Some Recent Economic Issues Related to China

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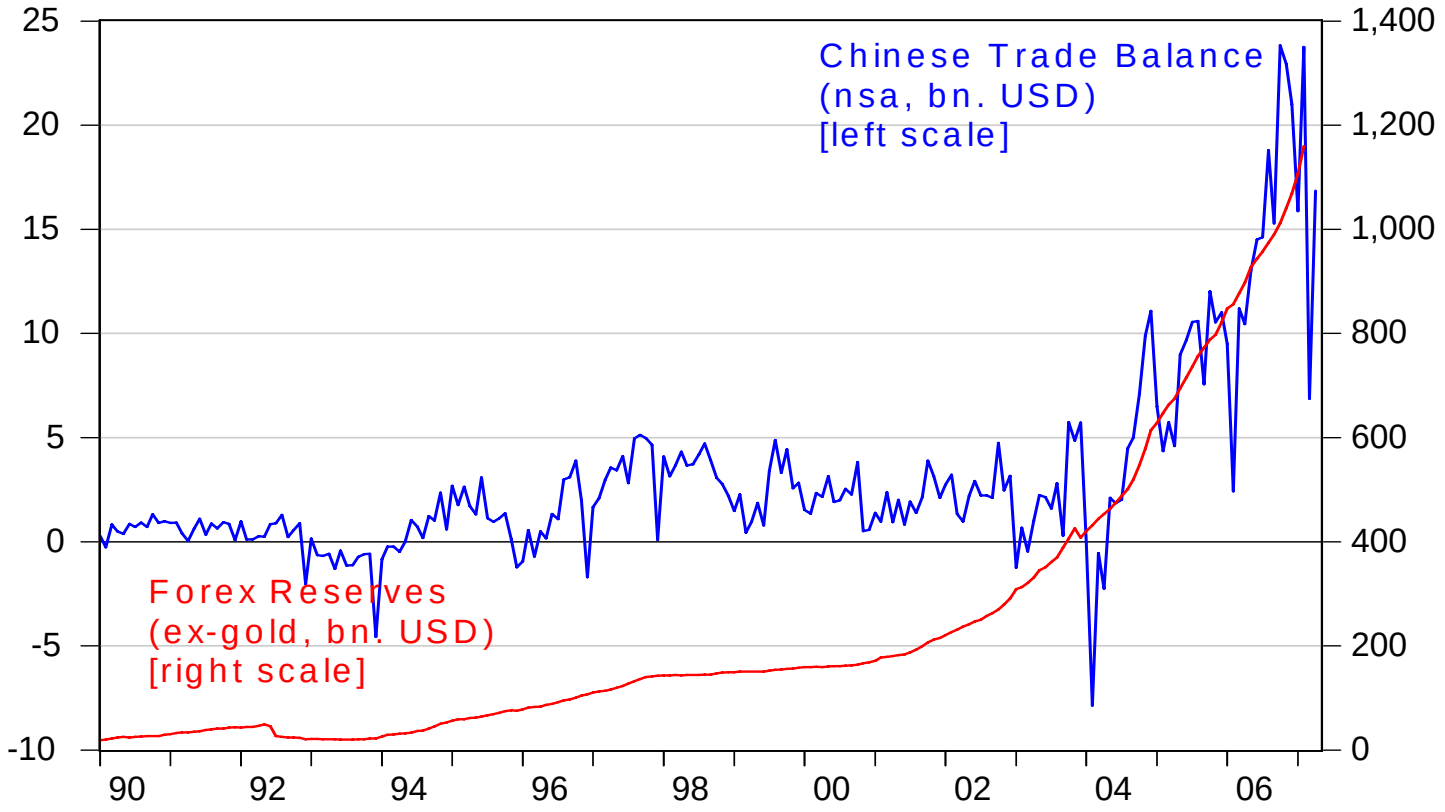
Some Recent Economic Issues Related to China

I: Renminbi Valuation – Too High, Too Low, or Do We Know?

