The price of war

By Moritz Schularick[1] [2]

Abstract

Armed conflicts cause massive economic costs – both in terms of lost income and reduced physical capital – which are borne overwhelmingly by the countries on whose territory the fighting takes place. But the economic costs of wars also spill over to other countries, particularly those geographically closest to the war site. We show that countries in proximity to a war site experience a fall in output while inflation rises after the onset of war. Interpreting these findings through the lens of a multi-country model of the world economy in the spirit of Gopinath et al. (2020), wars act as adverse supply-side shocks, spilling over to other countries via trade linkages. In our sample, wars tend to last longer than typical other supply shocks. We thus conclude that central banks should respond to these shocks by tightening monetary policy, rather than attempting to simply 'look through' war shocks.

1 Incidence and spill-overs of war

1.1 The incidence of wars

The global political landscape is undergoing a period of significant transformation. Geopolitical tensions are intensifying, and rivalries between nations are becoming more overt (Ayiar et al., 2023), some even violent. The process is driven by a volatile combination of rising nationalism and shifts in power dynamics (e.g. Baldwin, 2024), which are the two most common causes of interstate conflict.

To date, there is only limited evidence on the macroeconomic impact of interstate wars and their macroeconomic spillovers to other countries. In order to improve our understanding of the economic spillovers of war, we construct a new data set from 1870 to the present that covers all major wars, defined by causalities exceeding 10,000 people, combining macroeconomic and war-related data.

Our compiled sample covers the period from 1870 to the present and includes macroeconomic series for up to 60 countries, based on the MacroHistory database (Jorda, Schularick and Taylor, 2017). The information on wars stems from the Correlates of War project (Sarkees and Wayman, 2010). In our sample, the probability of war within a country's borders in a given year is 1.3% per year (Chart

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[1] Contribution based on CEPR Discussion Paper 18834: "The Price of War", by Jonathan Federle, André Meier, Gernot Müller, Willi Mutschler & Moritz Schularick.

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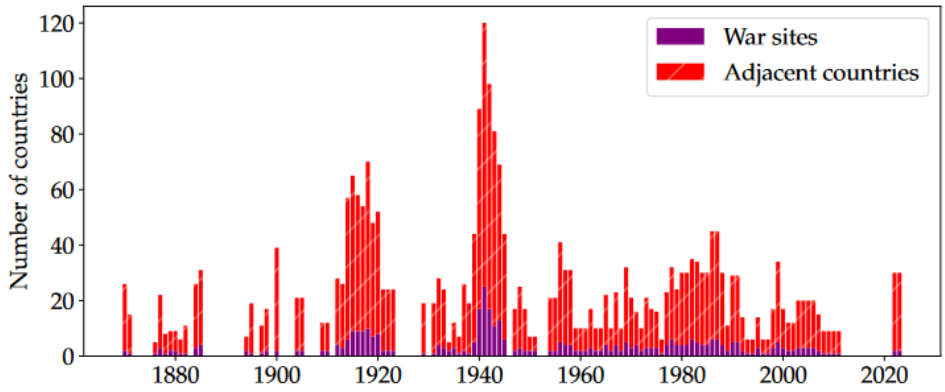
1). While the economic consequences of a war on one's own territory are severe, the probability of this happening is relatively low.

However, the picture changes when looking at the unconditional probability of being adjacent to a country at war. In our sample, this probability is about 8.5% per year, roughly twice as high as the unconditional probability of a financial crisis. Thus, war in a neighbouring country is not a rare event. Given these probabilities, academics, policymakers and central bankers need to consider and take into account the risk of war, also in countries nearby.

