps and prisons, and therefore are included in Table 1). Also, we would need the average daily wage rate an imprisoned person was forced to forego. However, the expenses coming from the foregone economic activity are included in the measurement of indirect war damages in section 2. In addition, one should stress mental sufferings of imprisoned persons, however, these expenses are hard to quantify, and, for purposes of the more objective economic analysis, we leave those subjective categories out of the analysis.

The third part represents mental sufferings of the families who lost their loved ones or have a wounded family member (some estimates cite 200,000 families). For the same reason, however, mental sufferings are hard to quantify. Around 50,000 to 70,000 families lost a family member (either being killed or permanently disabled) who was prior to the war the primary income source for the family. Since those income losses were discussed in section

¹³ The data on the educational pattern in Croatia are derived from the 2001 Census published by the Central Bureau of Statistics.

¹⁴ According to Družić et al. (2003), pp. 393-414.

1.1.2., we will not pursue the analysis further. Again, we leave out subjective sufferings of those families for the purposes of obtaining objective damage estimates.

1.2. Movable and Immovable Property

Movable and immovable property, either state- or privately-owned, was considerably damaged in the war. The analysis is divided among damages in industry, agriculture and forestry, health care sector, monetary sector, on infrastructure and telecommunications, residential units, natural resources, property owned by Croatian residents abroad, and cultural and historical heritage.

1.2.1. Industry-Related Damages

The following damages relate to the damages on plants, buildings, inventory and motor vehicles.

Table 7: Industry-related damages

Industry	Damages (in \$)
Metallurgy	187,000,000
Nonmetallic mineral mining (stone quarrying)	80,000,000
Chemicals	41,000,000
Textile	27,000,000
Rubber	660,000,000
Oil & gas (INA)	161,400,000
Total	1,156,400,000

Source: The Ministry of industry, shipbuilding and energetics, Zagreb, Document Category: 422-03/92-01/03; File No.: 526-01-92-3, February 12, 1993.

1.2.2. Damages in Agriculture, Forestry, Food- and Wood-Processing Industry

This section presents damages to the lost or stolen livestock, destroyed crops, destroyed food- and wood-processing industry plants, and expenses incurred due to the deterioration of cultivable areas and woodland.

Table 8: Damages in agriculture, forestry, food- and wood-processing industry

Industry	Damages (in \$)
Agriculture and food-processing industry (1993 average) ¹⁵	780,000,000
Forestry and wood-processing industry	630,000,000
Total	1,410,000,000

¹⁵ M.Pavković, "War Damages in Croatia" (Hrvatske ratne štete), Defimi, Zagreb, 1997, p. 67 and p. 69.

1.2.3. Infrastructural and Telecommunication Damages

Table 9: Infrastructural and telecommunication damages

Transport type	Damages (in \$)
Railroad	353,000,000
Road	351,000,000
Maritime	38,000,000
Waterway	90,000,000
Air ¹⁶	94,000,000
Telecommunications and media ¹⁷	528,000,000
Energy grids ¹⁸	680,000,000
Oil pipelines ¹⁹	24,100,000
Water supply management ²⁰	196,980,000
Total	2,355,080,000

1.2.4. Residential Real-Estate Fund

In the Homeland War 171,461 residential units in the Real-Estate Fund have been either damaged or completely destroyed²¹. By the end of the war, 183,526 residential units have been either destroyed or significantly damaged. In 1991, the average size of the residential unit was 70.4 squared meters²². Therefore, we can easily estimate the total number of destroyed or significantly damaged squared meters as $183,526 \times 70.4\text{m}^2 = 12,920,230.4 \text{ m}^2$. If the average price of a squared meter of a residential unit is €1,000, the total damages amount to €12,920,230,400 or **\$15,116,669,500**. A previous analysis of the damages in the Real-Estate Fund cites the total amount of **\$3.8 billion**; however, this figure is considerably lower than real damages²³.

1.2.5. Natural Resources and Environmental Damages

In this section we analyze devastated natural resources and natural beauties. In the section on mine clearance expenses we included the costs of the landmine contaminated areas. The remaining pollution is not easy to determine. The wood exploitation, as a renewable source of energy, is included in the dynamic assessment of the losses (indirect damages, that is, the

¹⁶ The figures in the first 5 rows are from Josip Kovačević et al., “War Damages and Reparations” (Ratne štete i reparacije), Školska knjiga, Zagreb, 1993, p. 100.

