THE SHIFT OF CYBERNETICS FROM THE US TO EUROPE: IMPLICATIONS FOR UNDERSTANDING THE FINANCIAL CRISIS

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A brief history of cybernetics

- Created in the U.S. during and after World War II
- Many key scientists were from Europe
- When they died, cybernetics research shifted back to Europe
- Cybernetics research has declined in the U.S. but is growing in Europe

The importance of cybernetics

- Cybernetics is a general theory of information-processing and decision-making
- It can be viewed as the foundation of the social sciences in somewhat the same way that physics is the foundation of the engineering disciplines

Why cybernetics prospers in Europe

- Americans and Europeans look for meaning in different ways
- Americans reason "down" to find meaning in examples and applications
- Europeans reason "up" to find meaning in larger categories or social context
- Hence, Europeans see general theories as important and useful. Americans do not
- There will be a presentation on "Convergers and Divergers" tomorrow

Test the hypothesis

- To test the hypothesis that there has been a shift of cybernetics research to Europe, we looked at the authors of articles in the journal *Cybernetics and Systems* from 1988 to 2007 in five year intervals
- Table 1 shows the number of articles from each country
- Table 2 groups the countries into regions

Country	1988	1992	1997	2002	2007
Argentina	0	0	0	2	0
Australia	0	0	2	2	5
Austria	1	0	2	1	0
Bulgaria	0	1	1	0	0
Canada	3	1	1	1	0
Chile	0	0	0	0	1
China	3	1	3	3	2
Croatia	0	0	0	0	1
Czech Republic / Slovakia	0	3	0	0	0
France	0	0	2	1	1
Germany	0	3	3	0	2
Greece	0	2	0	0	0
India	0	0	1	0	3
Iran	0	0	0	0	1
Israel	1	2	0	0	1
Italy	2	1	1	0	2
Japan	0	0	2	1	1
Jordan	0	0	0	1	0
Mexico	0	0	0	1	0
New Zealand	0	0	0	0	1
Norway	0	1	0	0	0
Oman	0	0	0	1	0
Poland	0	0	0	2	4
Russia	0	0	0	1	0
Serbia	0	0	1	0	0
Singapore	1	0	1	1	0
Slovenia	0	0	1	0	1
Spain	1	10	1	4	3
Sweden	0	0	0	0	2
Switzerland	1	0	0	1	0
Taiwan	0	3	2	8	3
Turkey	0	0	0	0	1
UAE	0	0	0	1	0
UK	1	1	2	5	2
USA	7	7	7	1	3
Yugoslavia	0	1	0	0	0

Table 1. **Number of articles per volume and per country**

Area	Symbol	Countries
Asia	A	Australia, China, India, Japan, New Zealand, Singapore, Taiwan
Europe	E	Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Italy, Norway, Poland, Russia, Serbia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Yugoslavia
Latin America	LA	Argentina, Chile, Mexico
Middle East	ME	Iran, Israel, Jordan, Oman, Turkey, United Arab Emirates
North America	NA	Canada, United States of America

Table 2. **Countries grouped by region**

Testing the hypothesis

- Table 3 shows the number of articles from each region in each of the 5 years chosen
- Figure 1 shows a graph of the number of articles by region
- Table 4 shows the percentage increase or decrease for each region from 1988 to 2007

Area	Symbol	1988	1992	1997	2002	2007
Asia	A	4	4	11	15	15
Europe	E	6	23	14	15	18
Latin America	LA	0	0	0	3	1
Middle East	ME	1	2	0	3	3
North America	NA	10	8	8	2	3

