Growth Dynamics: The Myth of Economic Recovery - Comment

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This comment highlights different ways of coding crisis episodes in Cerra and Saxena (2008) (CS). The comment shows that the coding used for civil war implies a misrepresentation of its impact. A correct coding of civil war reveals that the average civil war leads to a loss in output of 18 percent. This makes civil wars more devastating than all other crisis studied by CS.Title

In their article "Growth Dynamics: The Myth of Economic Recovery" Cerra and Saxena (CS) estimate the growth reaction to crisis episodes. They study four kinds of crisis: currency crisis, banking crisis, civil wars and stronger executive power. To study the effect of crisis on output they estimate growth regressions with a set of crisis dummies. They then use the estimated coefficients to calculate impulse response functions to visualize the output response to crisis. Their article concludes that crisis outbreak is followed by a persistent negative output response, except for civil wars who feature some recovery of output. The literature has taken their interpretation of the effects of civil war face-value.[1]

This note discusses an important methodological shortcoming in CS. We highlight the fact that CS code civil wars differently than all other crisis in their study. This leads to a misrepresentation of the output response to civil war.

I. Two Ways of Coding Crisis

In their study of crisis episodes CS gather data on four types of crisis in order to insert them into the following growth regression

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

where g_{it} is the real GDP per capita growth rate and a_i are country fixed effects. The crisis episodes enter through a panel of dummies $D_{i,t} = \{0, 1\}$. CS use the estimated coefficients β_j and δ_s to construct impulse response functions.

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[1] Blattmann and Miguel (2010), for example, write: *"Indeed, a recent study of the output response to alternative crises—including currency crises, banking crises, civil war, and sudden shifts in executive power—finds that while civil wars cause the steepest short-run fall in output (six percent on average), only in the case of civil war does output rebound quickly, recovering half of the fall within a few years, while output drops are more persistent for financial crises (Cerra and Saxena 2008)."* Blattman and Miguel (2010), p. 39.

For all crisis episodes but civil war CS only code the first year of crisis in dataset as $D_{i,t} = 1$ and all other years as $D_{i,t} = 0$. In what follows we will call this way of coding crisis the crisis *start* coding. CS code all civil war years with $D_{i,t} = 1$ and not just the start years as in banking crisis. We call this way of coding the crisis *year* coding.

Table 1 illustrates the two crisis codings in the example of a crisis that lasts for two years. The table shows the values that the crisis dummies $D_{i,t}$ take in each of the two coding types. For example, the first lag in the crisis *start* coding takes a value of 1 in the the second year of crisis. Further lags cover years after the end of crisis. Note that the first lag in the crisis *year* coding covers one year within and one year after crisis.

Table 1: Two Ways of Coding Crisis Events in CS

	crisis start coding (used for banking crisis in CS)					crisis year coding (used for civil war in CS)				
crisis data	Dit	Dit-1	Dit-2	Dit-3	Dit-4	Dit	Dit-1	Dit-2	Dit-3	Dit-4
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	1	0	0	0	0
1	0	1	0	0	0	1	1	0	0	0
0	0	0	1	0	0	0	1	1	0	0
0	0	0	0	1	0	0	0	1	1	0
0	0	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	1

CS use the estimated coefficients from equation (1) to simulate the output response to crisis starts and crisis years. In the case of crisis years their graphs show the output response to one crisis year. We reproduce some of the output responses in CS in appendix A to illustrate that we re-created their methodology correctly.

II. Misrepresentation of Civil Wars

Figure 1a shows the output response to a civil war year on the left.[2] CS report this graph in their figure 6. As a robustness check of their findings we change the coding for civil wars to bring it in line with the coding chosen for other crisis. Figure 1b shows the output response to a civil war start, i.e. if civil wars are coded as all other crisis in CS.

Clearly, the shape of the impulse response function is directly a result of the way that civil war is coded. If every civil war *year* is coded $D = 1$ (figure 1a) the decline is relatively small and output recovers somewhat. The *start* coding in figure 1b reveals a strong, persistent decline of output by about 18 percent.