Chart 1

Interstate wars 1870-2022



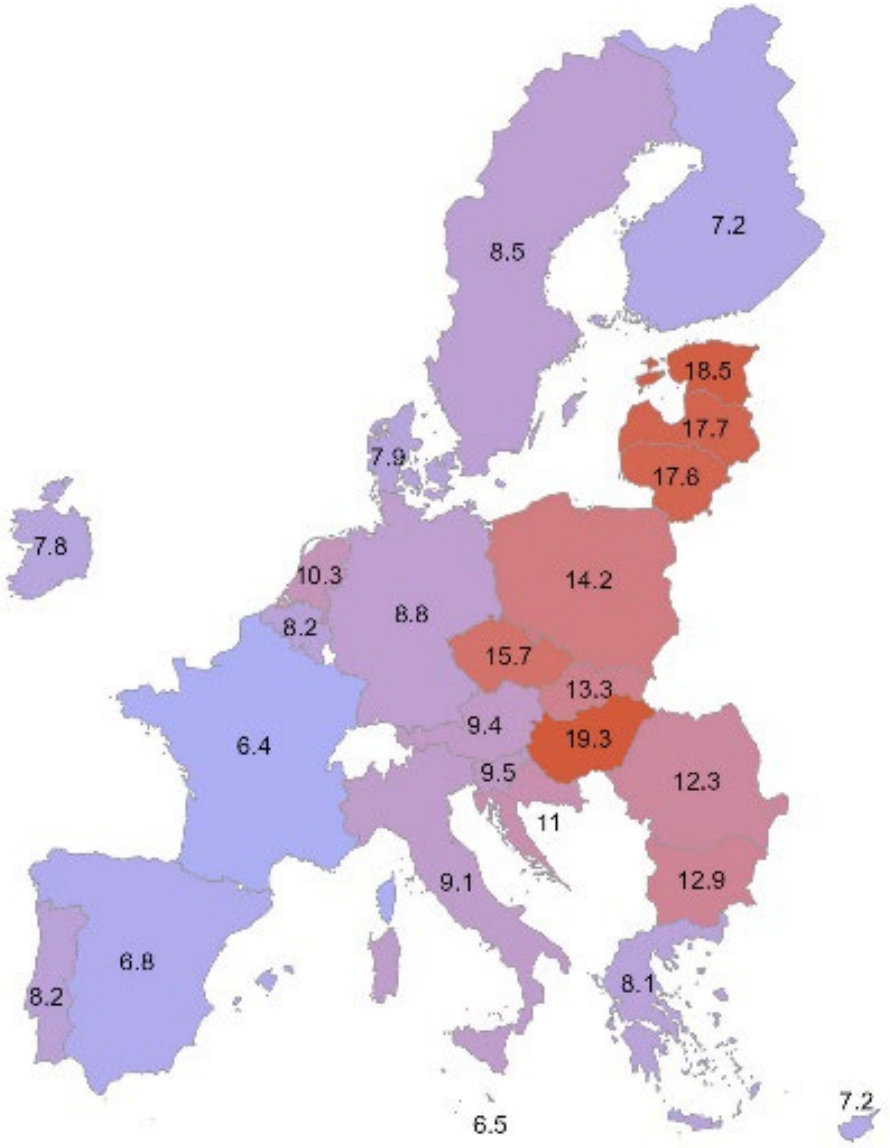
Source: Federle et al. (2024) based on Stinnett et al., 2002.

1.2 The economic spill-overs of war

In order to gain an initial understanding of the importance of the macroeconomic consequences of wars and their spill-overs to other countries, it is revealing to look at a map of Europe in the aftermath of the Russian invasion of Ukraine, showing the geographical dispersion of inflation in the EU between March 2022 and June 2023 (Figure 1). There is a clear visual gradient going from east to west. This illustrates that both economists and central bankers, have to turn their attention to the macroeconomic spillovers of wars.

In line with the suggestive evidence from the Russian invasion of Ukraine, we find that the economic toll of war is not confined to war sites or the other direct parties to the war, but spill over to other countries. The size of these spillovers – namely output losses and inflation hikes – critically depends on geographic distance to the war size. We offer a structural interpretation of the evidence through the lens of an international business cycle model.

Figure 1
Geographical dispersion of inflation after February 2022



Sources: Eurostat, own calculations.
Notes: average monthly year on year inflation (HCPI), March 2022 – June 2023.

2 The economic consequences of war

The consequences of war are manifold and include death and destruction, disruption of trade, and severe damage to public finances. For countries that experience war on their own soil, this typically results not only in a humanitarian, but also an economic catastrophe. However, it should be noted that wars and the associated rise in military spending can also have expansionary effects, which may assist in the recovery from economic depressions. The productive potential of an economy plays a significant role in determining the outcome of wars. It is therefore evident that an understanding

of the economic implications of war is of significant importance to economists and policy makers alike.

