

# **On the Global Spread of Risk Panics**

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# 1' Summary

- Evidence: Strong comovement of equity prices across countries during the global crisis of 2008. Similarly strong comovement of equity price risk (VIX).
- Goal: A theory of risk contagion.
- Two-country model building on Bacchetta, Tille, and van Wincoop's (2010) closed economy work.
- Mean-variance preferences  $\Rightarrow$  Asset price depends on asset price risk  $\Rightarrow$  Self-fulfilling shifts in risk are possible, with effects on asset prices.
- A (weak) macro fundamental becomes the trigger of expectation coordination and panic.

# The Heart of the Argument—as I See It

## Premise

- Masanao Aoki (1981), *Dynamic Analysis of Open Economies*, Academic Press:
  - Two-country models that satisfy certain symmetry requirements across countries can be solved by separating a system for world aggregates and a system for cross-country differences.
  - For any pair of home and foreign variables  $X_H$  and  $X_F$ , given the solution for the world aggregate  $X^W \equiv nX_H + (1 - n)X_F$  and the solution for the difference  $X^D \equiv X_H - X_F$ , the solutions for  $X_H$  and  $X_F$  are obtained as:

$$X_H = X^W + (1 - n)X^D \quad \text{and} \quad X_F = X^W - nX^D.$$

- This solution technique is particularly convenient as the system for world aggregates behaves as closed-economy system, and cross-country differences isolate purely relative effects.
- The technique has been widely used in the literature on two-country (or even multiple-country) models, from the non-microfounded literature on policy coordination (see Canzoneri and Henderson's 1991 MIT Press book) to the huge wave of microfounded literature started by Obstfeld and Rogoff's 1995 *JPE* article.

## The Heart of the Argument—as I See It, Continued

- Bacchetta and van Wincoop’s paper is an application of Aoki’s technique augmented for sunspots in asset prices.
- They set up a model that satisfies the symmetry requirements for separation of world aggregates and cross-country differences, such that the world aggregate behaves exactly like the closed economy of their work with Cedric Tille.
- In particular, mean-variance preferences ensure that the world equity price  $Q_t^W$  is such that:

$$Q_t^W = \frac{1}{R} E_t (Z_{t+1}^W + Q_{t+1}^W) - \frac{\gamma K}{WR} \text{var}_t (Z_{t+1}^W + Q_{t+1}^W),$$

where  $R$  is the constant interest rate on bonds,  $Z_t^W$  is the world aggregate dividend,  $\gamma$  is the aversion to variance in utility,  $K$  is the per-capita number of “trees” in each country, and  $W$  is agents’ wealth at birth.

## The Heart of the Argument—as I See It, Continued

$$Q_t^W = \frac{1}{R} E_t (Z_{t+1}^W + Q_{t+1}^W) - \frac{\gamma K}{WR} \text{var}_t (Z_{t+1}^W + Q_{t+1}^W).$$

- Because the current price depends on the expectation of future price and the conditional variance of future price, and the future price in turn depends on the conditional variance of price in the following period, the world equity price can be driven by sunspot fluctuations:

$$Q_t^W = \tilde{Q}^W + v_H^W A_{Ht} + v_F^W A_{Ft} + V_H^W A_{Ht}^2,$$

where  $A_{Ht}$  and  $A_{Ft}$  are home and foreign macro fundamentals (exogenous  $AR(1)$ ), and the solutions for the constant  $\tilde{Q}^W$  and the coefficients  $v_H^W$ ,  $v_F^W$ , and  $V_H^W$  can be recovered with the method of undetermined coefficients.

- Absent sunspots, we have the fundamental (or minimum state variable, MSV) solution:

$$Q_t^W = \tilde{Q}^W + v_H^W A_{Ht} + v_F^W A_{Ft}.$$

- Bacchetta and van Wincoop focus on a particular type of sunspot in which the home fundamental takes the role to coordinate expectations. Hence the term  $V_H^W A_{Ht}^2$ .

## The Heart of the Argument—as I See It, Continued

- The rest of the paper characterizes (some of) the possible sunspot fluctuations ( $V_H^W A_{Ht}^2$ ) and focuses on how these “panics” spread across countries by solving for the cross-country difference  $Q_t^D$  and recovering solutions for home and foreign equity prices.

