

Background Paper

Estimating the Financial Cost of Conflict on Estonian Territory: a Methodology

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March 2013

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ISSN 2228-2076

Summary

S1. This background paper, which has been prepared in response to a request from the Estonian Ministry of Defence, investigates the feasibility of assessing the cost of a conflict on Estonian territory, and proposes a methodology for calculating the direct military cost of such a conflict.

S2. The paper first draws on the literature to review possible cost estimation methodologies. It discusses the broad challenges of estimating the cost of conflict and considers the application of accounting, modelling and contingent valuation methodologies. It then provides examples of the costs of recent interstate conflict calculated using accounting and modelling approaches. Finally, an outline scheme for calculating just the direct military costs of a possible conflict in Estonia is proposed. While these costs may represent only a fraction of the full economic cost of a conflict, they are likely to be of most immediate concern to government should a conflict arise. Further, it is not considered feasible to calculate a credible value for the full economic cost of a conflict.

S3. We recommend that: ICDS should develop further the estimating methodology outlined in this paper and apply it to calculate the cost of a possible conflict, using an appropriate scenario. For this, we will need the support of the Ministry of Defence and, especially, the Headquarters of the Estonian Defence Forces in identifying and quantifying cost components.

Introduction

“To wage war, you need first of all money; second, you need money, and third, you also need money.” – Italian General Raimondo Montecuccoli (1609-1680)

1. This background paper investigates the feasibility of assessing the cost of a conflict on Estonian territory and proposes a methodology for calculating the direct military cost of such a conflict. It has been prepared in response to a request from the Estonian Ministry of Defence, and follows our earlier work in estimating casualty numbers in the event of a conflict in Estonia.¹

2. There are two principal reasons for attempting to establish the economic or financial cost of a possible conflict. Firstly, the cost of conflict may then be compared against the cost of alternatives, such as confidence building measures or mediation (assuming that these options are available and that credible costs can be assessed for them too). This calculation can then be used in evaluating alternative courses of action; in particular to consider how much might be invested in apparently expensive conflict avoidance measures in the expectation that these will prevent an even more expensive armed conflict. Secondly, if conflict is thought to be unavoidable, states need to quickly find the necessary funds to support it: as Boldt and Kassis write, “What is characteristic of war is the need to generate funds in a short period of time to support a significant increase in government spending.”² The need for funds can be met by drawing on a reserve, by increasing taxation or by borrowing, or by printing money. The latter option is not, of course, available to Eurozone countries. Borrowing, depending on international views about a particular conflict, may also not be possible, while reserves and extra taxes may be insufficient; there are circumstances in which conflict is simply not affordable. Prior planning can at least raise awareness of the sums involved, and may make the process of raising additional funds more manageable.

3. The paper first reviews possible methodologies for assessing the cost of conflict, and looks at some examples. It then proposes a model for use in assessing the direct military cost of conflict on Estonian territory.

Methodological Discussion

4. Attempting to estimate the cost of conflict is a relatively new field of research.³ Most of the literature treats war purely as an activity that incurs cost, although some authors are prepared to acknowledge that war may have economic benefits too, for example in mobilising an economy or in stimulating higher levels of growth through the catharsis that war brings.⁴ Most studies focus on internal conflict in the developing world, the dominant form of conflict since the end of the Cold War.⁵ Many authors in this field also promote the view that preventative measures, intervention or development policies are economically (as well as, of course, in human terms) preferable to conflict itself.⁶

5. Interstate wars are less well covered in the literature. In most cases, costing exercises are undertaken retrospectively to calculate the costs of real wars, rather

¹ Tony Lawrence, “Estimating Casualties in Conflicts on Estonian Territory,” ICDS Report (unpublished), April 2011.

² David J Boldt and Mary Matthewes Kassis, “War Finance: Economic and Historic Lessons,” *The Social Studies* 95, no. 5 (September/October 2004): 188.

³ Tilman Brück, Olaf de Groot and Carlos Bozzoli, “How Many Bucks in a Bang: On the Estimation of the Economic Costs of Conflict” in *The Oxford Handbook of the Economics of Peace and Conflict*, ed Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 252.

⁴ For example: Christopher Cramer, *Civil War Is Not a Stupid Thing. Accounting for Violence in Developing Countries* (London: C Hurst and Co, 2006).

⁵ For a review of some of the key studies in this area, see Christopher Blattman and Edward Miguel, “Civil War,” *Journal of Economic Literature* 48, no.1 (2010): 37–45.