¹⁷ Josip Božičević, “War Destruction in Transports and Communications in Croatia” (Ratna razaranja i štete u prometu i vezama Hrvatske), Croatian Academy of Arts and Sciences (HAZU), Zagreb 1992.

¹⁸ Božidar Javorović, “The Great Serbian Invasion and Croatian Defense” (Velikosrpska najezda i obrana Hrvatske), DEFIMI, Zagreb, 1995, p. 294.

¹⁹ The Ministry of industry, shipbuilding and energetics, Zagreb, Document Category: 422-03/92-01/03; File No.: 526-01-92-3, February 12, 1993.

²⁰ M.Pavković, “War Damages in Croatia“ (Hrvatske ratne štete), Defimi, Zagreb, 1997, p. 69

²¹ The Ministry of Construction and Environment Protection, “Survey of damaged residential units by municipalities” (Pregled oštećenih stanova po općinama), October 1992.

²² Družić et al., “Croatian Economic Development” (Hrvatski gospodarski razvoj), using the Central Bureau of Statistics data.

²³ Josip Kovačević et al., “War Damages and Reparations” (Ratne štete i reparacije), Školska knjiga, Zagreb, 1993, p. 100.

foregone economic activity). The only non-renewable source we mention here is the oil exploitation in the Đeletovci field, which INA estimated at \$215.6 for 1992 and 1993. If we assume that the exploitation in the next two years of occupation continued at the same pace, the total amounts to **\$531.2**.

1.2.6. “Legally” Stolen Property

This section includes the assets of Croatian companies that Serbian authorities transformed in separate legal entities prior to the war (this especially concerns INA, Končar, and electro-energetic plants).

Table 10: Confiscated and destroyed property abroad

Property type	Damages (in \$)
Electrical plants ²⁴	1,000,000,000
Oil plants (INA) ²⁵	143,800,000
Total	1,143,800,000

1.2.7. Belgrade's Occupation of the Monetary System

In January 1991 Serbia carried out a financial coup, occupied the monetary system of the former country and took away \$1.4 billion²⁶. At that time Croatia participated in the joint GDP of the former country at 25.5%²⁷, and, therefore, Croatia lost **\$357 million**.

1.2.8. Damages on the Cultural, Health Care, Educational, and Religious Property

Table 11: Damages on the cultural, health care, educational, and religious property

Area	Damages (million \$)
Education, religion and culture ²⁸	2,500
Health care	2,300
Total	4,800

1.3. Military Expenses

The data on military expenses vary from one source to another. One of them cites the figure of \$8,248,000,000²⁹ for the period 1991-1994. If we add military expenses for 1995 of \$1,894,000,000, the total military expenses amount to **\$10,142,000,000**. However, as the great part of imported weapons has not been officially registered due to embargo restrictions, we

²⁴ An estimate from M. Pavković, “Croatian War Damages” (Hrvatske ratne štete), Defimi, Zagreb, 1997., p. 64.

²⁵ The Ministry of Industry, Shipbuilding, and Energetics, Zagreb, Document Category: 422-03/92-01/03; File No.: 526-01-92-3, February 12, 1993.

²⁶ Ozren Žunec, “The War in Croatia 1991-1995, Volume I” (Rat u Hrvatskoj 1991.-1995. 1. dio), p. 3.

²⁷ Družić, I. and Sirotković, J., “Introduction to the Croatian Economy” (Uvod u hrvatsko gospodarstvo), p. 114.

²⁸ All figures from M. Pavković, “Croatian War Damages” (Hrvatske ratne štete), Defimi, Zagreb, 1997, p. 89 (1992 average estimate).

²⁹ According to Military Balance.

use the following estimation method. We multiply the total number of days spent in military with the annual cost per soldier in the EU (including equipment expenses). We estimate the total number of days spent in military at 100,000,000 (using the data of the Croatian War Veterans Investment Fund, where investment shares were allocated according to the number of days spent in military). The annual cost of a soldier in the EU is \$70,000³⁰, while in the U.S. and in the U.K. varies between \$100,000 and \$200,000. Using the EU cost per soldier, we obtain the following estimate: $100,000,000 \times (70,000 / 365) = \mathbf{\$19,178,082,191}$. Further analysis is not feasible due to data confidentiality and generally unfavorable conditions in Croatia at the time (1991-1995).

