

VOX

Research-based policy analysis and commentary from leading economists

Disasters, recoveries, and the equity premium

Robert Barro Emi Nakamura Jón Steinsson Jose F. Ursua

8 July 2010

Previous research suggests that the potential for rare, but large, economic disasters helps explain the equity-premium and related asset-pricing puzzles. This column presents evidence from a new empirical model of consumption disasters and discusses a range of assumptions required for the model to predict the observed long-run average equity premium.

Previous research, including Rietz (1988) and Gabaix (2009), suggests that the potential for rare, but large, economic disasters helps to explain the equity-premium and related asset-pricing puzzles. Motivated by these findings, our research described in Barro et al. (2010) uses data on per capita personal consumer expenditure for 24 countries over more than a century to estimate an empirical model of consumption disasters. The underlying data, from our paper Barro and Ursua (2008), are [online](#).

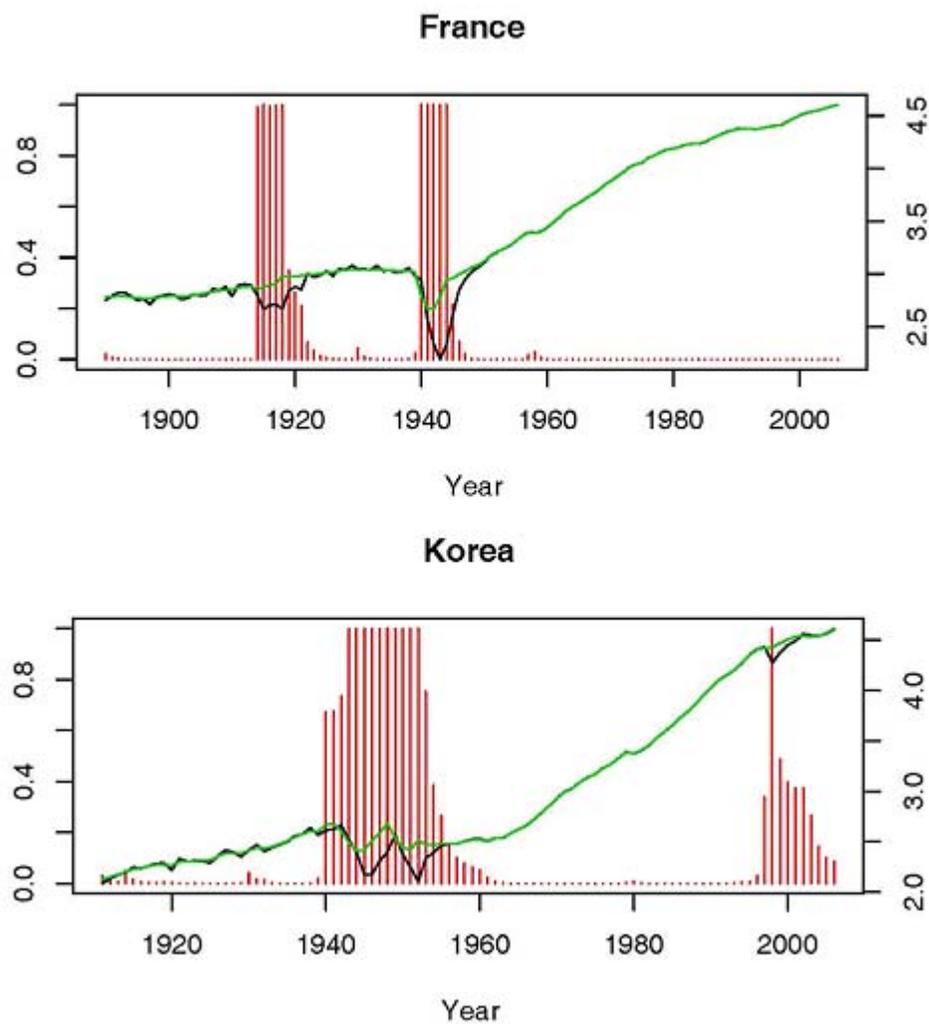
The model, estimated using Bayesian methods, extends previous empirical research in several important respects.