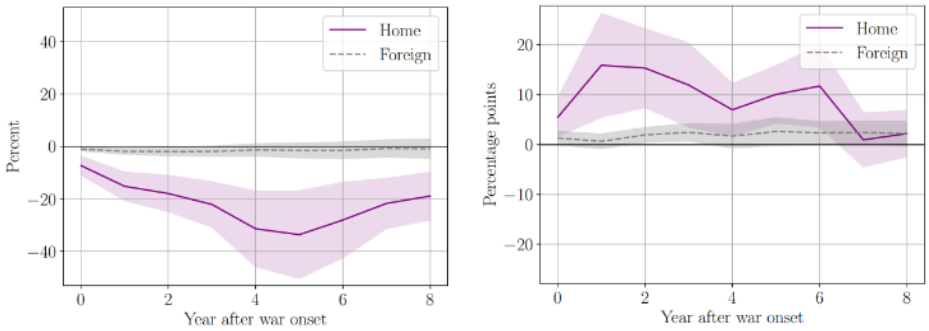
2.1 The economic impact on the war site

Following up on the suggestive evidence of figure 1, we analyse the economic effects of wars more formally. Using linear projection models, we estimate the effects of a war on a country's own territory, in terms of output and inflation. Chart 3 shows the adjustment of real GDP and inflation after the outbreak of war, indicated by year zero on the horizontal axis. The estimates for the war site are shown by the solid purple line, with 90% confidence bounds represented by the shaded purple area. Output in the war site drops by roughly one third, five years after the onset of the war. The war site also experiences a large and persistent increase in inflation. The effect peaks at about 15 percentage points in the first year following the start of the war, but remains persistently high up to 7 years after the onset of the war.

Chart 2

Strong adverse effect on war site, no spillovers on average

(linear model, point estimates and 90% confidence bounds based on Driscoll-Kraay SE)



Sources: Federle et al. (2024).
Notes: Figure shows how GDP and Inflation adjust in response to the start of war, in the war site (solid purple line), and in other countries (grey dashed line). Left panel shows percentage deviation of GDP from trend; right panel shows deviation of inflation from pre-war rate in percentage points. Horizontal axis measures time in years since the start of war. Shaded areas denote 90% confidence bounds.

2.2 The economic spill-overs to other countries

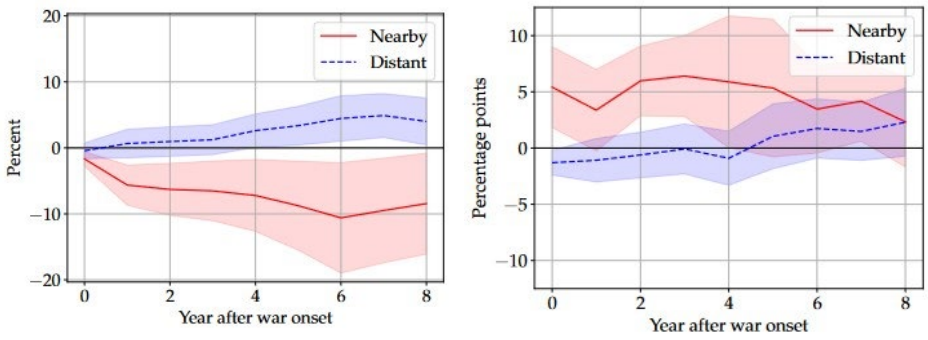
Chart 2 also shows the average economic spill-overs of war to other countries, in terms of output and inflation. These averages are formed over are the countries in our sample that are not war sites, although they may or may not be parties to the war, and are represented by the grey dashed lines in both panels. The average spillovers to other countries are very mild, and to a large extend not statistically significant. However, it turns out that these estimates mask considerable heterogeneity across countries.

We therefore 'zoom in' and allow the effect of the spill-overs differ depending on the geographic distance of a country to the war site. Chart 3 shows the heterogeneity of responses. The red solid line represents estimates for a 'nearby' country – that is, a

direct neighbour to the war site. The blue dashed line represents a country that is 'distant' – as far away as possible from the war site.

Chart 3

Zooming in: spillovers by distance on GDP (left) and inflation (right)



Sources: Federle et al. (2024).
Notes: Figure shows how GDP and Inflation adjust in response to the start of war, in nearby (solid red line) and distant (blue dashed line) countries. Left panel shows percentage deviation of GDP from trend; right panel shows deviation of inflation from pre-war rate in percentage points. Horizontal axis measures time in years since the start of war. Shaded areas denote 90% confidence bounds.

The difference between the nearby and the distant country is stark, and it is worth noting that the spillovers for most countries will fall somewhere in the range spanned by these two limiting cases. In the nearby country, real GDP declines upon impact and remains persistently weaker. Five years after the start of the war, GDP is more than 10% below its pre-war trend. At the same time, inflation rises significantly, reaching more than 6 percentage points above the pre-war trend 3 years after the onset of the war. This suggests that the supply shock in the war site also generates strong supply-side spillovers to the neighbouring economy. In contrast, the most distant countries experience stable inflation and even positive output spillovers. Table 1 shows the peak effect over the projection horizon for wars of sample-average size.