Trade Balance and Forex Reserves



Source: IMF, International Financial Statistics

Overview

RMB – overvalued or undervalued

Drawbacks of trend deviations approach

Survey of other approaches

Deviations from absolute PPP approach

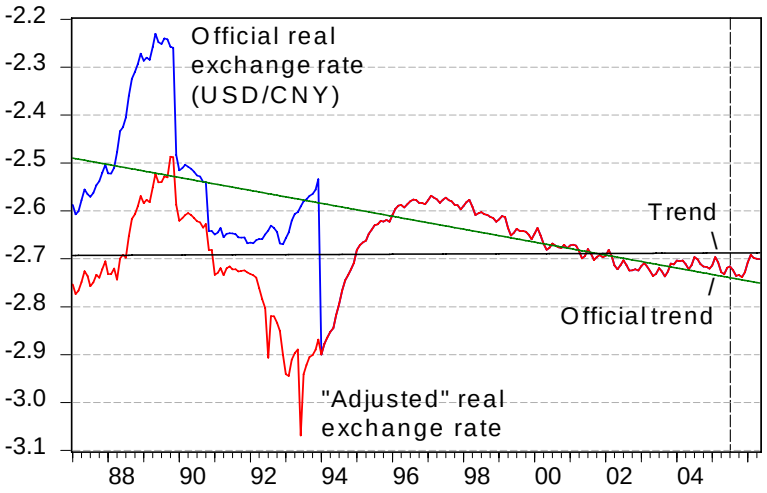
Accounting for serial correlation

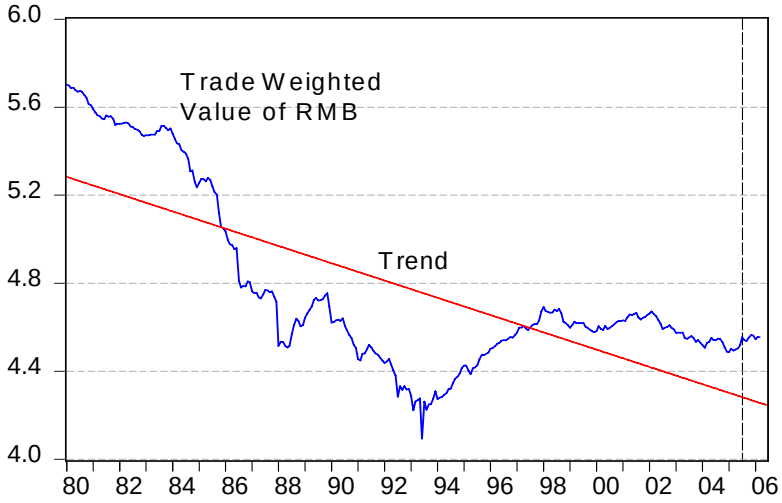
Stratification by development, income, region and time period