1.4. Landmine Clearance

We discuss the issue of landmine clearance in the separate section simply because it contains both material losses in terms of landmine clearance expenses and human losses in terms of dead and permanently disable persons.

1.4.1. Landmine Clearance Expenses

There are several different estimates of landmine clearance expenses. The Croatian Mine Action Center states the price of HRK 6.70 plus VAT per squared meter. However, we believe that this figure is understated; even landmine clearance companies state that the price of HRK 10 underestimates the true costs (RTL). Some international agencies estimate the cost at €1.53 per squared meter³¹, that is, \$1.79 in November 2005 exchange rate. In Bosnia and Herzegovina, the price per squared meter is KM 3³², that is, \$1.76 in November 2005 exchange rate. Other estimates include €1.70³³ and \$1.99 per squared meter. As the prices plunged at this level in the past two years (before they even reached the figure of €25 per squared meter), we believe the fair price is \$1.99 per squared meter.

The next is to determine the total landmine area. In the beginning of the clearance process, there were 5,980 squared kilometers of the suspected landmine area³⁴. According to the 2003 data, 26.09% of the suspected landmine area was contaminated. Therefore, we make use of this fraction in the estimate of the landmine-clear territory. As of today (December 2005), there are 1,174 squared kilometers of the suspected landmine area left to be examined. Therefore, 4,806 (5,980 – 1,174) squared kilometers are examined. If we use the same share of contaminated area, we obtain the estimate of 1,253 (4,806 × 26.09%) squared kilometers of landmine-clear territory. At least 30% of 1,117 square kilometers of the suspected landmine area is contaminated (according to the Croatian Mine Action Center). Hence, $1,174 \times 30\% = 352 \text{ km}^2$. The data for the rest of 822 (1,174 – 352) squared kilometers are completely unknown. Again, assuming that 26.09% of the area is contaminated, we obtain additional 214.5 (822 × 26.09%) squared kilometers. As a result, the total contaminated area is 1,819.5 (1253 + 214.5 + 352) squared kilometers. Using the price of \$1.99 per square meter, we obtain the total expense of **\$3,620,805,000**.

The same figure in domestic prices is $1,819,500,000 \text{ m}^2 \times (6.70+22\%) \div 6.30 = \mathbf{\$2,360,729,048}$. These are the total expenses up to 2009.

³⁰ Thompson, J.A.: Common Interest, Common Responsibilities, www.rand.org.

³¹ Landmine Monitor Report 2003, Croatia.

³² Implementation Completion Report, Bosnia and Herzegovina, Emergency Landmines Clearance Project (Credit 29050-BA).

³³ International Trust Fund for Demining and Mine Victims Assistance.

³⁴ Narodne novine, No. 92, p. 2138, July 7, 1998.

Further analysis can be performed if we break down the total expenses in the amount actually spend so far and the amount that is expected to be spend up to 2009. As of today, the landmine clearance expenses amount to **\$1,625,717,778** ($1,253,000,000\text{m}^2 \times (6.7 + 22\%) \div 6.30$) in domestic prices, and **\$2,493,470,000** in international prices.

1.4.2. Landmine Casualties

According to the Croatian Red Cross data³⁵, in the period of 1991-2003, 414 persons were killed by the landmines, 975 persons were permanently disabled and 275 suffered minor injuries. However, a part of these casualties were included in the measurement of section 1.1. The second available source (the Croatian Mine Action Center) states 263 landmine casualties from 1998, including 100 deaths. The latter figure is more reliable since it does not include war casualties.

Using these figures, we will estimate the number of permanently disabled persons up to 2009, when the process of mine clearance is expected to complete. According to the Croatian Mine Action Center data, there were 1,664 landmine casualties (the figure excludes casualties who were not registered), out of which 1,250 survived the accident. 78% suffered severe injuries, while the rest were permanently disabled ($975 \div 1,250$). If we assume the same fractions after the war, then out of 163 casualties who survived the accident ($263 - 100$), 127 are permanently disabled, and 36 suffered minor injuries.

However, one should not overlook the additional 4 years needed to remove all the landmines from the rest of the contaminated area. Since we do not have enough data for a more precise measurement, we use the linear estimation method. We need to estimate the average number of casualties per year. For the period 1998-2005 (8 years) we obtain the average of 16 ($127 \div 8$) permanently disabled persons, and 12.5 ($100 \div 8$) dead persons per year. Accordingly, in the next four years we expect 64 permanently disabled and 50 landmine-caused deaths. We disregard medical care expenses for the casualties with minor injuries, since they are negligible relative to the total expense.