⁶ For example: Paul Collier et al, *Breaking the Conflict Trap* (Washington DC: The World Bank and the Oxford University Press, 2004), 13-32; Paul J Dunne, “Copenhagen Consensus: An Economic analysis of the challenge of Armed Conflicts,” Challenge Paper, Copenhagen Consensus, 2012, 33-35.

than to estimate the costs of future wars. Other studies look at limited economic issues, such as reductions in trade or tourism receipts, rather than attempting to assess the full costs of war. While researchers largely agree that there is value in attempting to attribute costs to conflict, there is also broad consensus that this is a challenging task. Brück and others note the two key difficulties:

... even when addressing the costs of one specific conflict, different studies yield highly divergent results. This is due to the difficulty of quantifying many of the costs involved, as well as the difficulty of choosing which costs to include and which not to.⁷

6. As concerns which costs to include and which not, one key choice to be made is whether to account only for contemporaneous costs (those incurred during the conflict period) or accumulated costs (the contemporaneous costs plus the discounted values of future costs).⁸ A second (related) key choice is whether to calculate both direct and indirect costs. Direct costs, those most obviously attributable to the conflict, might include the costs of destroyed public and private infrastructure and personal property; the costs incurred by the armed forces during the conflict and the cost of replacing lost equipment; the costs associated with casualties, including deaths and the treatment of physical and mental injuries; the future costs of disability; and the future costs of physical and mental health care. Indirect costs, meanwhile, might include: costs associated with population displacement; the cost of reduced production, trade and investment due to violence or insecurity; costs due to reductions in educational opportunities and the 'brain drain' effect; reduced tourism from abroad; and other macroeconomic effects, such as inflation, further unemployment, and reduced economic growth.⁹ Even within these categories, there are decisions to be made about what to include or not, such as whether costs are due to the conflict or would be incurred anyway, and for how long after the conflict should post-conflict costs be calculated.¹⁰

7. In terms of methodologies for calculating the costs of conflict, the Geneva Declaration Secretariat identifies three broad approaches: the accounting approach, in which the costs of the various factors are added up; the modelling approach, in which a counter-factual scenario is generated and the difference between actual and expected economic growth is examined; and the contingent valuation approach, which seeks to capture the value that the market, or individuals would be prepared to pay to avoid conflict.¹¹ Other authors have presented different ways of classifying methodologies, in particular breaking down the modelling category into several sub-types.¹²

8. The accounting methodology is numerically easy to undertake and the calculations can be readily repeated for many scenarios; on the other hand the list of items to be accounted for might not be exhaustive and some costs could be left out or double counted.¹³ Further, data may not be readily available to populate the model and the more carefully a researcher looks for cost attributable to conflict, the more cost he or she is likely to find – high final cost figures may thus reflect greater research

⁷ Tilman Brück, Olaf de Groot and Carlos Bozzoli, "How Many Bucks in a Bang: On the Estimation of the Economic Costs of Conflict" in *The Oxford Handbook of the Economics of Peace and Conflict*, ed Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 253.

⁸ Javier Gardeazabal, "Methods for Measuring Aggregate Costs of Conflict," in *The Oxford Handbook of the Economics of Peace and Conflict*, ed. Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 227.

⁹ Stergios Skaperdas, "The Costs of Organized Violence: A Review of the Evidence." In *The Costs of Violence*, ed. the Social Development Department, The World Bank (Washington DC: The World Bank, 2009), 4-5.

¹⁰ Elisabeth Sköns, "The costs of armed conflict," in *Peace and Security: Expert Papers Series Five*, 169-190 (Stockholm: International Task Force on Global Public Goods, 2005), 172-3.

¹¹ Geneva Declaration Secretariat, *The Global Burden of Armed Violence* (Geneva Declaration Secretariat: Geneva, 2008), 91-92.

¹² See, for example, Javier Gardeazabal, "Methods for Measuring Aggregate Costs of Conflict," in *The Oxford Handbook of the Economics of Peace and Conflict*, ed. Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 229.

¹³ Javier Gardeazabal, "Methods for Measuring Aggregate Costs of Conflict," in *The Oxford Handbook of the Economics of Peace and Conflict*, ed. Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 229.

effort rather than real differences in cost.¹⁴ Nonetheless, this is a widely used methodology. The ‘three trillion dollars’ from the title of the 2008 Stiglitz and Bilmes book *The Three Trillion Dollar War*, for example, refers to the forecast direct costs to the US of the Iraq War, from 2003-2017, calculated by an accounting methodology.¹⁵

9. The modelling approach and the use of counterfactuals may be the only way to calculate many of the indirect costs associated with war; again, this technique is widely used.¹⁶ The added value of a modelling approach can be illustrated by considering the knock-on economic effects of direct military expenditure, which will not usually be captured by an accounting approach. Brück and others identify six ways in which military expenditure can impact (not always negatively) GDP growth, which an accounting approach would exclude:¹⁷

- a. crowding out (-) - expenditure on the military leads to a compensatory reduction of useful investment elsewhere;
- b. R&D (+) - an economy benefits from the civilian spin-offs from military research and development;
- c. demand (+/-) – military expenditure is part of a stimulus package using public demand to stimulate the economy; however, increasing public demand when an economy is already growing can lead to overheating;
- d. competition for resources (-) - the military’s demand for limited resources drives up the prices of these resources for the private sector;
- e. exports (+) – of military systems; and
- f. debt/tax increase (-) military needs to be paid for, either through increased taxes or larger debt servicing.