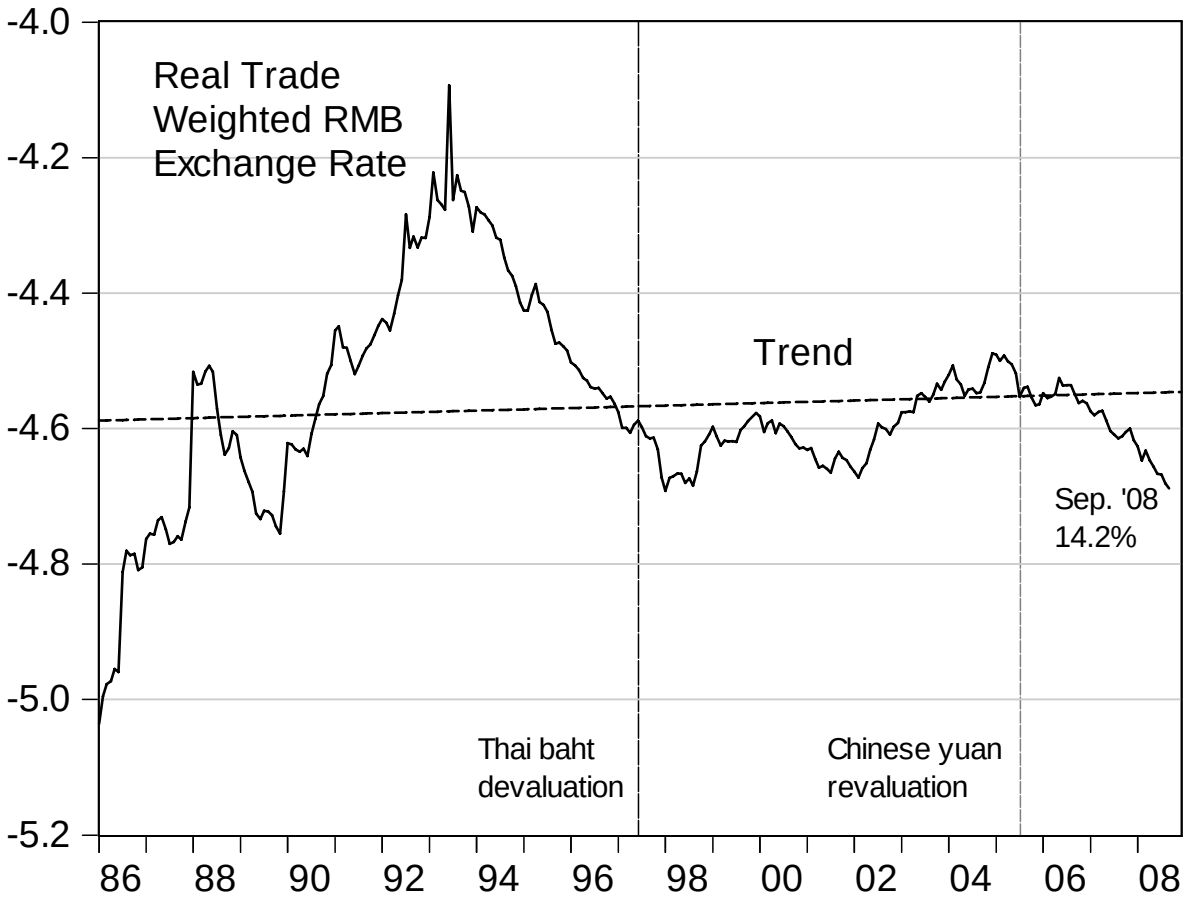
Beyond bivariate

Data revision

Misalignment via linear trends







Log trade weighted real RMB exchange rate, 1986M01-2008M11, and linear time trend. Source: IMF, *International Financial Statistics*, and authors' calculations. Pre-1994 data from March 2007 *IFS*.

A Selected Survey of Studies

	Relative PPP, Competitiveness	Absolute PPP-Income Relationship	Balassa-Samuelson (with productivity)	BEER	Macroeconomic Balance/External Balance
Time Series	Wang (2004) CCF (2007)	Bosworth (2004)	CCF (2005)	Zhang (2001) Wang (2004) Funke & Rahn (2005)	Bosworth (2004) Goldstein (2004) , Goldstein and Lardy (2006) Wang (2004)
Cross Section		Coudert & Couharde (2005) Frankel (2006)			
Panel		Cairns (2005b) CCF (2007)		CCF (2007)	Coudert & Couharde (2005)

Some algebra

$$p_t = \alpha p_{N,t} + (1-\alpha) p_{T,t}$$
$$q_t \equiv s_t + p_t^* - p_t = (s_t + p_{T,t}^* - p_{T,t}) + \alpha[(p_{N,t}^* - p_{T,t}^*) - (p_{N,t} - p_{T,t})]$$
$$\omega_t \equiv [p_{N,t} - p_{T,t}] - [p_{N,t}^* - p_{T,t}^*],$$
$$q_t = q_{T,t} - \alpha\omega_t$$

Exploiting the "Penn Effect"

$$r_{it} = \beta_0 + \beta_1 y_{it} + u_{it}$$

where r is $-q$

What is this definition of equilibrium?