Using the same estimation method for the value of human life, we obtain the following expenses:

Table 12: Expenses of landmines casualties (in \$)

Category	No. of persons	U.S. prices (in \$)		Domestic prices (in \$)	
		Expenses per person	Total	Expenses per person	Total
Permanently disabled (1998-2005)	127	960,000 ³⁶	121,920,000	718,680 ³⁷	91,272,360
Dead (1998-2005)	100	250,000 ³⁸	25,000,000	250,000	25,000,000
Permanently disabled (2006-2009)	64	960,000	61,440,000	718,680	45,995,520
Dead (2006-2009)	50	250,000	12,500,000	250,000	12,500,000
Total	227	-	220,860,000	-	174,767,880

³⁵ www.hcr.hr.

³⁶ See section 1.1.2. for further details.

³⁷ See section 1.1.2. for further details.

³⁸ See section 1.1.1. for further details.

Therefore, the total human losses caused by landmines are **\$220,860,000**.

Table 13: Total landmines expenses in Croatia

Expense type	Expenses in domestic prices (in \$)			Expenses in international prices (in \$)		
	Up to 2005	2005 -2015	Total	Up to 2005	2005 -2015	Total
Mine clearance	1,625,717,778	735,011,270	2,360,729,048	2,493,470,000	1,127,335,000	3,620,805,000
Human losses	116,272,360	58,495,520	174,767,880	146,920,000	73,940,000	220,860,000
Total	1,741,990,138	793,506,790	2,535,496,928	2,640,390,000	1,201,275,000	3,841,665,000

2. INDIRECT WAR DAMAGES

2.1. *The Methodology of Measurement*

The indirect war damages can be measured as a decrease in GDP below the level where it would be if the war did not happen. There are several scenarios we can use. Assuming that the war did not happen, ask yourself what would have been the income level? We could expect a fall in GDP due to market transition processes and the “lost decade” (in the 1980s the economy was gradually weakening). As a result, we should compare the Croatian economic development with the development of comparable countries.

- I. Scenario: The Croatian 1990 GDP is multiplied by the Slovenian growth rates. We measure the gap between the potential and the actual income, and discuss when we expect the actual GDP to return to its potential path.
- II. Scenario: The same as before, but instead of Slovenian growth rates, we use the weighted average of Hungarian, Slovenian, Czech, Polish and Slovakian growth rates.
- III. Scenario: The same as before, but Slovenian growth rates have a weight of 50%, while the rest of countries 12.5%. The rationale for the procedure is the fact that prior to the war and before the transition period, Slovenia was the country that highly resembled Croatia.

To save space, we proceed with the detailed presentation of the third scenario. In order to make it comparable, we state the final results for the first two scenarios.

Note:

The damages in tourism industry and the losses due to the business operation shrinkage are also included in this section. In addition, the costs of bankrupt companies and lost markets for Croatian businesses are also part of this estimation (some are the consequence of the war, and some are the consequence of the process of economic transition). As a result, we do not discuss these issues separately.

2.2. *Interpretation of Results*

Using the available data on GDP growth rates, and the procedure described in scenario III, we obtain annual weighted growth rates. We repeat the same procedure for the forecasted period, while making use of the available growth rate forecasts. For the years where forecasts were unavailable, we use the author’s estimates that highly resemble historical growth rates.

The growth rate series is used to estimate the potential GDP, that is, the GDP Croatia would accomplish if there was no war. The difference between the actual and the potential GDP provides an estimate of the foregone economic activity – \$85.7 billion up to 2004. If we extrapolate the losses up to 2015, and use the estimated growth rates, we obtain the loss of \$194.8 billion. For comparison purposes, scenario I estimates total damages at \$87.6 billion up to 2004, and \$187 billion up to 2015. Scenario II estimates total damages at \$84.5 billion up to 2004, and \$199.3 up to 2015. As one can easily spot, the divergences are insignificant – up to 2004 the relative divergence is 3.6%, and up to 2015 is 6.5%. The data and results for scenario III are presented in the following tables:

