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## War-Time Destruction and the Persistence of Economic Activity

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# War-Time Destruction and the Persistence of Economic Activity\*

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## Abstract

A key prediction of a large class of theoretical models is that the location of economic activity is not necessarily determined by fundamentals. To test the empirical relevance of these ideas requires a natural experiment in which a large but ultimately temporary shock dislocates economic activity. Following Davis and Weinstein (2002) a number of papers have used war-time destruction as such a temporary shock. In this paper we revisit this debate and use the cities that were part of pre-war Germany and become part of Poland after the Second World War as a natural experiment. We show that also in this case cities recover surprisingly fast from the war-time shock despite heavy destruction and the expulsion of the entire population. Our results suggest that either the location and size of cities is indeed determined by fundamentals or that even heavily destroyed cities are rebuilt because the ruins contain valuable surviving structures. We provide suggestive qualitative evidence that the second interpretation is more likely correct.

*Keywords:* Location of Economic Activity, War-time Destruction, German Division

*JEL:* F14, F15, N74

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# 1 Introduction

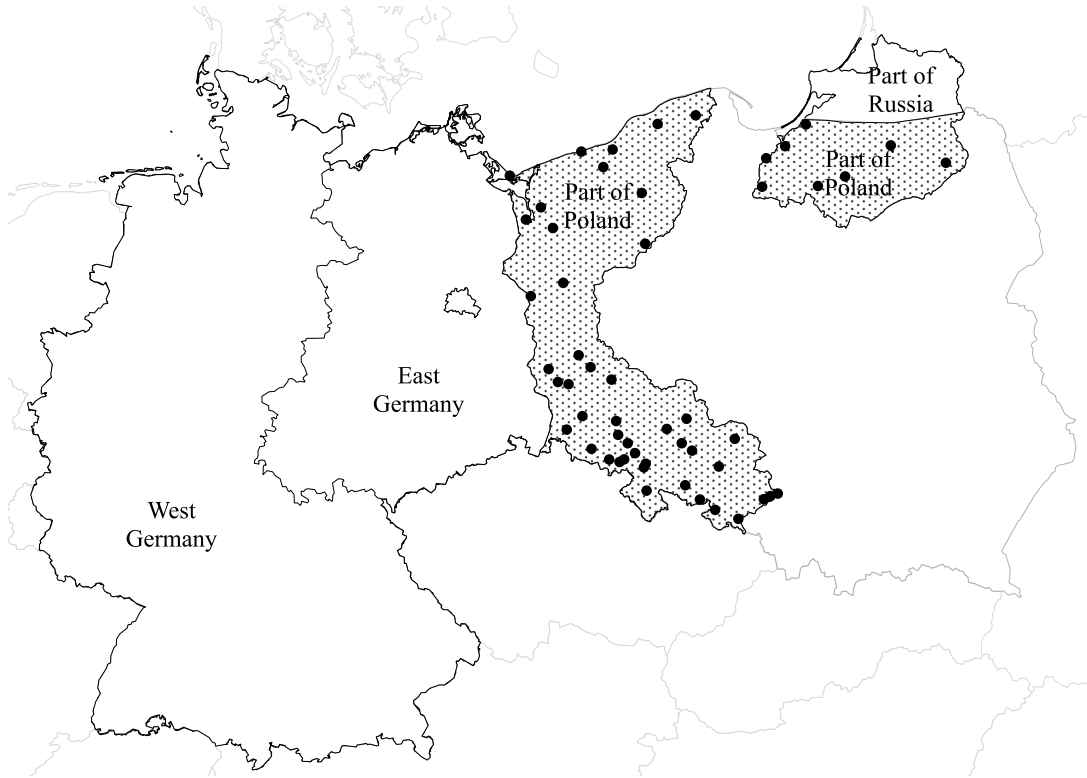
A key prediction of a large class of theoretical models is that the location of economic activity is not necessarily determined by fundamentals. While these ideas date back to at least Marshall (1920), they have returned to prominence in the literature on new economic geography following Krugman (1991). In this literature agglomerations of economic activity are sustained by the interplay of agglomeration and dispersion forces in a process of cumulative causation. Once a location has gained a critical mass of economic activity it can attract further activity and becomes self-sustaining. Where an agglomeration of economic activity forms depends on initial conditions, historical accidents or agents expectations.

To test the empirical relevance of these ideas requires a natural experiment in which a large but ultimately temporary shock dislocates an agglomeration of economic activity. If the activity returns to its original configuration after the shock has dissipated, this suggest that location choices are determined by the fundamental attractiveness of locations. If, however, a temporary shock results in a permanent shift in the location of economic activity, this would be powerful evidence for the importance of historical accident and multiple-steady states in location.