Table 3. **Number of articles per volume and per region**

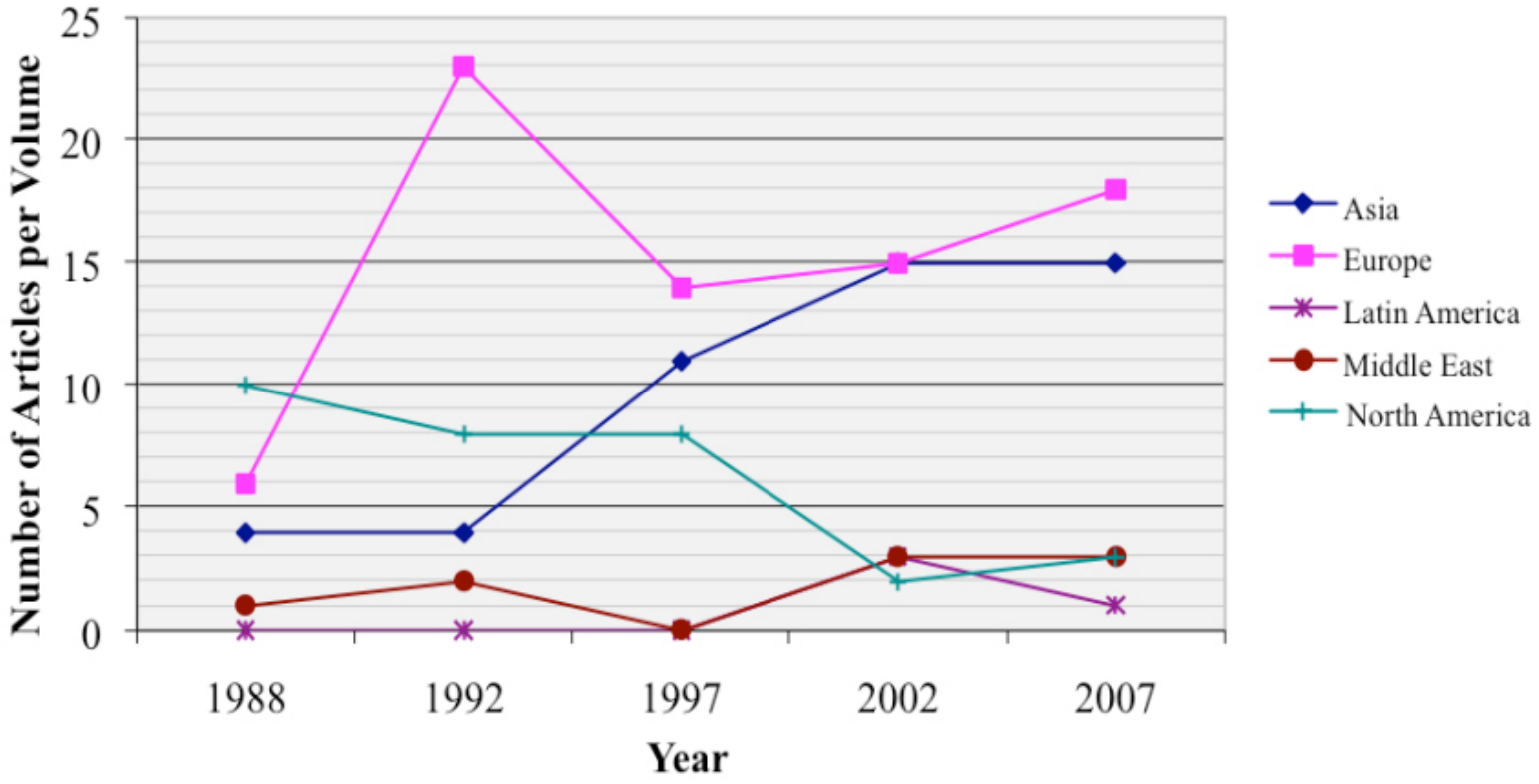

Figure 1. **Articles per volume by region over time**

Area	Symbol	1988	2007	Change	% Change
Asia	A	4	15	+11	+275%
Europe	E	6	18	+12	+200%
Latin America	LA	0	1	+1	N/A
Middle East	ME	1	3	+2	+200%
North America	NA	10	3	-7	-70%

Table 4. **Activity changes between 1988 and 2007 in absolute value and percentage**

Results of test of hypothesis

- North America was the leading contributor to cybernetics research in 1988
- Europe was second, Asia third, the Middle East fourth and Latin America fifth
- In 2007 Europe was first, Asia second, N. America and the Middle East were tied for third and Latin America was fourth

Implications of the shift of cybernetics research

- Since cybernetics provides a general theory for the social sciences, it can help to integrate economics, sociology, psychology and political science
- Reflexivity, a concept central to cybernetics, is used in explanations of boom and bust cycles
- Cybernetics also explains regulation, for example regulation of business by government, or regulation of economic activity

Recommendations for science policy

- To aid in creating an expanded theory of economics that better explains boom and bust cycles, support for cybernetics research in the U.S. could be resumed
- Educational programs to teach cybernetics need to be established at several universities in a way that is sustainable in discipline-oriented universities

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