If one relies upon $q_T = 0$, then roughly equivalent to assuming external balance

Then ω achieves internal balance.

Hard to believe in this dichotomy in general.

Hence, this approach does not confront short-run misalignment

(as in Goldstein-Lardy)

Data, sample period

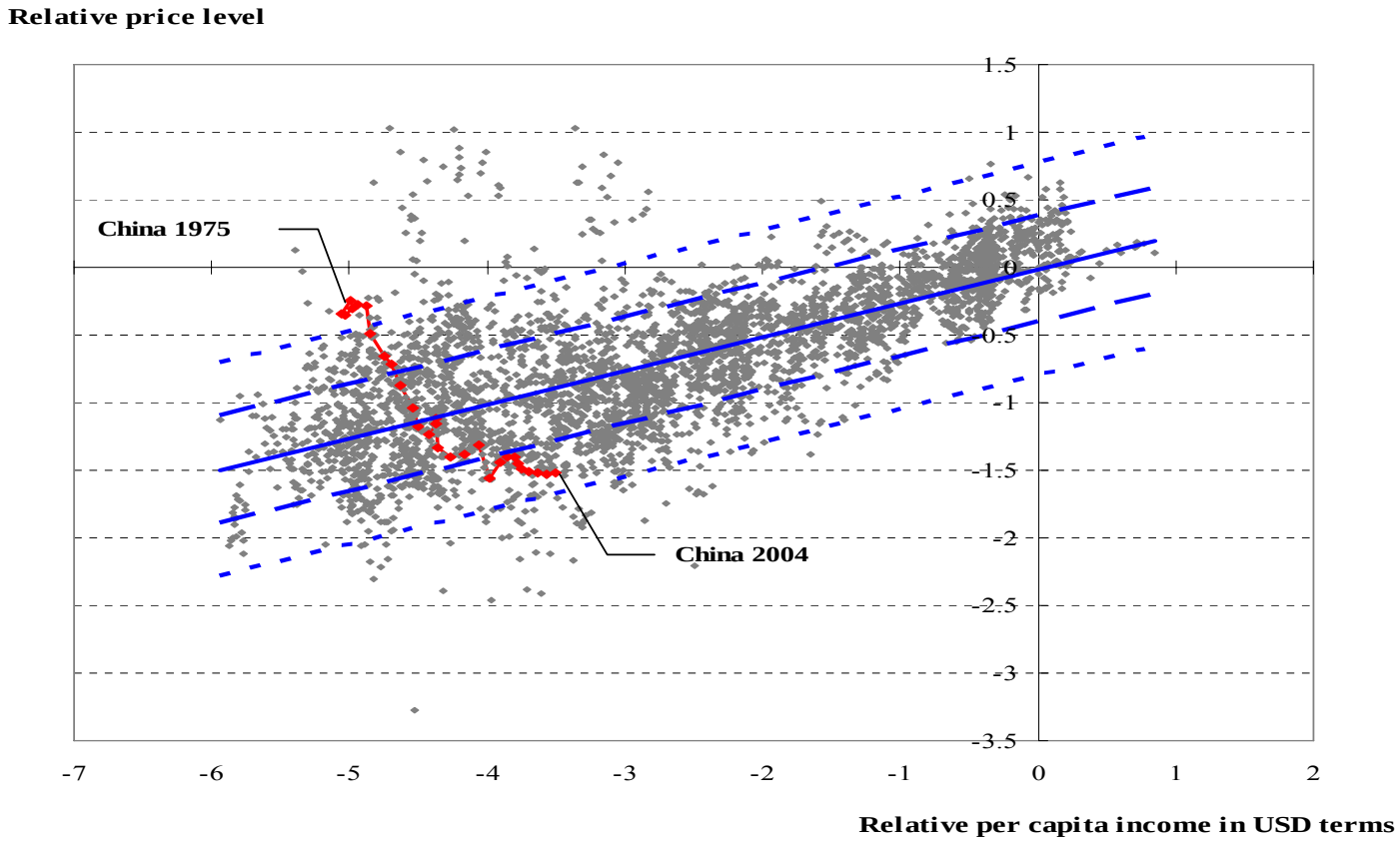
Bivariate Results

	USD-based GDP				PPP-based GDP				PPP-based GDP (Prais-Winsten)			
	Pooled OLS	Between	Fixed effects (Within)	Random effects	Pooled OLS	Between	Fixed effects (Within)	Random effects	Pooled OLS	Between	Fixed effects (Within)	Random effects
GDP per capita	0.249** (0.003)	0.254** (0.015)	0.391** (0.029)	0.297** (0.012)	0.299** (0.006)	0.300** (0.028)	0.273** (0.031)	0.284** (0.017)	0.147** (0.021)	0.396** (0.028)	0.036 (0.025)	0.132** (0.021)
Constant	-.016** (0.008)	-.036 (0.050)	-	0.084 (0.042)	-.134** (0.011)	-.177** (0.061)	-	-.204** (0.043)	-.026** (0.002)	0.001 (0.004)	-	-.027** (0.003)
Adjusted R^2	0.496	0.617	0.763	0.496	0.349	0.413	0.754	0.349	0.012	0.389	0.021	0.012
F-test statistic			29.468**				42.647**				1.218*	
Hausman test statistic				11.873**				0.167				39.384**
Number of observations	4018				4018				3958			