Table 1

Economic effects of wars

	Output (in percent)	Inflation (in ppts)
Home	-33.9***	15.9**
	-10.1	-6.3
Nearby	**-10.6****	**6.4*****
	-5.1	-2.2
Distant	4.9**	2.3
	-2	-1.8

Sources: Federle et al. (2024).
Notes: Peak effect over projection horizon for average large war (war site 6% of global GDP).

2.3 Understanding the spill-over mechanism

In order to explain the transmission channel from the war-site economy to the rest of the world, we turn to a state-of- the-art model of the world economy in the spirit of

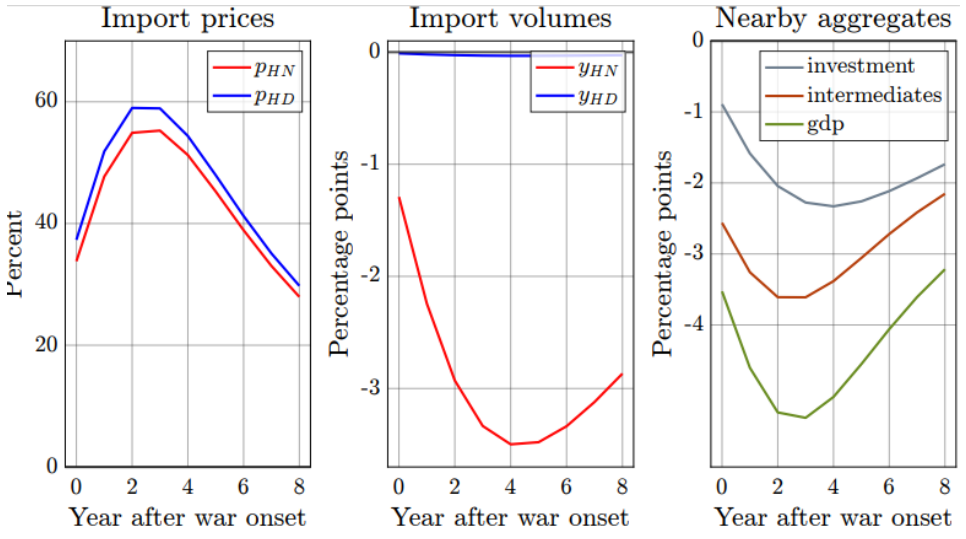
Gopinath et al. (2020). We assume that the war affects the war site in two ways, consistent with empirical evidence. First, a sizable fraction of its capital stock is destroyed. Second, productivity declines persistently. The decline in productivity is consistent with the notion that a shift to a war economy entails significant efficiency losses. We further assume that the country which is the war site (Home), is closely integrated with a nearby country (Nearby) but much less with a third country further away (Distant).

The shock to the model is the onset of a war in Home. At the war site, the war destroys the capital stock and lowers productivity, e.g. as workers are removed from productive jobs and turned into soldiers. Furthermore, the onset of the war also increases military spending, but this effect is heterogenous over the different countries. Calibrated to our data, the model is able to recreate the empirical patterns of output and inflation spill-overs. The mechanism is as follows: War acts as an adverse supply shock in the war site that spills over to neighbours through a trade channel. In the neighbouring country, there is an endogenous investment contraction as intermediate imports decline. For the distant economy, there's a positive effect stemming from some degree of trade rerouting and the increase in military spending.

Chart 4 shows the response to the adverse supply shock in Home. The left panel shows the strong effect of the supply-side shock in Home on the prices for imports from Home in the Nearby (red) and the Distant (blue) country. The middle panel shows the strong decline in import volumes for Nearby, due to the close economic integration with Home. The reaction of imports in Distant is close to zero. The decreased import of intermediates from home leads to an endogenous contraction with falling output and investment in the Nearby economy, as shown in the right panel.

Chart 4

Inspecting the mechanism: Supply side spillovers to Nearby



Sources: Federle et al. (2024).
Notes: Model reaction to a war shock in Home.

3 Implications for Central Banks

We show that wars operate as negative supply shocks, with strong spillovers in the vicinity of war sites, but the effects decline with distance. For countries close to war sites, this gives rise to inflationary pressure and pose difficult trade-offs for central banks, as the fallout of war cannot be fully contained. Furthermore, these spill-over effects of wars are measurable over many years in our data. This implies that central banks cannot simply 'look through' inflationary pressures of nearby wars, as they would with more transient supply shocks. Instead, they must consider the long-term nature of these pressures and the sustained impact on price stability.

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