10. The authors also note that the positive benefits of conflict - those that might stimulate GDP growth - are more likely to be secured if the conflict is long-lasting, while the negative effects will be evident in conflicts of shorter duration. Although more comprehensive than the accounting approach, the modelling approach is harder to realise and is thus more controversial methodologically. As Javier Gardeazabal notes:

Estimating the economic cost of conflict is a difficult task. It amounts to calculating what a given economic magnitude, say gross domestic product (GDP), would have been in the absence of conflict – a counterfactual calculation that is difficult to carry out.¹⁸

11. The contingent valuation approach appears to be much less widely used. However, in one of the apparently few studies that have attempted to calculate the cost of external war, Hess compares a country’s levels of consumption (i.e. the value of goods and services bought by people) in the real world against levels in a counterfactual world without conflict. From this, he calculates that “a lower bound estimate of the average benefit from eliminating war is about 8 percent of per capita

¹⁴ Paul J Dunne, “Copenhagen Consensus: An Economic analysis of the challenge of Armed Conflicts,” Challenge Paper, Copenhagen Consensus, 2012, 5-6.

¹⁵ Stiglitz and Bilmes calculate the full economic cost of the Iraq War to be as high as \$5 trillion: Joseph E Stiglitz and Linda J Bilmes *The Three Trillion Dollar War. The True Cost of the Iraq Conflict* (London: Allen Lane, 2008), 31.

¹⁶ For example, Lindgren reviews 14 studies (9 modelling and 5 accounting) to conclude that the average annual cost of internal armed conflict is around 3,7% of GDP: Göran Lindgren, “The Economic Costs of Civil Wars,” report no 72, Department of Peace and Conflict Research, Uppsala University, 2006, 63.

¹⁷ Tilman Brück, Olaf de Groot and Carlos Bozzoli, “How Many Bucks in a Bang: On the Estimation of the Economic Costs of Conflict” in *The Oxford Handbook of the Economics of Peace and Conflict*, ed Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 260.

¹⁸ Javier Gardeazabal, “Methods for Measuring Aggregate Costs of Conflict,” in *The Oxford Handbook of the Economics of Peace and Conflict*, ed. Michelle R Garfinkel and Stergios Skaperdas (New York: Oxford University Press, 2012), 227.

annual consumption.”¹⁹ This figure varies widely, however, among the countries studied, from as little as around 1,5% (Canada and Italy) to as much as 65% (Iraq). While of academic and broader policy interest, these figures have little to offer the practical defence planner and are thus of limited interest here.²⁰

How Much Does War Cost? Some Examples of Interstate Wars

12. The following section presents, for illustrative purposes, some examples from the literature of the costs of interstate conflict. It should be noted at the outset that costs are quoted in a variety of different forms and may thus not be comparable, and also that it is often not clear which costs are included in a particular calculation and which not.²¹

Costs to the US of Foreign Wars

13. The largest part of the cost of conflict literature dealing with external conflict is related to the costs incurred by the US in the interventions it led in Iraq and Afghanistan. Amy Belasco at the Congressional Research Service (CRS) puts the FY01-FY011 cost of the wars in Iraq, Afghanistan and other Global War on Terror operations at \$1 283 billion.²² This figure, based on DoD, State Department/USAID and Department of Veterans Administration budget submissions, includes war operations, diplomatic operations and medical care for war veterans. DoD accounts for 94% of the costs, including: personnel allowances, reserve activation costs, and Army and Marine Corps expansion; operation and maintenance costs to deploy and operate forces, provide for their logistic support and repair equipment; procurement costs to cover losses and upgrades, and Army and Marine Corps expansion; Research, Development, Test & Evaluation costs to advance war efforts; working capital costs to expand inventories of spare parts and fuel; and military construction, mostly of bases.²³ A breakdown by operation and by year is provided in Table 1.²⁴ Methodologically, the CRS figures measure the direct cost of the war by an accounting methodology (largely relying on DoD accounting as a basis).

Operation	FY01/2	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12 Request	Total FY01-FY11	Total FY01-FY12 Request
Iraq	0,0	53,0	75,9	85,5	101,6	131,2	142,1	95,5	71,3	49,3	17,7	805,4	823,1
Afghanistan	20,8	14,7	14,5	20,0	19,0	39,2	43,5	59,5	93,8	118,6	113,7	443,6	557,3
Enhanced Security	13,0	8,0	3,7	2,1	0,8	0,5	0,1	0,1	0,1	0,1	0,1	28,5	28,6
Unallocated	0,0	5,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	5,5	5,5
Totals	33,8	81,2	94,1	107,6	121,4	170,9	185,7	155,1	165,2	168,0	131,5	1 283,0	1 414,5

Table 1. Estimated War Funding by Operational Budget 2001-2012, \$ billions. Source: Belasco, Amy, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operations Since 9/11* (Washington DC: The Congressional Research Service, 2011), 3.

