

# **Trade Intensity and Business Cycle Synchronization: East Asia vs Europe**

Pradumna B. Rana, Tianyin Cheng, Wai-Mun Chia

**Nanyang Technological University**  
School of Humanities and Social Sciences  
Division of Economics  
Nanyang Avenue  
Singapore 639798

2010

# Introduction

- Europe:
  - Supra-national and more integrated economies were driven by strong political will and desire to promote peace and avoid wars
- East Asia:
  - Economic integration in East Asia was essentially market-led
  - It is only after the Asian Financial Crisis that East Asia started to supplement market-led integration with various official schemes to promote regional integration
  - ADB (2008) and Rana (2009) provide factors that led to this change in policy stance

# Introduction

Has rising trade intensity among East Asian and EU15 countries led to greater synchronization of business cycles?

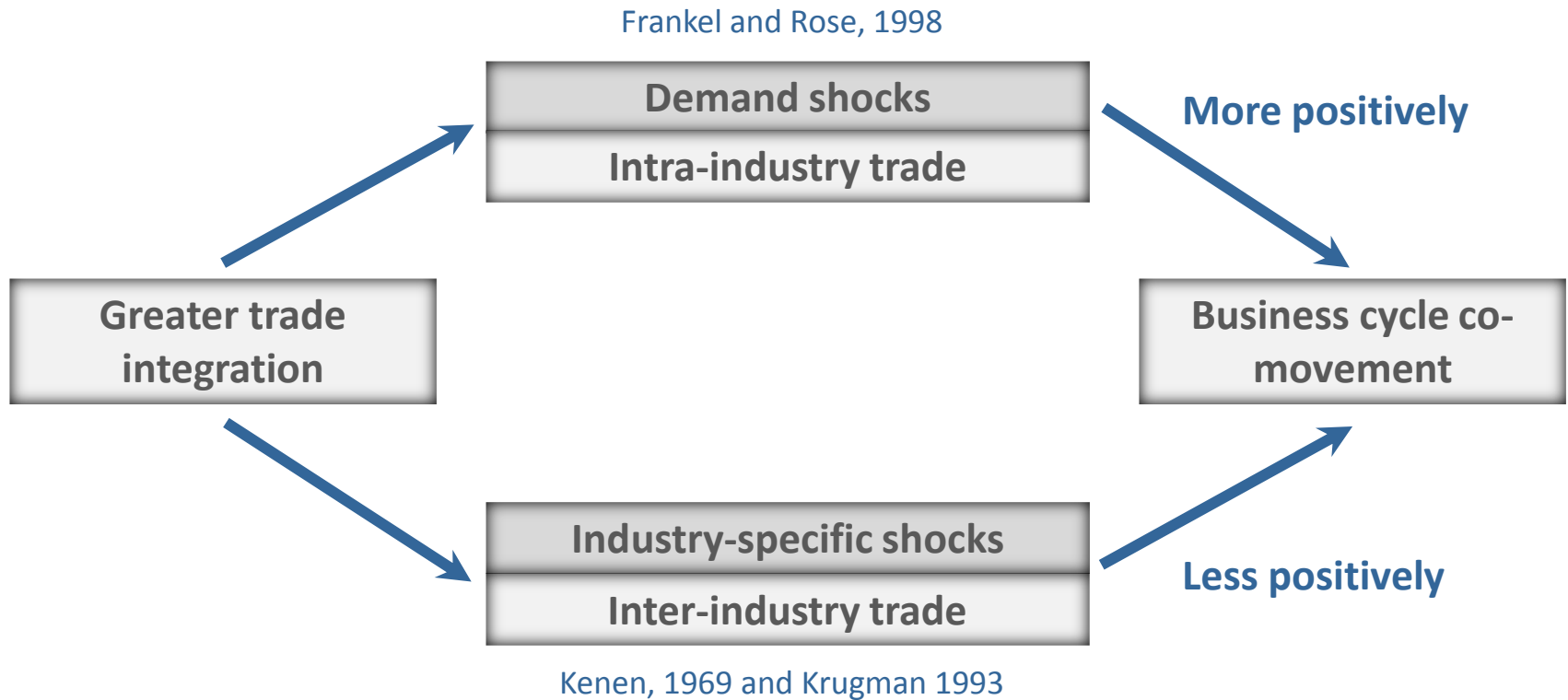


Is such synchronization higher in East Asia or Europe?