This effect of the coding is never discussed in CS. The authors compare the output response of a banking crisis start to the output response of a civil war year and conclude that *"In contrast to the extreme persistence of output loss following financial crises, output partially rebounds from a civil war (Figure 6)."*[3] Given the information put forward in figures 1a and 1b this conclusion seems dubious. A direct comparison of civil war and

[2] The data on civil wars are taken from Sarkees (2000) Correlates of War Intra-State War Data. The dashed lines report one standard deviation error bands computed from 1000 Monte Carlo simulations. The simulation uses the variance-covariance matrix of the estimated coefficients in equation (1) and their asymptotically normal distribution.

[3] Cerra and Saxena (2008), p. 442.

banking crisis in the start coding shows that civil war has a much more devastating effect on the economy.

Figure 1a: Output response to civil war year

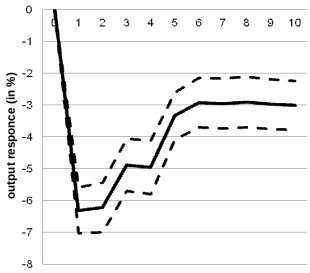
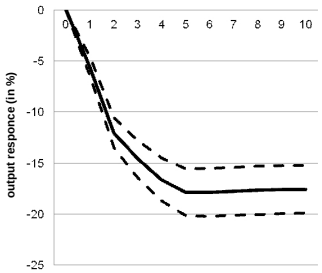


Figure 1b: Output response to civil war start



In appendix B we show formally that the *start* coding captures the average growth after the start of a crisis correctly.[4] Intuitively, each lag captures the growth in a different year following the start of crisis. The first lag, for example, captures average growth in the first year after crisis start. The estimated coefficients therefore represent the average growth response to the outbreak of a civil war.

Each dummy in the *year* coding, however, captures several years at once. For example, the first lag in the crisis year coding, D_{it-1}, in table 1 captures the second year of crisis and the first year after the end of crisis. It is easy to show that this leads to uninterpretable OLS estimates if civil wars extend beyond one year, i.e. for more than 70 percent of civil wars in the data used by CS.

Even if we disregard this problem the output responses in CS only display the reaction to one year of war. As the average civil war lasts longer than five years this implies a considerable misrepresentation of the impact of civil war. Indeed, one can use the estimates from the year coding to show that five years of civil war imply an output contraction similar in magnitude to figure 1b.[5]

III. Conclusion

In this note we show that the output responses for civil war displayed in CS misrepresent their impact. The magnitude of this misrepresentation can be seen when comparing figures 1a and 1b. Figure 1a (figure 6 in CS) suggests a 3 percent impact of civil war reached after recovery. The correct magnitude provided by figure 1b suggests that, on average, output declines by about 18 percent. This makes civil wars the most devastating crisis studied by CS.

Our analysis can be applied to other studies who use a similar methodology. The analysis of the impact of conflict on trade in Martin, Mayer and Thoenig (2008), for example, could face similar problems.

[4] It also in line with the existing literature. Romer and Romer (2010), for example, use the same method to calculate the impact of exogenous tax shocks on growth.

[5] See web-appendix C for details.

An issue not covered by this comment is the fact that the impulse functions like the one displayed in figure 1b mix the output response to crisis of different lengths. The response after the fourth year of crisis start, for example, captures recovery periods of shorter crisis and continuing collapse in persisting crisis. As a consequence the impulse response function loses some of its appeal as a summary of the data.

REFERENCES

[5] Blattman, Christopher and Edward Miguel. 2010. "Civil War." *Journal of Economic Literature*, 48:1, 3–57.

[5] Cerra, Valerie and Sweta Chaman Saxena. 2008. "Growth Dynamics: The Myth of Economic Recovery." *American Economic Review*, 98(1), 439–57.

[5] Martin, Phillipe, Thierry Mayer and Mathias Thoenig. 2008. "Make Trade not War?" *Review of Economic Studies*, 75(3), 865-900.

[5] Romer, Christina and David Romer. 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." *American Economic Review,* 100, 763–801.

[5] Sarkees, Meredith R. 2000. "The Correlates of War Data on War: An Update to 1997." Conflict Management and Peace Science, 18(1): 123-44.