¹⁹ Gregory D Hess, “The Economic Welfare Cost of Conflict: An Empirical Assessment,” CESifo Working Paper no. 852, presented at CESifo Area Conference on Public Sector Economics, May 2002.

²⁰ Estonia is not included in Hess’s dataset. For illustrative purposes: Eurostat reports that Estonia’s consumption between 2004 and 2011 has varied between 70.6% of GDP and 76.5% of GDP; taking 8% of these figures (although 8% is a high value when compared to the European states included in Hess’s dataset) would suggest that Estonians would be willing to permanently pay around 5,6 to 6,1 % of GDP to live in a purely peaceful world.

²¹ For comparison, costs provided in currencies other than \$US have been converted to \$US according to historical rates given by Oanda as follows: Pakistani Rs-\$US, average 2008-9: 0,0133; Pakistani Rs-\$US, average 2002-3: 0,0164; Indian Rs-\$US, average 2002-3: 0,021; Israeli New Shekel-\$US, average Dec 2008: 0,258;

²² People are generally poor at conceptualising such large numbers, but better at visualising large distances. A stack of 1 283 billion dollar bills would be approximately 140 000 km tall, around 3,5 times the circumference of the earth at the equator, and almost 4 times the height of a geostationary earth orbit.

²³ Amy Belasco, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operation Since 9/11* (Washington DC: The Congressional Research Service, 2011), 1-2.

²⁴ For the purposes of comparison, in 2011, Estonia spent 5,1% of its defence budget – around €14m – on operations, the large part of this expenditure on the ISAF operation in Afghanistan. Piret Paljak, “Participation in International Military Operations,” in *Twenty Years of Baltic Defence Development*, ed. Tony Lawrence and Tomas Jermalavičius (Tallinn: ICDS)(forthcoming).

14. Belasco further estimates that the operation and maintenance costs of the wars in Iraq and Afghanistan averaged \$525 000 per soldier per year in Afghanistan, and \$462 000 per soldier per year in Iraq.²⁵

15. Other authors have also provided estimates of the cost to the US of the Iraq and Afghanistan wars. For example, Stiglitz and Bilmes, projecting forwards from 2008, estimated the incurred and likely future budgetary costs of the wars in Iraq and Afghanistan in a “realistic-moderate scenario” at \$3,5 trillion, and the full economic cost of the Iraq war alone at \$5 trillion.²⁶ The Eisenhower Study Group argued that the CRS estimates were too low and attempted a calculation of the economic cost of the war in Iraq, Afghanistan and Pakistan. Their total for “the budgeted costs of the war (Congressional war appropriations) and our incurred obligations for Veterans medical and disability,” was \$3 668 billion, almost three times Belasco’s figure.²⁷ And writing in 2005, Bennis, Leaver and the IPS Iraq Task Force estimated direct monthly costs of the war in Iraq alone, based on Congressional approvals, to be \$5,6 billion (around 80% of Belasco’s figures), which they compared with the \$5,1 billion the US spent monthly on the Vietnam war.²⁸ The wide range of these figures illustrate very well the difficulty of estimating the costs of conflict, and the dilemmas of deciding what to include in calculations.

16. Stephen Daggett, also of the CRS, calculates costs for other major US wars. For Vietnam, for example, he calculates a cost of \$738 billion from 1965-1975, while the 1990-1991 Persian Gulf War is placed at \$102 billion.²⁹ These costs, expressed in constant \$FY2011, cover military operations only. Daggett notes the difficulty in making comparisons across historical time periods due to changing definitions of war costs and accounting for inflation.

Russia-Georgia 2008

17. Small economies tend to be more affected by war than do large ones – Daggett, for example puts the cost of the Iraq War in its peak year at only 1% of US GDP.³⁰ A more relevant scenario for this study might thus be the Russia-Georgia War of 2008. Although this conflict lasted only a few days, Philips provides an estimate of about \$1,2 billion in damages to the civilian economy (more than 9% of GDP), as follows:³¹

- a. damage to roads, \$150 million;
- b. destruction of civilian infrastructure and private property, \$350 million;
- c. crops and farmland, \$100 million;
- d. environmental damage oil spills and forest fires, \$200 million;
- e. increased shipping costs, \$100 million; and
- f. loss of fiscal revenue (August-December 2008), \$300 million.

²⁵ Amy Belasco, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operation Since 9/11* (Washington DC: The Congressional Research Service, 2011), 23. The 2011 figure for Estonia would be approximately one tenth of this figure (based on data from Paljak, *Participation in International Military Operations*).

²⁶ Stiglitz and Bilmes, *The Three Trillion Dollar War*, 59, 31.