If trade integration among countries in the region has led to increased output co-movement, it would provide a strong case for macroeconomic policy coordination

# Trade Integration & Business Cycle Co-movement



# Trade Integration & Business Cycle Co-movement

- The seminal work on this topic is that of Frankel and Rose (1998)
- Several other authors have improved on the work of Frankel and Rose
  - Calderon, Chong and Stein (2003)
  - Shin and Wang (2004)

# In This Study

- We improve on the work of Shin and Wang (2004) in two ways:
  - Estimate an equation similar to that of Shin and Wang but as suggested by Frankel and Rose we introduce instrumental variables (Rana, 2008)
  - We provide a comparative analysis between East Asia and Europe

# Hypothesis & Evidence

- Hypothesis
  - Because production is more vertically integrated in East Asia as opposed to EU15, we expect the relation between trade integration and output co-movement to be stronger in East Asia as opposed to EU15
- Evidence
  - In East Asia 71% of parts and components exports go to other EA countries; in EU15, 56%  
(Baldwin and Carpenter, 2009)

# Data & Methodology

- Output co-movement:
  - Bilateral correlation of annual GDP (first differenced and logs) for two equal size periods 1987-1996 (Period I) and 1997-2006 (Period 2)
- Hodrick-Prescott filter and quadratic trend model:
  - No significant change in the resulting correlations
- Sample size:
  - 90 for East Asia
  - 210 for EU15



# Bilateral Trade Intensity

- Three proxies for bilateral trade intensity:

- Export

$$wx(i, j, T) = \ln \left( \frac{1}{|T|} \sum_{t \in T} \frac{x_{ijt}}{X_{it} + X_{jt}} \right)$$

- Import

$$wm(i, j, T) = \ln \left( \frac{1}{|T|} \sum_{t \in T} \frac{m_{ijt}}{M_{it} + M_{jt}} \right)$$

- Export and import

$$wt(i, j, T) = \ln \left( \frac{1}{|T|} \sum_{t \in T} \frac{x_{ijt} + m_{ijt}}{(X_{it} + X_{jt}) + (M_{it} + M_{jt})} \right)$$

# Intra-Industry Trade Intensity

- A measure of intra-industry trade intensity (IIT) is derived from Grubel and Lyold (1975):

$$IIT(i, j, T) = \frac{1}{|T|} \sum_{t \in T} \left( \frac{\sum_k (x_{ijt}^k + m_{ijt}^k) - \sum_k |x_{ijt}^k - m_{ijt}^k|}{\sum_k (x_{ijt}^k + m_{ijt}^k)} \right)$$

- We construct IIT at two digit (IIT<sub>2</sub>), three digit (IIT<sub>3</sub>) and four digit (IIT<sub>4</sub>) levels.

# Panel Regression

- We run the following panel regression to test the impact of trade intensity on business cycle synchronization:

$$yr(i, j, T) = \alpha(i, j) + \beta \text{ trade intensity}(i, j, T) + \gamma IIT(i, j, T) + \varepsilon(i, j, T)$$

# Regression Results

The effects of trade intensity on output co-movement among 10 EA countries and EU-15 for the period 1987-2006

	Panel regression with fixed effects			Panel regression with IV		
<b>10 East Asian Countries</b>						
wx	0.136 (0.548)			0.513 (1.617)		
wm		-0.159 (-0.800)			0.465 ** (2.139)	
wt			0.137 (0.449)			0.497 * (1.896)
IIT4	2.978 *** (3.854)	3.329 *** (4.644)	2.957 *** (3.380)	2.483 *** (4.099)	2.297 *** (3.805)	2.371 *** (3.895)
<b>EU-15</b>						
wx	-0.003 (-0.079)			-0.004 (-0.115)		
wm		0.046 (1.331)			0.036 (0.954)	
wt			0.002 (0.046)			-0.002 (-0.056)
IIT4	1.057 *** (4.305)	0.816 *** (3.463)	1.034 *** (4.101)	1.064 *** (4.266)	0.868 *** (3.521)	1.054 *** (4.096)

# Regression Results

## Gravity equations with trade intensity as dependent variables

	10 East Asian Countries			EA-15		
	wx	wm	wt	wx	wm	wt
Constant	-11.249 *** (-3.609)	-21.161 *** (-6.346)	-16.68 *** (-6.302)	-14.693 *** (-9.580)	-17.324 *** (-8.607)	-15.536 *** (-11.324)
Distance (in logs)	-0.446 *** (-3.286)	-0.321 ** (-2.099)	-0.388 *** (-3.372)	-0.233 ** (-2.520)	0.023 (0.224)	-0.079 (-1.016)
Border dummy	0.403 (1.247)	0.222 (0.657)	0.242 *** (0.881)	1.415 *** (5.856)	1.206 *** (4.447)	1.28 *** (6.302)
Common language	0.387 * (1.945)	0.913 *** (4.170)	0.7 *** (4.137)	0.043 (0.140)	-0.006 (-0.017)	0.023 (0.087)
Own GDP(in logs)	0.323 *** (4.629)	0.182 ** (2.360)	0.285 *** (4.817)	0.037 (0.613)	0.046 (0.642)	0.021 (0.400)
Partners GDP (in logs)	0.03 (0.300)	0.486 *** (4.422)	0.244 *** (2.899)	0.363 *** (7.430)	0.384 *** (6.163)	0.374 *** (8.650)
Observations	84	84	84	171	171	171
R-squared	0.318	0.379	0.445	0.601	0.514	0.627

# Policy Implications

- When intra-industry trade increases
  - Business cycles become more synchronized
  - The cost of a currency union falls
- EA is now broadly as interdependent in trade as EU
- Intra-industry trade and output co-movement is stronger in EA than in EU means that benefits from macroeconomic policy coordination are becoming larger
- The Chiang Mai Initiative Multilateralism is a step forward, but more needs to be done to institutionalize policy coordination in EA