Table 14: Growth rates of selected countries

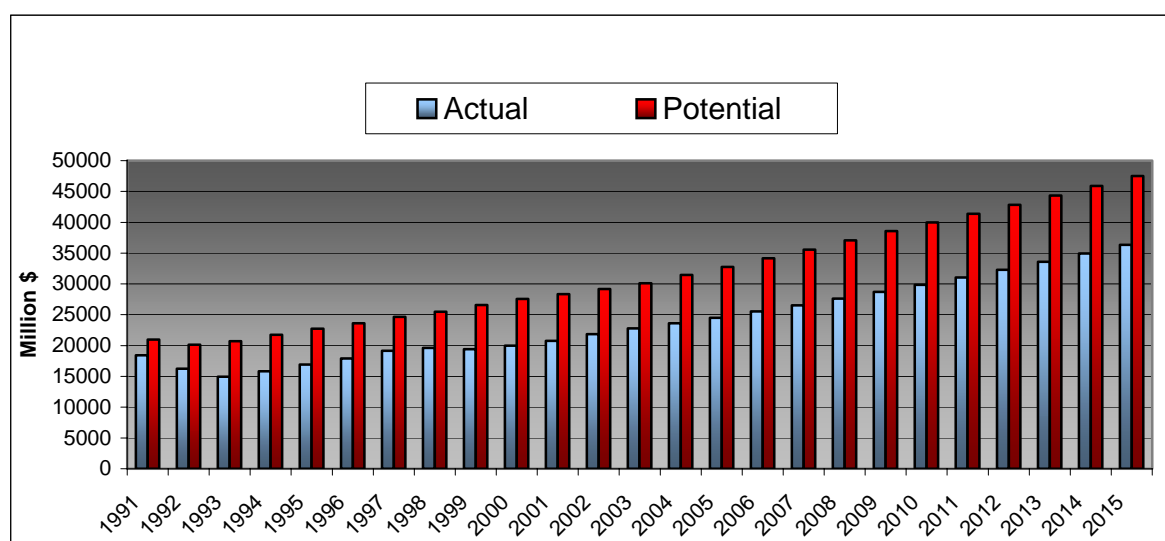
GDP growth rates (%)	Croatia	Slovenia	Czech Republic	Slovakia	Hungary	Poland	Weighted growth rate	
Historical data	1991	-21.1	-8.9	-11.6	-14.6	-11.9	-7	-10.1
	1992	-11.7	-5.5	-3.3	-6.1	-3.1	2.6	-4
	1993	-8	2.8	0.6	7.6	-0.6	3.8	2.8
	1994	5.9	5.3	3.6	6.2	2.9	5.2	4.9
	1995	6.8	4.1	5.9	5.8	1.5	7	4.6
	1996	5.9	3.6	4.2	6.1	1.3	6	4
	1997	6.8	4.8	-0.7	4.6	4.6	6.8	4.3
	1998	2.5	3.6	-1.1	4.2	4.9	4.8	3.4
	1999	-0.9	5.6	1.2	1.5	4.2	4.1	4.2
	2000	2.9	3.9	3.9	2	5.2	4	3.8
	2001	3.8	2.7	2.6	3.8	3.8	1	2.8
	2002	5.2	3.3	1.5	4.4	3.5	1.4	3
	2003	4.3	2.5	3.7	4.2	3	3.8	3.1
	2004	3.7	4.3	3.8	5.5	4	5.4	4.5
Forecasts	2005	3.7	3.9	4.3	5.8	3.7	4.3	4.2
	2006	4.2	3.7	4.4	6.5	4	4.2	4.2
	2007	4	3.5	4.7	7	3.7	4.1	4.2
	2008	4	3.5	4.1	7.1	3.7	4.3	4.2
	2009	4	3.5	3.9	6.5	3.5	4.3	4
	2010	4	3.5	3.5	5	3.5	4	3.8
	2011	4	3	3.5	5	3.5	4	3.5
	2012	4	3	3.5	5	3.5	4	3.5
	2013	4	3	3.5	5	3.5	4	3.5
	2014	4	3	3.5	5	3.5	4	3.5
	2015	4	3	3.5	5	3.5	4	3.5

We multiply the estimated growth rates with 1990 Croatian GDP. The measurement is provided in the following table.

