

Calculating the cost of conflict

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International Consulting Economists' Association,
9 January 2018

Vast literature on conflict

- Amount of Conflict from Richardson (1960), *Statistics of Deadly Quarrels* to Pinker (2011) *The Better Angels of Our Nature: Why violence has declined*.
- Costs of conflict,
 - Ricardo, Malthus and Say wrote on the costs of the Napoleonic War,
 - Stiglitz & Bilmes (2008): *The Three trillion dollar war on Iraq*.
 - S&B will be used as an example, but not intended as a criticism
- This presentation draws on:
 - Smith (2014), The Economic Costs of Military Conflict, *Journal of Peace Research*.
 - Bove, Elia & Smith (2016) On the heterogeneous consequences of civil war, *Oxford Economic Papers*

- Consider
 - Purpose of the calculations: why are you doing it?
 - Data used: what variables in what units.
 - Aggregation and Valuation. How do you add up over: outcomes, time (discount rates), lives lost; etc.
 - Counterfactuals
- Argue that the literature is often not explicit about these issues which conceals the fact that measurement of the cost of conflict is often highly problematic involving ethical and philosophical issues not just technical economic ones.

Purpose of calculating costs of conflict

- Purpose always determines how costs should be calculated: the cost of a car can be calculated differently for different purposes.
- Why is the cost of conflict calculation being done?
- Examples
 - Ex ante: Angell (1910) *The Great Illusion: A study of the relation of military power in nations to their economic and social advantage*
 - Ex post: Bogart (1920) *Direct and indirect costs of the Great World War*
 - Keynes: *The Economic Consequences of the Peace* (1919) and *How to Pay for the War* (1940)
- To help finance or to help oppose a war. This is often not explicit

Different purposes give different answers to questions

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- Which outcomes are regarded as costs?
- In what units: lives lost, GDP lost, capital destroyed?
- Cost to whom? Are enemy deaths a cost or a benefit of the conflict?
- Why only costs, not costs and benefits?
 - Assumption that measuring costs is less subjective than measuring benefits?
 - Ignoring benefits can cause problems. Can be arbitrary what is a cost.
 - Shows the value of conflict prevention; if we knew how to prevent conflict.
- Purpose is often persuasive polemics so do not want to make the difficulties explicit

Alternative Approaches to costs

- Qualitative versus Quantitative
- Focus on a single target versus multiple targets
- Individual case studies can take account of a lot of qualitative material but are a sample of one often chosen for its salience, which may make it atypical
- Typical large N studies often ignore country specific heterogeneity e.g. by imposing common coefficients
- How do you choose the control group to construct the counterfactual
- Want to use large sample but allow for heterogeneity

Data on conflicts and outcomes

- What counts as a conflict, homicide levels in "peaceful" Mexico larger than many countries "at war".
- UCDP/PRIO definition of conflict, e.g. involving a state, excludes Somalia
- Costs to whom: enemies? animals?
- What costs do you count in what units
 - number of conflict deaths; often contested e.g. Wikipedia Casualties of the Syrian Civil War cites estimates range 321-470 thousand, UN 400 thousand, April 2016. Bigger variations for Iraq and DRC.
 - focus on what can be measured ignores psychological effects, transformation of society
 - some costs, such as future medical bills for veterans depend on institutions?

- often focus variable y_{it} is the level or growth of GDP;
- GDP is a very limited measure with perverse implications, e.g. per capita GDP goes up if the conflict kills off the old people
- market prices often leave out many factors
- often badly measured ignores destruction of capital loss of life
- will use it for the purpose of analysing sensitivity to construction of counterfactual

Aggregation and Valuation

- Valuation. How do you add up over: outcomes, time (discount rates), lives lost; etc.
- Does the number matter? Would the Iraq War be good value at \$1bn rather than \$3bn?
- Value of life: For Iraq S&B use \$7.2m value of a US life; Bruck et al. 2.05m euro for a German life. Iraqi lives?
- Disabilities: QALYs/DALYs,
- Perverse effects if value of life < cost of treating injuries
- The direct military costs of WWII are estimated at \$4.3 trillion in 2008 dollars. Not comparable to S&B \$3 trillion for Iraq.
- Happiness?
- Interpersonal comparisons? Distribution? Young versus old? Combatants versus civilians?

Counterfactuals

- Any calculation of historical costs involves a comparison with a counterfactual: what would have happened had there been no conflict.
- Prospective versus retrospective calculations
- For retrospective calculations, one can never know what would have happened otherwise. Does that make calculation of costs impossible?
- Often try to pretend that no counterfactual is involved.
- Even when it is just accounting, need rules for particular cases, e.g. if it is marginal costs to military: what is marginal?