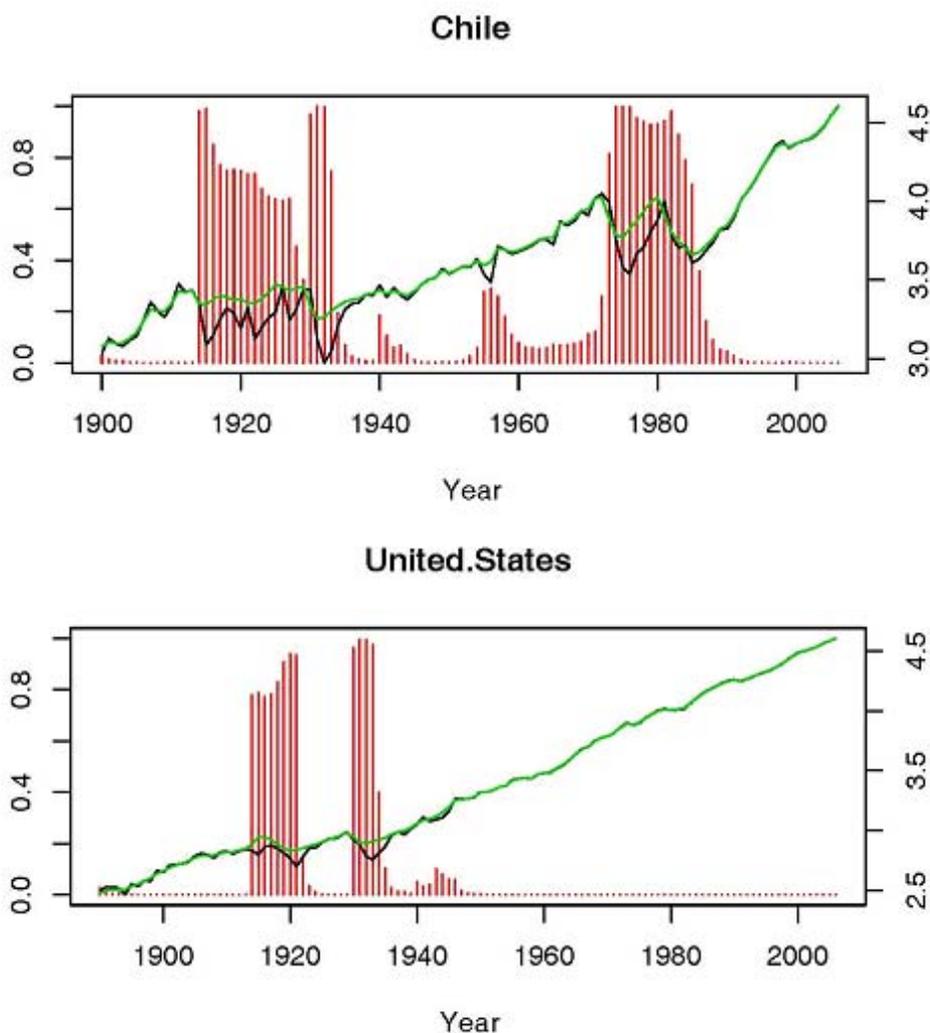
- First, instead of assuming that disasters have completely permanent effects on levels of GDP and consumption, the model allows for recoveries – periods of abnormally high average growth – following disasters such as the world wars.
- Second, instead of measuring disasters informally as peak-to-trough declines (and approximating theoretically by downward jumps at an instant of time), the analysis allows for stochastically varying durations of disasters.
- Finally, the estimation allows the timing of disasters to be correlated across countries.

Empirically, the two world wars and the Great Depression show up as clear global disaster events. Other major disasters include South Korea during the Asian

Financial Crisis, Chile in two periods since the Second World War, and Spain over a long interval that includes the Civil War. Figure 1 shows results for posterior disaster probabilities in four countries: France, South Korea, Chile, and the US.