²⁷ Eisenhower Study Group, *The Costs of War Since 2001: Iraq, Afghanistan, and Pakistan. Executive Summary* (Providence, RI: Watson Institute for International Studies, Brown University, 2011), 7-8.

²⁸ Phylis Bennis, Erik Leaver and the IPS Iraq Task Force, *The Iraq Quagmire. The Mounting Costs of War and the Case for Bringing Home the Troops* (Washington DC: Institute for Policy Studies and Foreign Policy In Focus, 2005), 13.

²⁹ Stephen Daggett, *Costs of Major US Wars* (Washington DC: The Congressional Research Service, 2010), 2.

³⁰ Ibid.

³¹ David L Philips, *Post-Conflict Georgia* (Washington DC: The Atlantic Council of the United States, 2008), 9.

18. The author also notes that economic growth for 2008 was likely to fall to between 5-6 %, as compared to the IMF forecast before the conflict of 9%, and that the Georgian government's forecast \$2 billion in Foreign Direct Investment for 2008 was likely to fall to between \$1,1 and \$1,3 billion.³² It is also relevant that after the war, Georgia received a \$1,07 billion aid package from the US and up to €500 million from the European Commission.³³ Other authors, quoting the Georgian Ministry of Defence, report the cost of damage inflicted on the Georgian military to be \$143 million.³⁴ If these figures are accurate, the military cost would represent around 9% of the total (civilian and military) cost.

Other Conflicts

19. A discussion draft from Pakistan's Centre for Public Policy Research makes an interesting attempt to quantify the costs of conflict in the North West Frontier Province and Federally Administered Tribal Areas to Pakistan's economy. These costs arise both because Pakistan is fighting an insurgency in these areas, and because of overspill effects from the conflict in neighbouring Afghanistan. Quoting the Pakistani Finance Ministry, the report forecasts the direct costs of the conflict in 2008/9 to amount to Rs 114 billion (\$1,5 billion) and the indirect costs, Rs 564 billion (\$7,5 billion) although the proportion of the costs attributable to the insurgency on the one hand and the overspill effects from Afghanistan on the other is not specified.³⁵ Nonetheless, being a neighbour to a country at war can clearly also be a costly business; the report also quotes a "Pak-US business council" estimate of the total net loss to Pakistan due to the war, between 2001 and 2008, at \$35 billion.³⁶

20. Writing ahead of the 2011 South Sudan independence referendum, a group of several agencies attempted to estimate the cost, should Sudan return to war. Their report analyses several scenarios according to figures from the literature concerning civil wars to conclude that for medium or high conflict scenarios the cost could range between \$52 billion (US\$ 2010) and \$81 billion over a ten year period, or between 80% and 120% of 2010 GDP, when compared against a low conflict (business as usual) baseline scenario.³⁷ The report, which also estimates costs to the region and to the international community, once again highlights the impact that assumptions can have on the overall calculations; using different combinations of scenarios, the total calculated cost to Sudan may be as 'low' as \$35 billion or as high as \$116 billion.³⁸ On a related theme, while not an external conflict, Ali estimates the cost to Sudan of the war in Darfur (from 2003 to 2009) at \$24 billion, equivalent to 162% of GDP, or around 23% GDP per year. This includes around \$10 billion (\$1,7 billion per year) in direct military costs, \$7,2 billion in lost productivity due to internal displacement, \$2,6 billion due to lifetime lost earnings of the dead and \$4,1 billion in infrastructure damage.³⁹

21. As an example of a low intensity conflict, albeit one that cost the lives of 913 Indian and 456 Pakistani soldiers between 2003 and 2007, Strategic Foresight Group reports the "economic cost" of the conflict in the Siachen area of the India-Pakistan border, to have been Indian Rs 14,6 billion (\$306m) per year and Pakistani Rs 3,7 billion (\$60 million) per year in 2002-3.⁴⁰ And as another example of a short duration

³² Ibid. The IMF reports actual GDP growth of 2,3% for 2008, a decline in GDP of 3,8% in 2009, and a return to growth of 6,3% in 2010, although the impact of the global financial crisis must also be considered here. The World Bank reports Foreign Direct Investment of \$1,5 billion in 2008. Data from International Monetary Fund, "Data and Statistics," and The World Bank, "Data".

³³ David L Phillips, *Post-Conflict Georgia*, 5.

³⁴ Tamar Khorbaladze, "Counting the cost of war," *Emerging Markets*, 13 October 2008.

³⁵ Centre for Public Policy Research, "Estimating Conflict Cost: The Case of North West Frontier Province and Pakistan (Draft for Discussion)", 7.

³⁶ Ibid.

³⁷ Frontier Economics, Institute for Security Studies, Society for International Development and Aegis, *The Cost of Future Conflict in Sudan* (2010), 15.

³⁸ Ibid., 16.