Making the counterfactual explicit

- Counterfactual 1, no conflict, Counterfactual 2 different ways the conflict could have happened
 - Treatment of Financing, S&B treat interest payments on debt as a cost, but that makes debt financing more expensive than financing through money/inflation or fiscal financing through higher taxes and lower other expenditure.
- What is the implicit counterfactual in Large N cross-section or panel studies?
- What additional covariates to include in regression equations: over-control problem (*Ceteris Paribus* or *Mutatis Mutandi*)
- Example: what was the cost of World War II for Japanese and US GDP?
- Counterfactual: trend from 1870-1929.

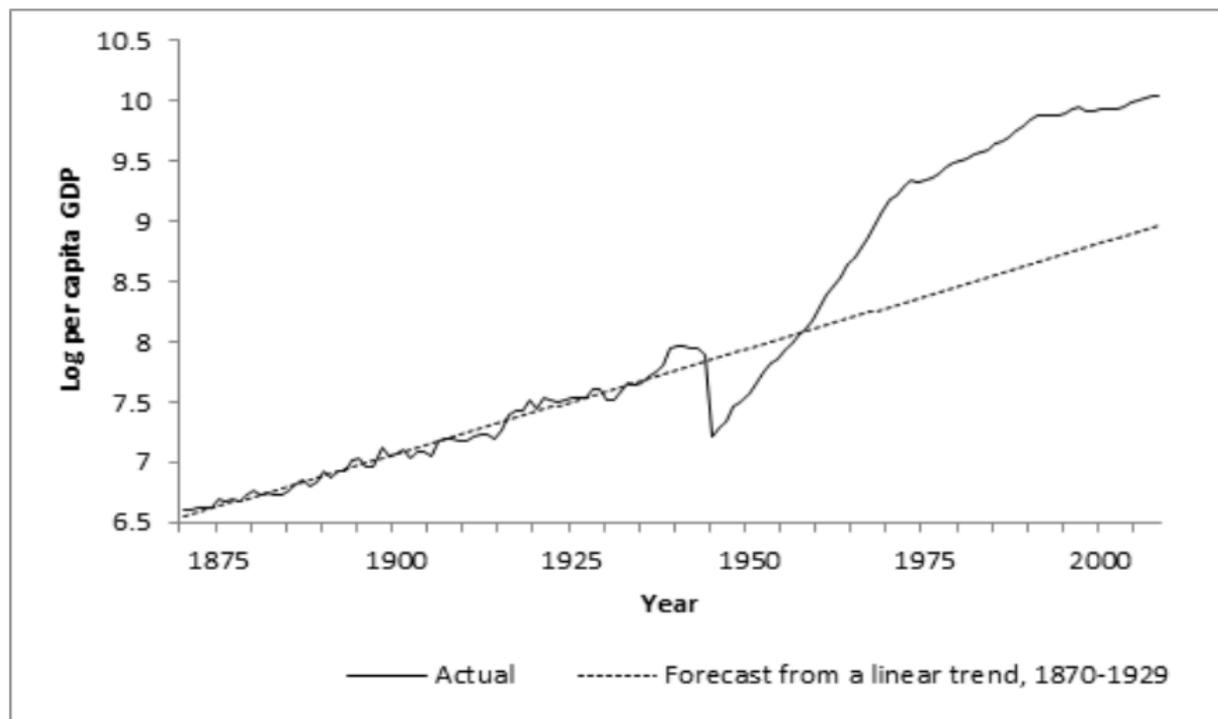
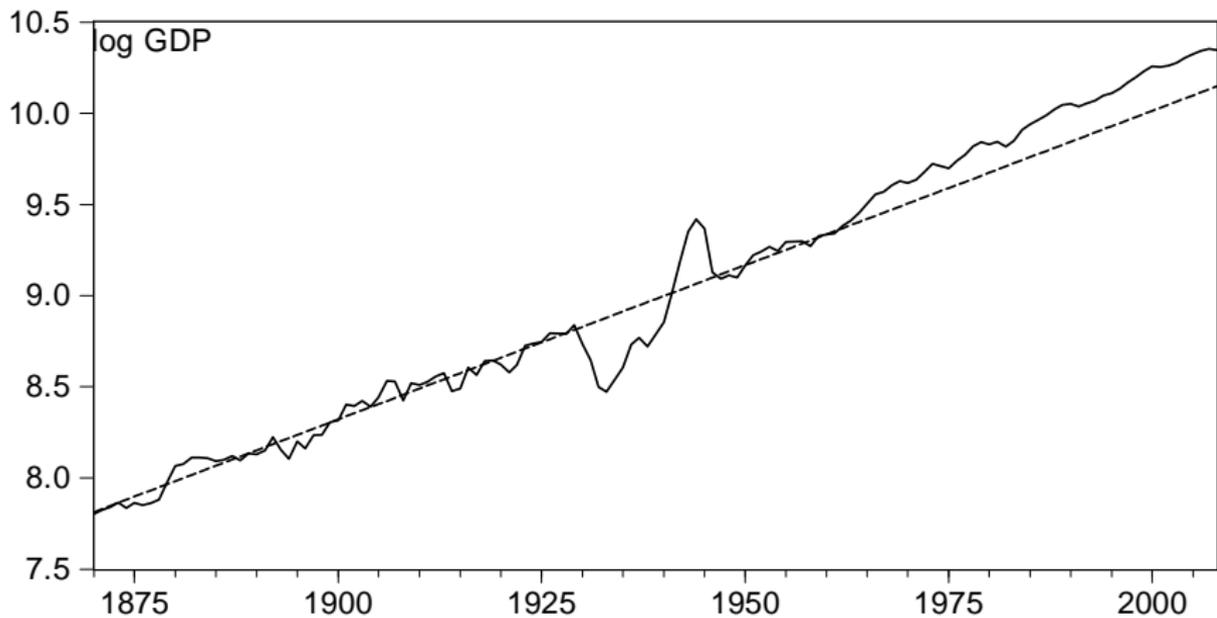