In a seminal paper, Davis and Weinstein (2002) propose war-time destruction as a large temporary shock, which can potentially dislocate agglomerations of economic activity. They show that Japanese cities that were heavily destroyed during the Second World War fully recover from this shock in less than 20 years. Their conclusion from this evidence is that if even vast levels of war-time destruction cannot permanently shift the location of economic activity, multiple steady-states in location must be of primarily theoretical interest. This finding has been confirmed in number of different contexts. Davis and Weinstein (2008) show that not only the total population of Japanese cities but also the location of specific industries return to their pre-war pattern. Brakman et al. (2004) show that a similar pattern holds for war-time destruction in West Germany. Miguel and Roland (2011) find that even the sweeping bombing campaign in Vietnam has not changed location choices across regions of Vietnam.<sup>1</sup>

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<sup>1</sup>An exception are Bosker et al. (2007, 2008) who find some evidence of a permanent change in the distribution



In this paper we provide new evidence on the ability of war-time destruction to shift the economy between multiple steady-states. In particular we consider the case of the cities that were part of pre-war Germany and became part of Poland after the Second World War. The map above shows the locations of the former German cities that had at least 10,000 inhabitants in the 1919 census and became part of Poland after the Second World War. Many of these cities were heavily destroyed during the final months of the war. In addition the German population of these cities was virtually completely expelled during the closing months of the war and in its immediate aftermath.

This natural experiment has a number of attractive features. First, a key concern with the evidence presented in Davis and Weinstein (2002) is that patriotism may have motivated the rebuilding of the Japanese cities in the wake of the Second World War. In contrast, Poland felt no patriotic obligations to rebuild these “enemy” cities, if anything the opposite.

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of population across West German cities after the Second World War.

Second, another concern with the experience of the Japanese cities is that social networks that continued to exist made rebuilding the natural focal point after the war. As virtually the complete population was expelled from the German cities that became part of Poland, this is not a concern in this natural experiment. Finally, in the case of Japan, the legal system and property rights persisted after the war. In the context of the former Germany cities, all property rights and the entire legal system were eliminated by the expulsion of the population and the transfer of the cities to a new state.

Our basic empirical strategy is to compare the long-term population growth of these cities prior to the Second World War and in the decades after the war. Our main finding is that, similar to the experience of Japanese cities, the former German cities that become part of Poland fully recover from the war-time shock. This result is particularly surprising given the extensive destruction of some of these cities and the fact that in the 1946 Polish census there are several cities that record population levels of less than 20 percent of their 1939 population. However, even these cities recover over the post-war period. These results suggest that the rebuilding of cities even after catastrophic levels of destruction is not driven by feelings of patriotism, surviving social networks or the continuing existence of property titles.

We use qualitative evidence to explore two possible interpretations of these findings. One possible conclusion from these results is that the location and size of cities is simply determined by the fundamental attractiveness of different locations. While it is not obvious what these fundamentals are for many of the cities in our sample, we cannot rule out this possibility. The main alternative interpretation of our results is that even heavily destroyed cities are rebuilt, because the ruins of cities contain many valuable surviving structures, which makes it cheaper to rebuild a city than to start a new settlement from scratch or extend another city. We provide suggestive evidence from Polish post-war planning documents, which suggest that reusing the damaged cities, was a fundamental part of the strategy to minimize the costs of post-war rebuilding.

Apart from war-time destruction, a few other natural experiments have been proposed to test whether temporary shocks can have a permanent effect on the location of economic activity.

Redding, Sturm and Wolf (2011) use the Division and Reunification of East and West Germany as a shock to the relative attractiveness of locations. They show that Division, which ultimately turned out to be temporary, has permanently shifted the hub of German air traffic from Berlin to Frankfurt. Bleakley and Lin (2012) trace the historical location of portage sites. They find that even though portage has become economically irrelevant more than a century ago, former portage sites are typically still the location of economic agglomerations today. Our results help to reconcile the difference in findings between these approaches and the literature which has considered war-time destruction as a temporary shock.

Finally, our paper also contributes to the wider literature on multiple-steady states and multiple equilibria. Classic contributions to this literature include Arthur (1994) and David (1985), which argue that historical accidents can move the economy between different steady-states. The role of expectations in triggering shifts between different equilibria is analyzed in Cooper and John (1988), Murphy, Shleifer, and Vishny (1989) and Shleifer (1986). The relative importance of historical accidents versus expectations in shifting the economy between different steady-states is discussed in Krugman (1991b).

The remainder of this paper is organized as follows. Section 2 provides some historical background. Section 3 discusses the data sources and our empirical strategy. Section 4 presents the empirical results. Section 5 discusses the implications of our results and Section 6 concludes.