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Wars and capital destruction

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ABSTRACT

In this paper, we propose a theoretical framework to investigate the impact of conflicts and wars on key macroeconomic aggregates and welfare. Using a panel data with 9 countries from 1870 onwards, we first show that the consumption-to-output ratio is minimal during WWII for participants. While this can be explained by an increase in public spending in the USA, this cannot be the case in other countries that participated in WWII, as they experience a large fall in output during wartime. To account for this, we build a variation of a Real Business Cycle model first proposed by Hercowitz and Sampson (1991). We extend the initial model to account for specific shocks that destroy private and public capital stocks – as conflicts do – by assuming an (exogenously) time-varying parameter in the law of capital accumulation. In addition, the model imbeds generalized TFP shocks capturing standard technological factors as well as the potential effects of war on the labor force. The model is estimated and used (i) to assess the importance of capital shocks during war episodes, and (ii) to quantify the welfare effects of conflicts. We show that capital shocks are crucial to account for the macroeconomic dynamics of countries that have experienced large war-related destruction, and that the welfare losses from fluctuations can be quite large when considering data samples that include major war episodes.

1. Introduction

Wars and conflicts destroy both human and physical capital, with dramatic consequences on the economy. Yet this simple assessment received little attention in the literature on war economics. This paper is an attempt to model wars and conflicts in their destructive dimension, so as to analyze their effects on key macroeconomic aggregates and welfare.

Using post-war data for developed countries has become customary in the current macro-econometric literature. At first sight, one reason may be that the relevance of the neoclassical framework during war episodes is questionable. Wars may induce very large shocks in the economy. This is at odd with the usual practice that considers small perturbations around a deterministic steady state and uses linear approximations of equilibrium conditions to characterize models dynamics. Further, the modern macro-econometric literature typically treats government spending as unanticipated "shocks" while central policies may account for more than half of the GDP during major conflicts.

Despite these difficulties, several recent empirical works have emphasized the importance of a careful look at military and conflict data in macroeconomics. Braun and McGrattan (1993) and McGrattan and Ohanian (2010) show that properly

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written Real Business Cycle (RBC hereafter) models are able to capture many economic phenomena of World War II (WWII hereafter) in the USA or in the UK. One of the reasons may be the following: even during war episodes the very basic needs – consumption – and means of production – capital and labor – remain and RBC models precisely rely on these basic means and needs. Also, Ramey (2011) emphasizes that much of the variability of the shocks in public expenditure is explained by military expenditures because other sources of public expenditures (education, health, etc.) are much more stable over time. Hence, once trends are removed, unexpected shocks in public expenditures are mainly military. Moreover, the "narrative approach" (Ramey and Shapiro, 1997) highlights the role of war/peace episodes in the identification of unexpected fiscal shocks. Ramey (2011) argues that the distinction between military and civilian public expenditures induces major differences in the analysis of private responses to unexpected central policy shocks.

In addition, much empirical effort has been devoted to precise accounting of the costs of war. Most empirical contributions show that net effects of wars (including destruction and potential positive effects induced by larger public expenditures, R&D) are negative. For instance, Collier (1999) argues that a civil war might cause a 2.2 percentage point loss in the annual growth rate. A welfare analysis conducted by Blomberg and Hess (2012) shows that agents would be willing to give up about 7% of permanent consumption to live in a peaceful world. Bilmes and Stiglitz (2008) count the cost of Iraq war in trillions of dollars, highlighting that globalization and technical progress make wars more costly. The massive role played by engineering and logistics problems has also been made clear for WWII while specialists of WWI put forth the major impact of human losses.

Adopting an alternative perspective, Martin et al. (2008) identify the impact of international trade on the occurrence of armed conflicts. Using an extensive data set on bilateral trade and armed conflicts, they show that increasing bilateral trade flows (through bilateral trade agreements for example) significantly reduces the probability of armed conflict with the corresponding trade partner without increasing the probability of conflicts with other trade partners. In this sense, trade openness could be seen as a peace-promoting technology. However, they show that multilateral trade openness reduces the bilateral trade dependence, and thus the cost of bilateral armed conflicts which increases the probability of war. This mixed evidence shows that trade openness and armed conflicts are closely related in the data but that both the sign and the magnitude of the relationship depend on the specific characteristics of trade flows and agreements. To sum up, data show that major conflicts reduce international trade flows, and are therefore a possible source of economic downturns.

Finally, in two recent contributions Nakamura et al. (2013) and Barro and Ursùa (2011) made clear that modern wars (especially WWII) have disastrous consequences on civilian economics both for "winners" and "losers". They analyze a rich panel data with 24 countries and more than 100 years. Consequences of wars on consumption are analyzed using a small neoclassical model. These extremely bad events induce a major increase in volatility measurement that may account for the observed equity premium without relying on implausible and/or sophisticated models of risk aversion.

In terms of reliable data during war episodes, the successive efforts of Maddison (2001) and of Nakamura et al. (2013) and Barro and Ursùa (2011) provide consensual figures about private consumption and GDP for several countries on an annual basis for a long period of time that includes both WWI and WWII. We complete the data set with public spending data taken from Mitchell (1998a, 1998b, 1998c) to uncover crucial features of the dynamics of key macroeconomic variables during war episodes. While the data set of Barro and Ursùa (2011) covers the period from 1790 to 2009 for 42 countries, we collect reliable public spending data from 1870 to 1993 for Denmark, France, Germany, Italy, Japan, Spain, Sweden, the UK and the USA. This leaves us with 9 countries with exploitable data from 1870 to 1993. Unfortunately, public spending data are missing during major war episodes for most countries, except for Denmark, Sweden, the UK and the USA.

We thus exploit data for Denmark, France, Germany, Italy, Japan, Spain, Sweden, the UK and the USA between 1870 and 2009 for GDP and consumption, and between 1870 and 1993 for public spending over GDP. While this set of countries is not

Table 1
Key features of the data.

Country	C/Y			G/Y		Log-dev. of output	
	I	II	III	IV	V	VI	VII
Denmark	2001	45.66	48.21	1982	52.90	−1.53	−1.12
France	1943	38.98	60.34	–	–	−86.46	61.14
Germany	1944	22.63	52.22	–	–	−78.52	28.96
Italy	1943	49.69	66.86	–	–	−46.17	7.25
Japan	1945	25.67	55.27	–	–	−87.64	28.98
Spain	1936	50.97	61.34	–	–	−45.49	9.27
Sweden	2008	46.64	NaN	1993	39.18	0.00	NaN
United Kingdom	1943	43.21	61.08	1944	68.15	0.62	−14.42
USA	1944	46.18	65.30	1945	45.92	21.59	−19.35

Notes: I: Year of minimum value, II: Minimum value, III: Value 5 years after the minimum, IV: Year of maximum value, V: Maximum value, VI: Linear trend, 1 year after C/Y is minimum (%), VII: Linear trend, 5 years after C/Y is minimum minus 1 year after (%). Data source for GDP and consumption: Barro and Ursùa (2011). We use GDP and consumption in levels in 2006 (the base year of the data set) from the OECD national account database to build the time series in levels. Data source for public spending over GDP: Mitchell (1998a, 1998b, 1998c). For most countries except Denmark, Sweden, the UK and the USA, data points are missing during war episodes.