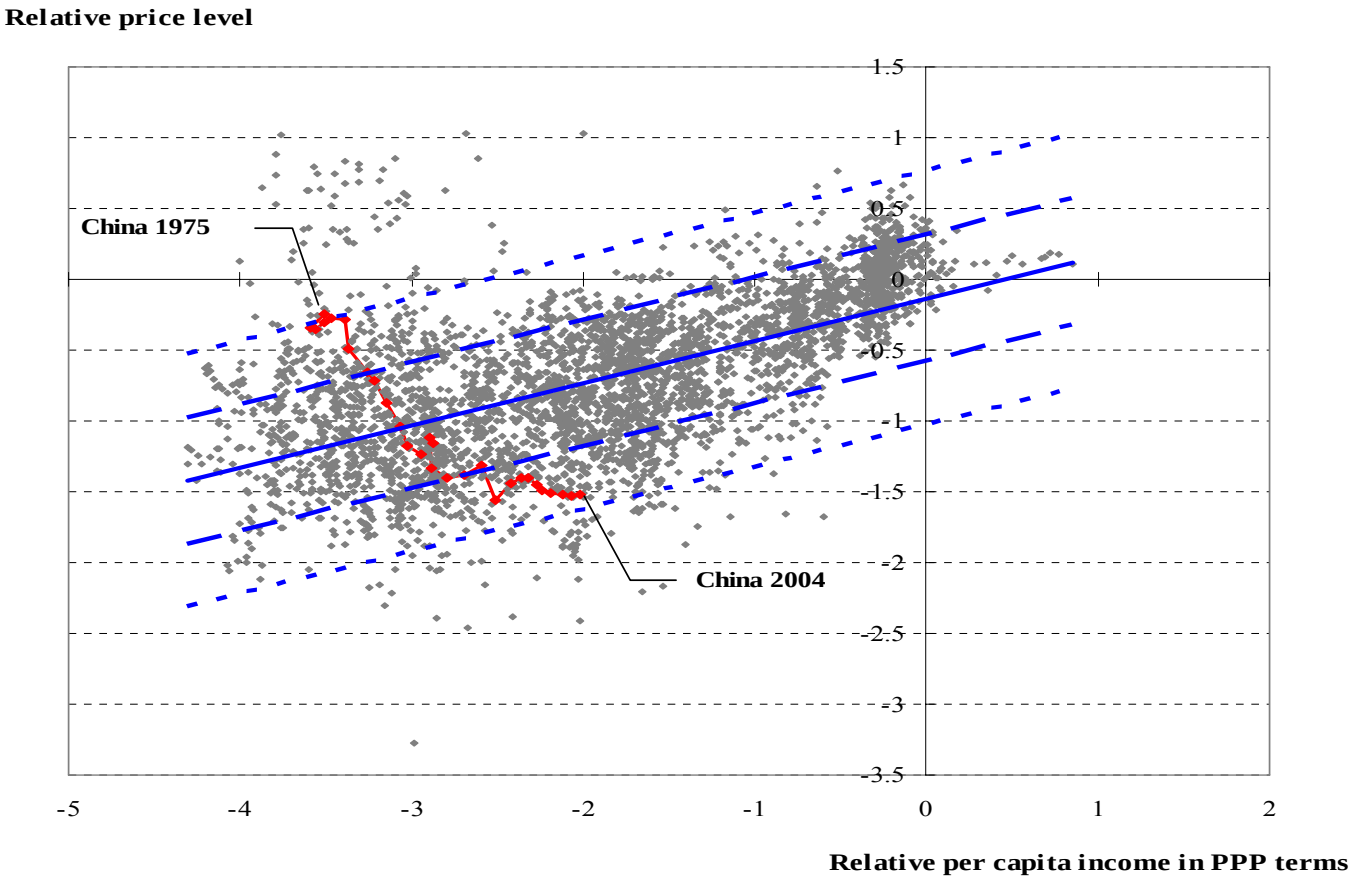
Remarks

- Alternative model specifications
  - We focus on pooled OLS as the simplest to understand
  - Other approaches (fixed effects) can lead to smaller misalignments