Figure: Japan



USA

Large number of studies estimating effect of civil wars on GDP

- Can you get a better counterfactual than that trend?
- Purpose of the calculation and construction of counterfactual are central but not explicit
- Classic Cross-section study by Collier suggested average 2% effect
- More recent studies use panels and more sophisticated statistical techniques,
- Estimates show a lot of heterogeneity
 - between countries: different wars are different
 - between studies: results are sensitive to how counterfactuals are specified
 - between variables: effects on level of GDP different from effects on growth in GDP, let alone for other variables
 - between estimation methods

Regression Approach

- Cerra & Saxena (2008) annual data $t = 1960 - 2001$, for country $i = 1, 2, \dots, 190$, g_{it} growth and D_{it} a crisis dummy:

$$g_{it} = \alpha_i + \sum_{j=1}^4 \beta_j g_{i,t-j} + \sum_{s=0}^4 \delta_s D_{i,t-s} + \varepsilon_{it}$$

- Implicit counterfactual: prediction of an AR(4).
- Crises: currency crisis, banking crisis, political crisis, civil war.
- Estimate impulse response functions implied by regressions.
- Find that the effects of financial crises and deterioration in political governance are very persistent but there tends to be a partial rebound after civil wars (Phoenix effect).
- Strong homogeneity assumptions: same dummy for different sized wars, same slope coefficients. Endogeneity issues? Criticised by Mueller (2012)

Constructing Counterfactuals

- Consider a single target, unit 1, subject to intervention at T_0 , with post intervention data $t = T_0 + 1, T_0 + 2, \dots, T_0 + T_1$, with $T = T_0 + T_1$.
- There are $N - 1$ controls not subject to the intervention and not affected by the intervention in unit 1.
- The effect of the intervention is measured as

$$d_{1,T_0+h} = y_{1,T_0+h} - \sum_{i=2}^N w_i y_{i,T_0+h}; \quad h = 1, 2, \dots, T_1. \quad (1)$$

- How to choose controls and weights? May be multiple targets.
- In these contexts we are always measuring the effect of treatment on the treated.

Synthetic control method (SCM) examples

- SCM controls chooses chooses the comparison units to match (be as similar as possible) to the target on the basis of variables x_{ikt}
- Abadie & Gardeazabal (2003) costs of Basque terrorism, Abadie et al. (2014) German reunification.
- These are all single target cases. Since they have made their package Synth available on Matlab, R and Stata, others have applied it to multiple target cases.
- Costalli et al. (2014) use synthetic control estimators to measure the economic costs of Civil War in a panel for multiple targets.
- Need support (values covered) of the target to match that of the controls
- The weights are often chosen by cross-validation, which may be problematic for potentially non-stationary time-series samples.

German Reunification, Abadie et al. (2014)

- In the case of German reunification, the controls and weights w_i are Austria, 0.42, US, 0.22, Japan 0.16, Switzerland 0.11 and Netherlands, 0.09.
- The synthetic West Germany is similar to the real West Germany in pre 1990 per capita GDP, trade openness, schooling, investment rate and industry share.
- As they note there may be spillover effects. Since Austria, Switzerland and Netherlands share borders with Germany there is a possibility that their post 1990 values may be influenced by German reunification.
- Those that are geographically the most similar are most likely to show spillover effects.