³⁹ Hamid E Ali, *Estimate of the Economic Cost of Armed Conflict: A Case Study from Darfur* (Al Jazeera Centre for Studies, 2011), 2.

⁴⁰ Strategic Foresight Group, "Cost of Conflict between India and Pakistan.", 15.

conflict, according to Israeli Finance Ministry Sources, the three week Gaza War in 2008-9 cost Israel some NIS 2-3 billion (\$0,52-0,77 billion, around 0,5-0,7% of GDP).⁴¹

22. Finally, on a point of detail, two Croatian doctors have analysed the cost of treating those injured in the wars in Croatia and Bosnia-Herzegovina. They put the average cost of hospitalisation and treatment at \$70 per patient per day and calculate the total cost of treating 2138 patients at Split University Hospital, between 1991 and 1995, at \$2,6 million.⁴²

Summary

23. These various reported costs are summarised in Table 2. To provide a point of comparison, an average monthly cost in \$m 2010 has been calculated from the reported costs.⁴³ However, a great deal of caution is necessary here, as the reported figures measure the cost of conflict using many different – and often not very transparent – methods.

Conflict (Source)	Reported Figure \$m	Monthly Cost of Conflict \$m	Monthly Cost of Conflict \$m 2010
Siachen, 2002-3, "economic cost" to Pakistan (Strategic Foresight Group)	60	5	7
Siachen, 2002-3, "economic cost" to India (Strategic Foresight Group)	306	26	35
Afghanistan, 2008-9, direct cost to Pakistan (CPPR)	1 500	125	130
Sudan, economic cost of return to conflict, medium conflict scenario (Frontier)	52 000	433	433
Afghanistan, 2008-9, indirect cost to Pakistan (CPPR)	7 500	625	650
Sudan, economic cost of return to conflict, high conflict scenario (Frontier)	81 000	675	675
Russia-Georgia, 2008 cost to Georgia of damage to military (Khorbaladze)	143	858	928
Gaza War, 2008-9, financial cost to Israel, low estimate (Globes)	520	693	949
Gaza War, 2008-9, financial cost to Israel, high estimate (Globes)	770	1 027	1 405
Vietnam military operations, 1965-1975 (CRS)	738 000	5 591	5 815
Iraq, cost to US Government Budgets (DoD, State/USAID, DVA) in 2010 (CRS)	71 300	5 942	5 942
Russia-Georgia, 2008 economic cost to Georgia (Philips)	1 200	7 200	7 788
Afghanistan, cost to US Government Budgets (DoD, State/USAID, DVA) in 2010 (CRS)	93 800	7 817	7 817
Gulf War I, military operations, 1990-91 (CRS)	102 000	14 571	15 154

Table 2. Cost of Interstate Conflict: Summary.

Estimating the Cost of a Conflict in Estonia

24. As the discussion and examples above illustrate, estimating the cost of a future conflict is a complex and uncertain task. In estimating the cost of a possible conflict in Estonia, therefore, it is proposed to consider only the direct military costs: firstly because these costs are easier to identify and quantify, and secondly because these are the costs that will most likely need to be borne immediately by the government - indirect costs and economic costs will be incurred later. Nonetheless, it should be noted that these costs are potentially only a small fraction of the total cost of a war. The direct military cost would be calculated by identifying and summing the various military cost components – i.e. by using an accounting methodology.

⁴¹ Adrian Filut, "Treasury in dark on cost of Pillar of Cloud," *Globes*, 15 November 2012.

⁴² Dujomir Marasovic and Milka Brzovic, "War Injuries in Croatia: Cost and Duration of Hospitalization," *The National Medical Journal of India* 16, no. 3 (2003): 165.

⁴³ Discount rate: 4%.

Cost Components

25. Each cost component will consist of five parts:

- a. An identifier. This is, simply, the identity of the component to be costed. The challenge here is to identify all relevant components. This might be best achieved by breaking down the totality of the conflict into successively more detailed elements until a costable component is reached, a process analogous to the development of a work breakdown structure in an engineering costing exercise.⁴⁴ A partial example is shown in Figure 1.