  - The problem is interpreting what deviations from fixed effects means
- Output effects
- Uncertainty

Simple price level – income ($)



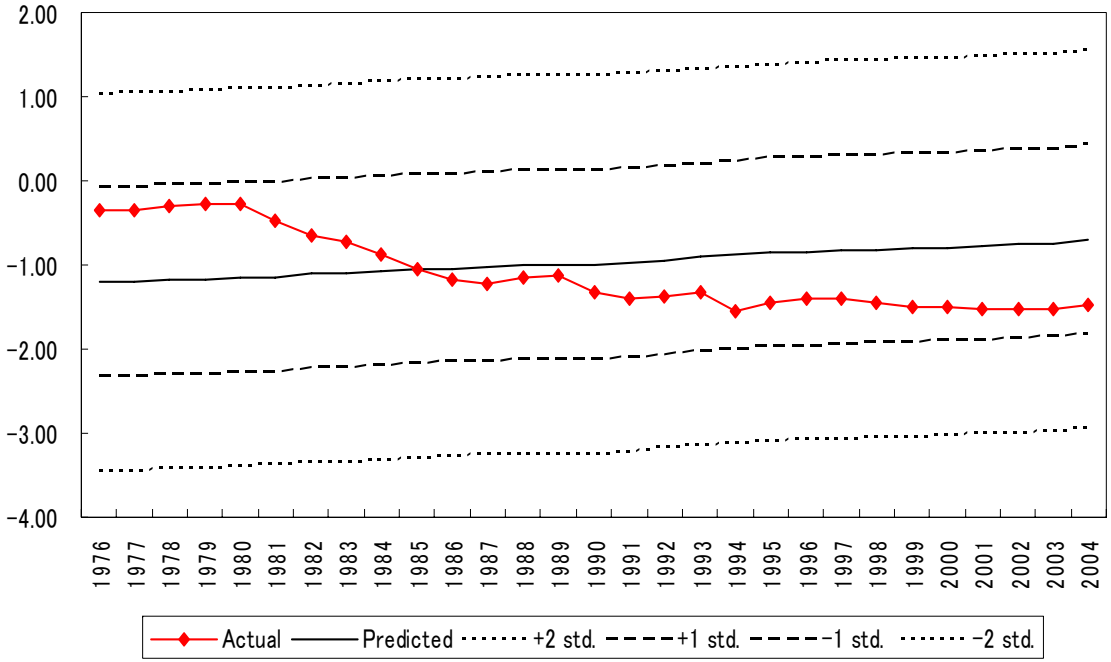
Simple price level – income (PPP)