Issues with Synthetic control methods

- In the case of microeconomic treatment effect studies this procedure is sensible: choose controls that are similar in characteristics to those that are treated: match patients treated with a drug to untreated controls of similar age, sex, background etc.
- Summarised by propensity score predicting "treatment", here probability of conflict
- If there is a single case, e.g. Basque terrorism, one cannot calculate propensity score. With multiple cases, e.g. Civil War, one can. Although there are some significant variables (rich countries have fewer civil wars) it is difficult to predict civil wars. So propensity scores are likely to be inaccurate.
- It is not clear that this procedure is as sensible in macroeconomic time-series contexts, where there are strong common factors driving the y_{it} , so prediction from outcomes in other units y_{jt} is more sensible.

Panel Data Approaches

- Contrast Hsiao et al. (2012), *A panel data approach for program evaluation: measuring the benefits of political and economic integration of Hong Kong with mainland China*.
- They measure the effect in the same way using (1), but choose the w_i by regression of y_{1t} , growth in Hong Kong on a subset of y_{jt} , $j = 2, 3, \dots, N$, growth in the control countries during the pre-intervention period.
- The subset is chosen by a model selection procedure. They emphasize that Hong Kong is too small for the effects of integration with China to influence any of the control countries.
- The control group they select contains USA and Taiwan with positive weights and Japan, Korea, Philippines and Taiwan with negative weights.

Contrast 1.

- The Abadie et al. procedure is designed to build a synthetic control which matches (is very similar to) the target. This is sensible in a microeconomic context when the units are only subject to weak factors.
- The Hsiao et al. procedure is designed to construct a good prediction of the focus variable in the target taking advantage of the strong factors present in macro-economic time-series. This is sensible in a macroeconomic context, because very different countries can be driven by the same common trends.
- Hsiao et al. include the US in the controls, not because the US is like Hong Kong, but because US growth is a good predictor of Hong Kong growth.
- No other country is like Hong Kong, not even Singapore, the closest comparison, so Hong Kong may be outside the support of the control data.
- This is a problem for the synthetic control method, which relies on finding an average that is similar, but not for the prediction method.

Contrast 2.

- Abadie et al. criticize the fact that regression methods can give negative weights, but this is to be expected if one interprets the procedure as involving prediction using global factors.
- Suppose Hong Kong before integration is largely driven by global factor A, the US by factors A and B, and Japan largely by factor B; then the US minus Japan provides an estimate of factor A, which drives Hong Kong.
- Hsiao et al. have a comparison of their method with that of Abadie et al. but not the reverse.
- Best comparison so far: Gardeazabal and Vega-Bayo (2016) "An empirical comparison between the synthetic control method and Hsiao et al's panel data approach to program evaluation", *Journal of Applied Econometrics*, SCM works better if there is a close match.

- Data 1960 to 2010 from Penn World Tables and UCDP/PRIO conflict data base
- Dependent variable. y_{it} is either log per-capita real GDP or the growth rate in per-capita real GDP
- Independent variable $c_{it} = 1$ if a civil war is taking place in country i in year t and $c_{it} = 0$ otherwise.
- Over this period more than 20% of the countries have experienced at least ten years of civil war, peak rate in the 1980s and 90s.
- The sample is made up of 27 countries that had civil wars plus those that had no wars at all. We exclude cases where the country was subject to interstate or extra-systemic wars.

- $N = 92$ countries 27 of which had civil wars, $T = 50$. So large N large T .
- We do not include other covariates to avoid “over-controlling” and under-estimating the total impact effect of civil war.
- To be included we require 15 years pre-war and 10 year post war observations, so exclude civil wars after 2002.
- For multiple civil wars we use the first.
- We exclude from the control groups countries sharing borders with the treated groups.

Heterogeneous Estimates

- Massive dispersion of estimated $\hat{\beta}_i$
 - for level between -3.3 Sierra Leone to +0.30 (Liberia)
 - for growth between -0.13 (Guinea-Bissau) to 0.06 (Djibouti)
- Almost no correlation between the growth and levels estimates of $\hat{\beta}_i$

- Major conceptual difficulties in calculating costs of conflict: purpose is central.
- Construction of counterfactual problematic
- Estimated GDP costs of civil wars differ substantially
 - over time for each country,
 - over countries
 - over level and growth equations
 - over estimation methods
- In this example the SCM and panel estimates are not very different but level and growth effects are

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