- Since

$$Q_t^D = \frac{1}{R} E_t (Z_{t+1}^D + Q_{t+1}^D) - \frac{\gamma K}{WR} cov_t (Z_{t+1}^D + Q_{t+1}^D, Z_{t+1}^W + Q_{t+1}^W),$$

the solution for  $Q_t^D$  is also subject to the possibility of sunspots:

$$Q_t^D = \tilde{Q}^D + v_H^D A_{Ht} + v_F^D A_{Ft} + V_H^D A_{Ht}^2,$$

but Bacchetta and van Wincoop really downplay these “relative” sunspots by arguing that  $V_H^D = 0$  is the most plausible scenario ( $V_H^D$  is indeterminate).

## Panic Spread versus Panic “Allocation”

- By building a symmetric model for solution with Aoki’s technique in which world variables are subject to sunspot fluctuations “by design,” it seems to me that this paper has little to say about how a panic *spreads* across the globe.
  - The panic is global to begin with.
- What the paper really addresses is the question of how the effects of this global panic are *allocated* across countries through potentially different relative effects, and what are the conditions subject to which the global panic has similar effects across countries.
  - In other words, going back to  $Q_H = Q^W + (1 - n)Q^D$  and  $Q_F = Q^W - nQ^D$ , the paper tells us the conditions under which the panic dynamics of  $Q_H$  and  $Q_F$  are mainly driven by  $Q^W$ .
- I would argue that this is not an analysis of contagion.
- To study contagion, I would like the paper to tell us *how* a panic that starts in a country or market or group of agents *becomes* global.
  - What are the channels through which panic becomes global? Structural interdependence? Information transmission? Behavioral story?
- I do not see that in this paper, where contagion is “subsumed” in the assumption of a global panic to begin with.

## Do We Believe in Sunspots?

- I am always a bit uncomfortable with sunspot-driven stories.
- The sunspots Bacchetta and van Wincoop focus on are only one of the possible sunspot equilibria one could consider for this model.
- Why this rather than others?
- There is an element of arbitrariness that I find unsettling.
- Moreover, in different contexts, scholars have argued against the relevance and plausibility of sunspot equilibria.



## Do We Believe in Sunspots? Continued

- For instance, McCallum (*JME* 2003, *JEDC* 2007) argues that the MSV solution is the only relevant one in (linear) rational expectation models based on the criteria of learnability and E-stability (Evans and Honkapohja, 2001, *Learning and Expectations in Macroeconomics*, Princeton U Press).
  - Basic presumption: Individual agents do not have exact knowledge of the economy's structure, so it must be considered whether plausible expectation correction mechanisms are convergent (E-stable).
  - The MSV solution is iteratively E-stable and least-square learnable in real time.
  - Sunspot solutions do not satisfy these criteria.
- Would Bacchetta and van Wincoop's results (and those with Tille) stand against this type of results?
- Do we really believe the global crisis was the result of sunspots?

## Suppose We Believe in Sunspots

- Suppose we believe that a global indeterminacy was indeed a factor in the crisis.
- A recent article by Jääskelä and Kulish (*JEDC* 2010, “The Butterfly Effect of Small Open Economies”) provides an alternative lens to look at Bacchetta and van Wincoop’s results.
  - Two-country, New Keynesian monetary model: small country, large country (approximately, the world).
  - Large country policy results in indeterminacy.
  - Then, small country shocks (which have no effect on large country under determinacy) propagate to the world (“butterfly effect”).
- Rose and Spiegel (2010): Rest-of-the-world exposure to U.S. assets did not matter for propagation of the crisis.
- Put differently, the crisis spread also to markets from whose perspective, in terms of exposure, the U.S. trouble-assets were like the small economy of Jääskelä and Kulish.
- If global financial market behavior is subject to indeterminacy, a shock to U.S. trouble-assets can affect the entire world.
- Still unclear how contagion really works at a deeper level though.

## Conclusion

- From the paper's Conclusion: "The main goal of this paper is to shed light on how a global financial panic can spread across the globe."
- Problem: If the panic is global (as implied by the approach), it has already spread across the globe, and what we are really studying is how its effects are "allocated" across the globe.
- The interesting question about panic spread (or contagion) is how a *local* panic *becomes global*.
- By designing a model in which panic is global "by assumption" and then relying on Aoki's technique, it seems to me that Bacchetta and van Wincoop are not addressing this question.
- I also remain uncomfortable with stories based on sunspots.
- So... fun paper that I enjoyed reading, but I look forward to seeing more work on this topic.