Serial Correlation

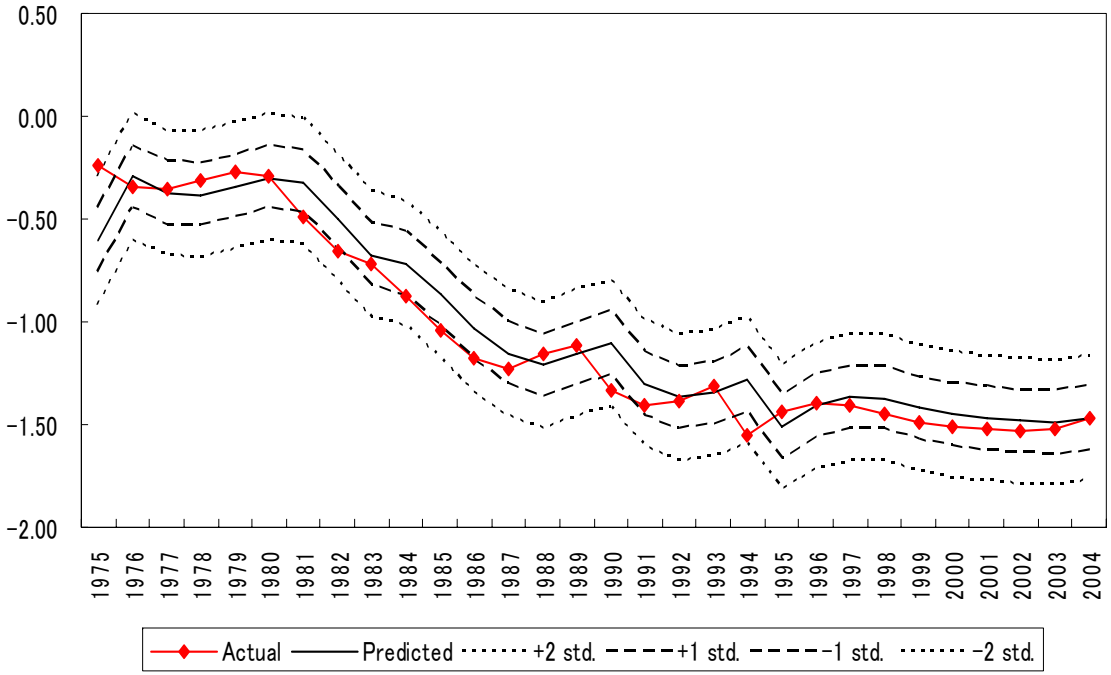
Ad hoc approach

– Standard error adjustment $[1/(1-\hat{\rho}^2)]^{0.5} \approx 2$



Prais-Winsten procedure

– Explicitly account for serial correlation



Additional Specifications

Subsample Analyses

- Developed/Developing
- High, middle, and low income
- Asia, Latin America, Africa
- 1975-1989,1990-2004

Remarks

- Different GDP effects
- A similar basic message
  - "Strong" Undervaluation evidence
  - (sampling uncertainty)
  - Controlled for serial correlation – the undervaluation estimate is small
- See the paper for details

Beyond Bivariate

- Short-run internal and external imbalances
- Control variables
- Demographics, policy, financial dev.
- Corruption, capital controls
- See the paper for details

Remarks

- Similar messages
  - Large sampling uncertainty
  - Serial correlation "inflates" the undervaluation estimate

Data Issues

Vintages of *WDI* matter

Data from *World Development Indicators*, 1971-2005

Data from *World Development Indicators*, 1980-2006

New Data (November 2008)