Figure 1. Ex post disaster probabilities in four countries

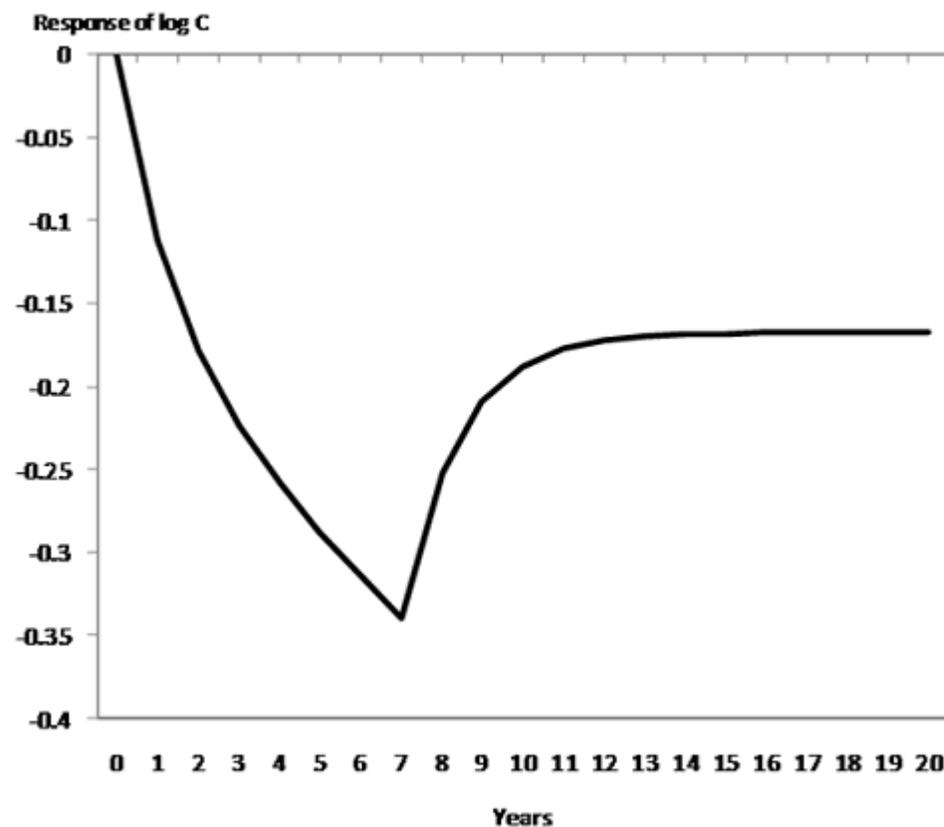




Note: Black lines show logs of actual consumption and green lines show logs of potential consumption, toward which actual consumption moves in the long run. The vertical axes show ex post probabilities of disasters.

Our estimates imply that the probability of entering a disaster is 1.7% per year and that disasters have a mean duration of 6.5 years. In the average disaster, consumption falls by 30% in the short run but only 14% in the long run. That is, recoveries eventually reverse roughly half of the fall in consumption during a disaster. Figure 2 plots the course of an average disaster, given our findings.

Figure 2. A typical disaster



Note: The figure plots the evolution of log consumption during and after a disaster that strikes in period 1 and lasts for 7 years. In this simulation, the key disaster variables take on values equal to their posterior means in each period. We also abstract from trend growth and assume that all other shocks are equal to zero.

We investigate the asset-pricing implications of the estimated stochastic process for rare consumption disasters. In a model with power utility and standard values for risk aversion, stocks surge at the onset of a disaster due to agents' strong desire to save. This counterfactual prediction leads to a low equity premium, especially in normal times. In contrast, a model with Epstein-Zin-Weil preferences and an intertemporal elasticity of substitution equal to 2 eliminates these counterfactual patterns. Thus, we focus on the latter model.

The model gets close to the observed long-run average equity premium of about 5% per year (for unlevered equity) if the coefficient of relative risk aversion, γ , is around 6.5. This value exceeds the range for γ of 3 to 4 found in previous research. The biggest reason for the change is the treatment of disasters as roughly half temporary. If the disasters that we isolated were, instead, fully permanent, a value $\gamma=4.5$ would suffice to accord with the observed equity premium.

The main effect from allowing for multi-period disasters is a weakening in the

correlation during disasters between the declines in consumption and stock prices. If we had assumed instead that disasters occurred in an instant (and were also fully permanent), then a coefficient of relative risk aversion around 3 would have been enough to generate an average equity premium of 5% per year.

Finally, the allowance for cross-country correlation of disaster events is important for describing the global nature of disasters. More fundamentally, the extent to which shocks are worldwide, rather than local, would matter for determining each country's consumption in each year, with the results depending on the extent of economic integration across countries. However, since our results are conditioned on given time series for each country on consumption, our results on asset pricing would not change if we ignored the cross-country correlation of disasters.

References

Barro, Robert J. (2006). "[Rare Disasters and Asset Markets in the Twentieth Century](#)", *Quarterly Journal of Economics*, 121:823-866.

Barro, Robert J and Jose F. Ursua (2008). "[Macroeconomic Crises since 1870](#)," *Brookings Papers on Economic Activity*, Spring, 255-350.

Gabaix, Xavier (2009), "[Variable Rare Disasters: An Exactly Solved Framework for Ten Puzzles in Macro-Finance](#)," unpublished, New York University, December.

Barro, Robert J, Emi Nakamura, Jon Steinsson, and Jose F Ursua (2010), "[Crises and Recoveries in an Empirical Model of Consumption Disasters](#)," unpublished, Columbia University, April.

Rietz, Thomas A (1988), "[The Equity Risk Premium: A Solution](#)", *Journal of Monetary Economics*, 22:117-131.

This article may be reproduced with appropriate attribution. See Copyright (below).

Topics: [Financial markets](#), [International finance](#)

Tags:

Comments