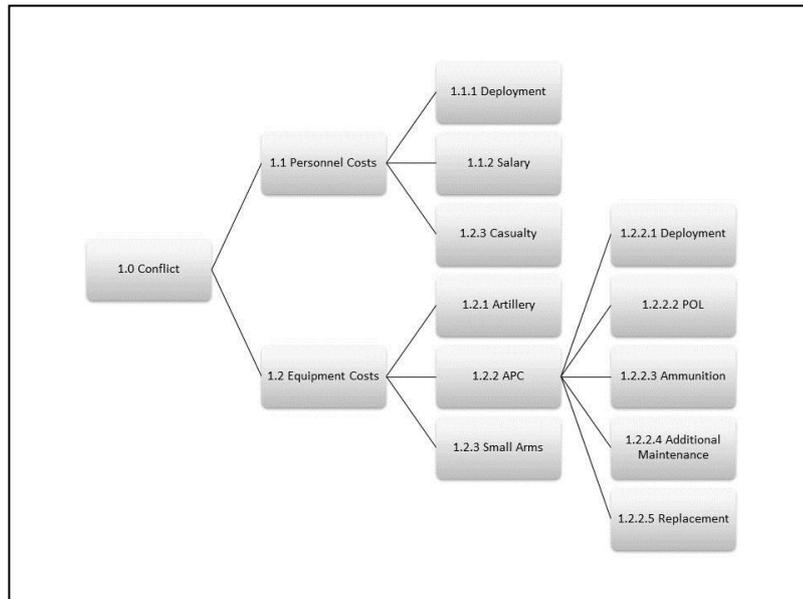


Figure 1. Illustrative Partial Identification of Cost Components.

- b. A usage rate. This part, an indication of the ‘consumption’ of the component will vary according to the component to be costed. Examples include the number of personnel deployed, the number of pieces of equipment destroyed, and the ammunition usage rate of a particular piece of equipment. Usage rates for certain military scenarios or tasks are given in publications such as staff officer handbooks.
- c. A cost per use. This is the cost of each component, for example the cost of the medical treatment of each casualty, the cost of a mortar round, or the replacement cost of each piece of destroyed equipment.
- d. A discount factor. The costs of certain components will not be immediately incurred. Costs occurring in the future, such as equipment replacement, will need to be discounted to current cost values.⁴⁵
- e. A total current cost. The cost per use multiplied by the usage rate, discounted as necessary. The cost of the conflict will be given by the sum of the total current cost of all components.

⁴⁴ John Vail Farr, *Systems Life Cycle Costing. Economic Analysis, Estimation and Management* (Boca Raton, FL: CRC Press, 2011), 7.

⁴⁵ Mark Teal et al, *Management Decision Making. Towards an Integrative Approach* (Harlow: Pearson Education Limited, 2003), 210.

Three Point Estimates

26. It is unlikely that values for usage rates and cost per use can be determined with any great confidence. A more helpful estimate of the costs of each component, and thus the total costs of the conflict, may be obtained using three point estimates.⁴⁶ In this method, estimates of optimistic, most likely and pessimistic usage rates or costs, would be made and the cost of each component calculated either by applying a simple formula to these estimates, or by applying a probability distribution and running a Monte Carlo simulation.⁴⁷ The latter approach, while more time consuming and difficult to apply, would provide a range of costs of conflict with associated confidence levels – arguably a more useful outcome.

Scenario

27. It will be necessary to develop a scenario as the basis for the costing exercise. The most appropriate choice, at least in terms of developing and testing a cost estimating method, would be the scenario created for our work aimed at estimating casualty numbers in the event of a conflict in Estonia. In brief, this is a medium-scale warfighting scenario, with two phases: in the first phase, red forces enter Estonian territory with little warning and face a retirement and delaying action for a period of 3 days; in the second phase, the remaining blue forces are reinforced and carry out a counterattack.⁴⁸

Conclusions and Recommendations

28. This paper has considered methodologies for the calculation of the cost of conflict and their potential application in estimating the cost of a conflict on Estonian territory. Examples of cost of conflict calculations have been discussed. Because of the difficulties and uncertainties involved in calculating the full economic cost of future conflict, it is considered feasible only to attempt to estimate the direct costs of a conflict to the armed forces. An approach for this is proposed above. It should be noted, however, that this cost may be only a small fraction of the full economic cost.

29. This paper thus recommends that ICDS should develop further the estimating methodology outlined above and apply it to calculate the cost of the conflict described in the aforementioned scenario. For this, we will need the support of the Ministry of Defence and, especially, the Headquarters of the Estonian Defence Forces in identifying and quantifying cost components. This will be a time consuming process and, unless MoD/HQ EDF assess this work to be a priority, it is unlikely to be possible to complete the work during the current year.

⁴⁶ John G Goodpasture, *Quantitative Methods in Project Management* (Boca Raton FL: J Ross Publishing, 2004), 51-55.

⁴⁷ Teal, *Management Decision Making*, 165-168.

⁴⁸ Lawrence, *Estimating Casualties*, 4.