Table 15: An estimate of foregone GDP up to 2015

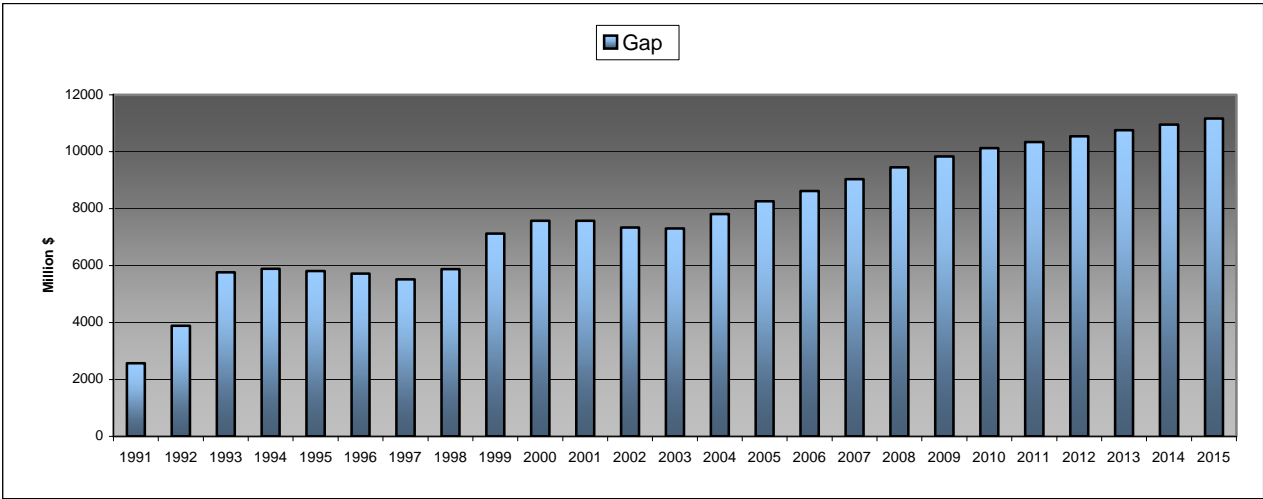
Million \$	Actual	Potential	Gap	Cumulative	
Historical data	1990	23,345			
	1991	18,419	20,990	2,571	2,571
	1992	16,264	20,153	3,889	6,460
	1993	14,963	20,722	5,759	12,219
	1994	15,846	21,735	5,889	18,109
	1995	16,923	22,730	5,806	23,915
	1996	17,922	23,639	5,717	29,632
	1997	19,141	24,658	5,518	35,149
	1998	19,619	25,497	5,878	41,027
	1999	19,442	26,561	7,119	48,146
	2000	20,006	27,580	7,574	55,720
	2001	20,767	28,339	7,572	63,292
	2002	21,846	29,189	7,343	70,635
	2003	22,786	30,090	7,304	77,939
	2004	23,629	31,440	7,812	85,751
Forecasts	2005	24,503	32,765	8,262	94,012
	2006	25,532	34,153	8,621	102,634
	2007	26,554	35,584	9,030	111,663
	2008	27,616	37,060	9,445	121,108
	2009	28,720	38,552	9,832	130,940
	2010	29,869	39,998	10,128	141,068
	2011	31,064	41,398	10,334	151,402
	2012	32,306	42,846	10,540	161,942
	2013	33,599	44,346	10,747	172,689
	2014	34,943	45,898	10,955	183,644
		2015	36,340	47,505	11,164

Figure 1: Actual and potential GDP



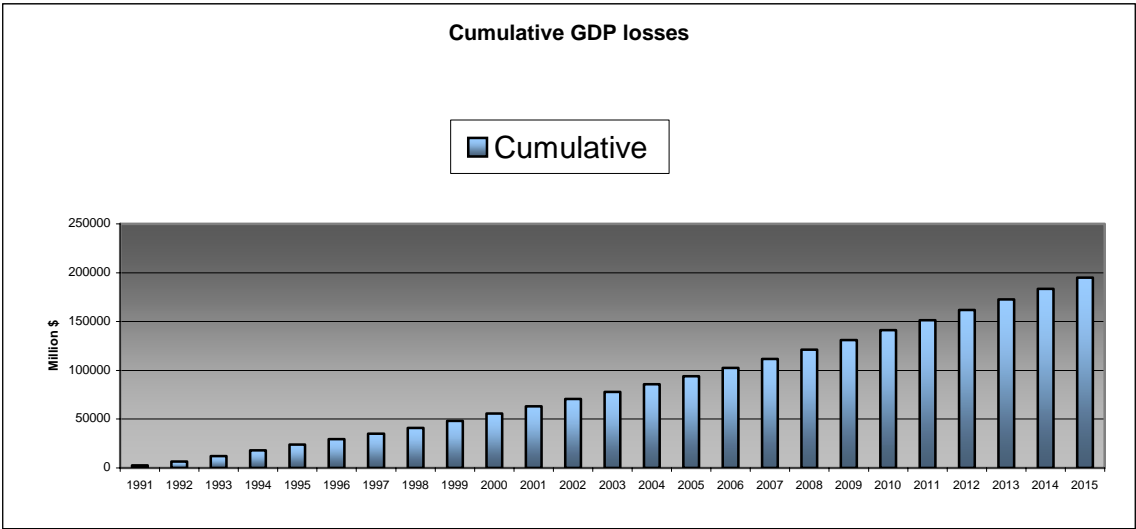
It is easy to spot the huge gap between the actual and potential GDP.

Figure 2: GDP losses over years



After the first few years, the gap gradually began to close. However, the banking system crisis coupled with the introduction of VAT, induced the gap to the new highs. The infrastructural projects the coalitional government started (road building) reversed the negative trend. In 2004 the gap again rallied in the absence of infrastructural projects and as a consequence of the increase in the country’s foreign debt.

Figure 3: Cumulative GDP losses



Of course, the positive difference between Croatian growth rates and growth rates of other comparable countries will cause the cumulative GDP losses to follow the geometrical path, the trend which should be stopped as soon as possible.

2.3. Indirect Damages in the Tourism Industry

Since tourism is the most important Croatian export industry, as well as the industry severely affected by the war, we will separately analyze its losses. While interpreting the results of the analysis, one should bear in mind that the estimated damages encompass the total tourism-related expenses, including secondary effects on the associated services and businesses.

Table 16: An estimate of war damages in the tourism industry

Year	No. of overnights, in thousands	Damages, in thousands \$	Cumulative, in thousands \$	
Historical data	1989	67,298		
	1991	10,424	5,744,304	
	1992	10,724	5,713,974	
	1993	12,909	5,518,518	
	1994	19,976	4,267,327	
	1995	12,886	5,696,570	
	1996	21,456	4,303,008	
	1997	30,314	3,078,224	
	1998	31,288	3,146,043	
	1999	26,563	3,823,645	
	2000	21,377	5,924,760	
	2001	43,404	1,835,898	
	2002	44,692	1,927,838	
	2003	46,635	2,796,013	
	2004	47,797	2,744,398	56,520,519
Forecasts	2005	51,143	2,277,841	
	2006	53,189	1,989,394	
	2007	55,316	1,689,409	
	2008	57,529	1,377,425	
	2009	59,830	1,052,961	
	2010	62,223	715,519	
	2011	64,712	364,579	
	2012	67,301	-399	
	2013	69,993	-379,975	
	2014	72,793	-774,735	
	2015	75,704	-1,185,285	63,647,255

Source: Croatian National Bank, Central Bureau of Statistics.

To obtain the total damages, we first calculate the foregone number of overnights in the period 1990-2004. To do so, we compare the actual number of overnights with the most successful pre-war year (1989). Second, we use the balance of payments data in order to estimate the total revenues per overnight. This procedure for 2004 yields the loss of more than \$56 billion in the tourism industry and associated services. In the following period (2005-2015), we assume the 4% average growth rate of overnights (only in 2005 we use 7% on the basis of actual, but preliminary data). Also, the average revenue per overnight is assumed to be at 2004 level. In this way we obtain the cumulative damages from 1991 to 2015 of more than \$63 billion.