Bibliography

- Ali, Hamid E. *Estimate of the Economic Cost of Armed Conflict: A Case Study from Darfur*. Al Jazeera Centre for Studies, 2011.
- Belasco, Amy. *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operation Since 9/11*. Washington DC: The Congressional Research Service, 2011.
- Bennis, Phylis, Erik Leaver and the IPS Iraq Task Force. *The Iraq Quagmire. The Mounting Costs of War and the Case for Bringing Home the Troops*. Washington DC: Institute for Policy Studies and Foreign Policy In Focus, 2005.
- Blattman, Christopher and Edward Miguel. "Civil War." *Journal of Economic Literature* 48, no.1 (2010): 3–57.
- Brück, Tilman, Olaf de Groot and Carlos Bozzoli. "How Many Bucks in a Bang: On the Estimation of the Economic Costs of Conflict." In *The Oxford Handbook of the Economics of Peace and Conflict*, edited by Michelle R Garfinkel and Stergios Skaperdas, 252-274. New York: Oxford University Press, 2012.
- Centre for Public Policy Research. "Estimating Conflict Cost: The Case of North West Frontier Province and Pakistan (Draft for Discussion)." http://cppr.edu.pk/index.php?option=com_content&view=article&id=238&Itemid=332, accessed 14 February 2013.
- Collier, Paul, V L Elliot, Håvard Hegre, Anke Hoeffler, Marta Reynal-Querol and Nicholas Sambanis. *Breaking the Conflict Trap*. Washington DC: The World Bank and the Oxford University Press, 2004.
- Daggett, Stephen. *Costs of Major US Wars*. Washington DC: The Congressional Research Service, 2010.
- Eisenhower Study Group. *The Costs of War Since 2001: Iraq, Afghanistan, and Pakistan. Executive Summary*. Providence, RI: Watson Institute for International Studies, Brown University, 2011.
- Farr, John Vail. *Systems Life Cycle Costing. Economic Analysis, Estimation and Management*. Boca Raton, FL: CRC Press, 2011.
- Filut, Adrian. "Treasury in dark on cost of Pillar of Cloud." *Globes*, 15 November 2012. <http://www.globes.co.il/serveen/globes/docview.asp?did=1000798882&fid=1725>, accessed 14 February 2013.
- Frontier Economics, Institute for Security Studies, Society for International Development and Aegis. *The Cost of Future Conflict in Sudan*. 2010.
- Gardeazabal, Javier. "Methods for Measuring Aggregate Costs of Conflict." In *The Oxford Handbook of the Economics of Peace and Conflict*, edited by Michelle R Garfinkel and Stergios Skaperdas, 227-251. New York: Oxford University Press, 2012.
- Geneva Declaration Secretariat. *The Global Burden of Armed Violence*. Geneva Declaration Secretariat: Geneva, 2008.
- Goodpasture, John G. *Quantitative Methods in Project Management*. Boca Raton FL: J Ross Publishing, 2004.
- Hess, Gregory D. "The Economic Welfare Cost of Conflict: An Empirical Assessment." CESifo Working Paper no. 852, presented at CESifo Area Conference on Public Sector Economics, May 2002

- Hoeffler, Anke and Marta Reynal-Querol. *Measuring the Costs of Conflict*. Oxford: Centre for the Studies of African Economies, 2003.
- International Crisis Group. "Western Sahara: The Cost of the Conflict." Middle East/North Africa Report no. 65, 11 June 2007.
- International Monetary Fund. "Data and Statistics." IMF. <http://www.imf.org/external/data.htm>, accessed 2 November 2012.
- Khorbaladze, Tamar. "Counting the cost of war." *Emerging Markets*, 13 October 2008.
- Lawrence, Tony. "Estimating Casualties in Conflicts on Estonian Territory." ICDS Report (unpublished), April 2011.
- Lindgren, Göran. "The Economic Costs of Civil Wars." Report no 72, Department of Peace and Conflict Research, Uppsala University, 2006
- Marasovic, Dujomir and Milka Brzovic. "War Injuries in Croatia: Cost and Duration of Hospitalization." *The National Medical Journal of India* 16, no. 3 (2003): 165.
- Oanda. <http://www.oanda.com/>, accessed 15 February 2013.
- Paljak, Piret. "Participation in International Military Operations." In *Twenty Years of Baltic Defence Development*, edited by Tony Lawrence and Tomas Jermalavičius. Tallinn: ICDS (forthcoming).
- Sköns, Elisabeth. "The costs of armed conflict." In *Peace and Security: Expert Papers Series Five*, 169-190. Stockholm: International Task Force on Global Public Goods, 2005.
- Strategic Foresight Group. "Cost of Conflict between India and Pakistan." <http://www.strategicforesight.com/index.htm>, accessed 15 February 2013.
- Stiglitz, Joseph E and Linda J Bilmes. *The Three Trillion Dollar War. The True Cost of the Iraq Conflict*. London: Allen Lane, 2008
- Stiglitz, Joseph E and Linda J Bilmes. "Estimating the Costs of War: Methodological Issues, with Applications to Iraq and Afghanistan." In *The Oxford Handbook of the Economics of Peace and Conflict*, edited by Michelle R Garfinkel and Stergios Skaperdas, 275-317. New York: Oxford University Press, 2012.
- Teal, Mark, Vincenzo Dispenza, John Flynn and David Currie. *Management Decision Making. Towards an Integrative Approach*. Harlow: Pearson Education Limited, 2003.
- World Bank. "Data." <http://data.worldbank.org/>, accessed 2 November 2012.