CONCLUSION

As we stated in Introduction, the total damages are divided among two time periods – up to 2004, and from 2005 to 2015. We estimated the damages both in domestic and international (European, U.S. or U.K.) prices. We summarize the results in the following two tables:

Table 17: Total damages in domestic prices (in \$)

Damage category	Period		Total
	1991-2004	2005-2015	
1.1.1. Dead and missing persons	3,595,500,000	0	3,595,500,000
1.1.2. Wounded and permanently disabled	23,217,108,994	0	23,217,108,994
1.1.3. Displaced persons and refugees	2,000,000,000	0	2,000,000,000
1.1.4. Emigrants	46,325,508	0	46,325,508
1.1.5. PTSD	342,500,000	228,250,000	570,750,000
1.1. Total human losses	29,201,434,500	228,250,000	29,429,684,500
1.2.1. Industry	1,156,400,000	0	1,156,400,000
1.2.2. Agriculture, forestry and related industries	1,410,000,000	0	1,410,000,000
1.2.3. Infrastructure and telecommunications	2,355,080,000	0	2,355,080,000
1.2.4. Residential real-estate funds	3,800,000,000	0	3,800,000,000
1.2.5. Non-renewable natural resources	531,200,000	0	531,200,000
1.2.6. Property of Croatian companies abroad	1,143,800,000	0	1,143,800,000
1.2.7. Occupation of the monetary system	357,000,000	0	357,000,000
1.2.8. Historical and cultural heritage, health care system property	4,800,000,000	0	4,800,000,000
1.2. Total property losses	15,553,480,000	0	15,553,480,000
1.3. Total war expenses	10,142,000,000	0	10,142,000,000
1.4.1. Landmine clearance	1,625,717,778	735,011,270	2,360,729,048
1.4.2. Landmine casualties	116,272,360	58,495,520	174,767,880
1.4. Total losses from landmines	1,741,990,138	793,506,790	2,535,496,928
1. DIRECT WAR DAMAGES	56,638,904,638	1,021,756,790	57,660,661,428
2. INDIRECT WAR DAMAGES	85,751,000,000	109,058,000,000	194,809,000,000
TOTAL DAMAGES	142,389,904,630	110,079,756,790	252,469,661,420

Table 18: Total damages in international prices (in \$)

Damage category	Period		Total
	1991.-2004.	2005.-2015.	
1.1.1. Dead and missing persons	3,595,500,000	0	3,595,500,000
1.1.2. Wounded and permanently disabled	31,171,429,100	0	31,171,429,100
1.1.3. Displaced persons and refugees	27,612,050,310	0	27,612,050,310
1.1.4. Emigrants	1,089,335,454	0	1,089,335,454
1.1.5. PTSD	342,500,000	228,250,000	570,750,000
1.1. Total human losses	63,810,814,860	228,250,000	64,039,064,860
1.2.1. Industry	1,156,400,000	0	1,156,400,000
1.2.2. Agriculture, forestry and related industries	1,410,000,000	0	1,410,000,000
1.2.3. Infrastructure and telecommunications	2,355,080,000	0	2,355,080,000
1.2.4. Residential real-estate funds	15,116,669,500	0	15,116,669,500
1.2.5. Non-renewable natural resources	531,200,000	0	531,200,000
1.2.6. Property of Croatian companies abroad	1,143,800,000	0	1,143,800,000
1.2.7. Occupation of the monetary system	357,000,000	0	357,000,000
1.2.8. Historical and cultural heritage, health care system property	4,800,000,000	0	4,800,000,000
1.2. Total property losses	26,870,149,500	0	26,870,149,500
1.3. Total war expenses	19,178,082,191 approximate figure	0	19,178,082,191
1.4.1. Landmine clearance	2,493,470,000	1,127,335,000	3,620,805,000
1.4.2. Landmine casualties	146,920,000	73,940,000	220,860,000
1.4. Total losses from landmines	2,640,390,000	1,201,275,000	3,841,665,000
1. DIRECT WAR DAMAGES	112,499,436,550	1,429,525,000	113,928,961,550
2. INDIRECT WAR DAMAGES	85,751,000,000	109,058,000,000	194,809,000,000
TOTAL DAMAGES	198,250,436,550	110,487,525,000	308,737,961,550

At the end, the figure of the total war damages in Croatia looks really astonishing. The fact that the figure represents between 7.5 and 9 annual gross domestic products (2004 GDP) probably tells us more than the figure itself. It is also interesting to note that although the direct damages are of great proportions, Croatia will suffer a loss related to the foregone economic activity for a long period of time.

It is also worth to emphasize that these kinds of estimates are hard to perform. The author was constrained by using only the aggregated data, and had to formulate certain assumptions that made the estimation possible. The author's intention was to use only reliable data sources and objective assumptions that would not bias the result in any direction. Therefore, we hope that potential errors are minimized.

Finally, although Croatia has suffered enormous losses and, unfortunately, additional losses will incur in the future, a quick solution to the problem is not feasible.

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