	USD-based GDP				PPP-based GDP				PPP-based GDP (Prais-Winsten)			
	Pooled OLS	Between	Fixed effects	Random effects	Pooled OLS	Between	Fixed effects	Random effects	Pooled OLS	Between	Fixed effects	Random effects
GDP per capita	.173** (.013)	.173** (.013)	.283** (.064)	.209** (.010)	.183** (.019)	.175** (.018)	.283** (.064)	.229** (.012)	.154** (.016)	.238** (.017)	.103** (.021)	.137** (.014)
Constant	-.157** (.040)	-.172** (.042)	-	-.069** (.035)	-.271** (.047)	-.307** (.044)	-	-.196** (.034)	-.022** (.003)	-.010** (.002)		-.024** (.003)
Adjusted R^2	.379	.517	.688	.379	.270	.344	.687	.270	.030	.536	.020	.030
F-test Statistic			26.572**				35.177**				.725	
Hausman test statistic				1.317**				.708				4.368*
Number of observations	4157				4169				4111			

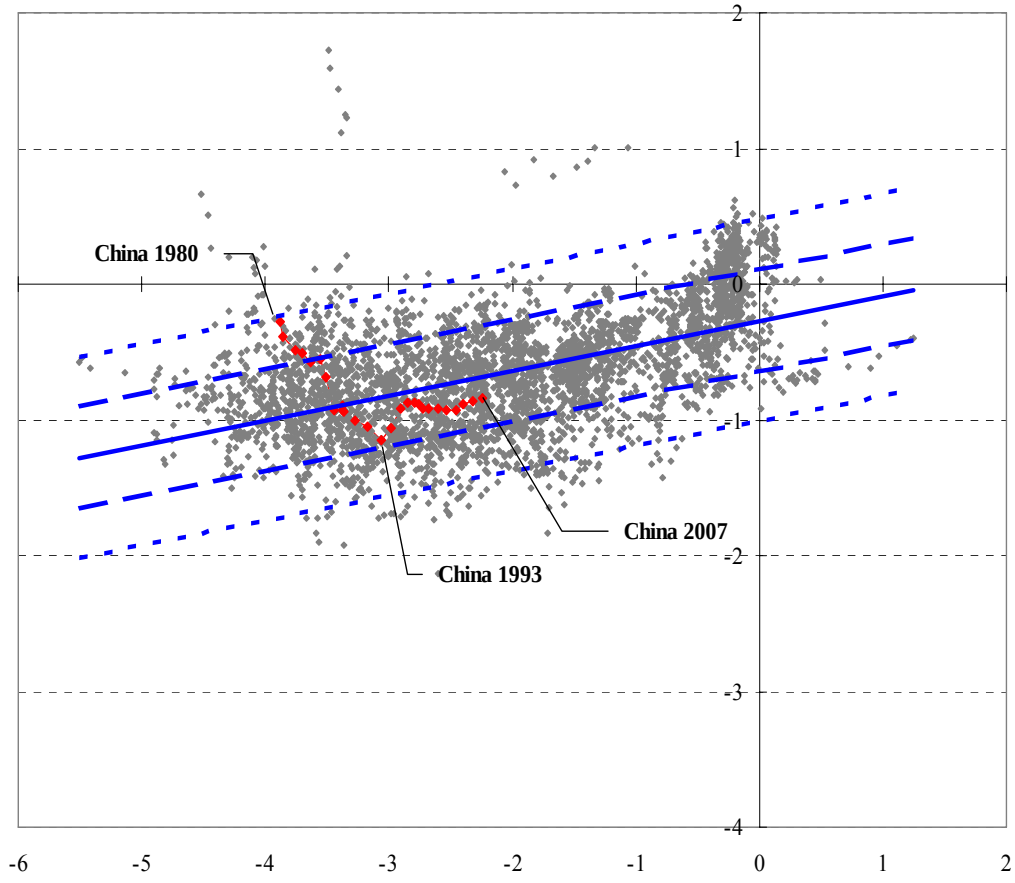
Remarks

The change in the data is substantial (China is only one example)

The resulting point estimates are not extremely different

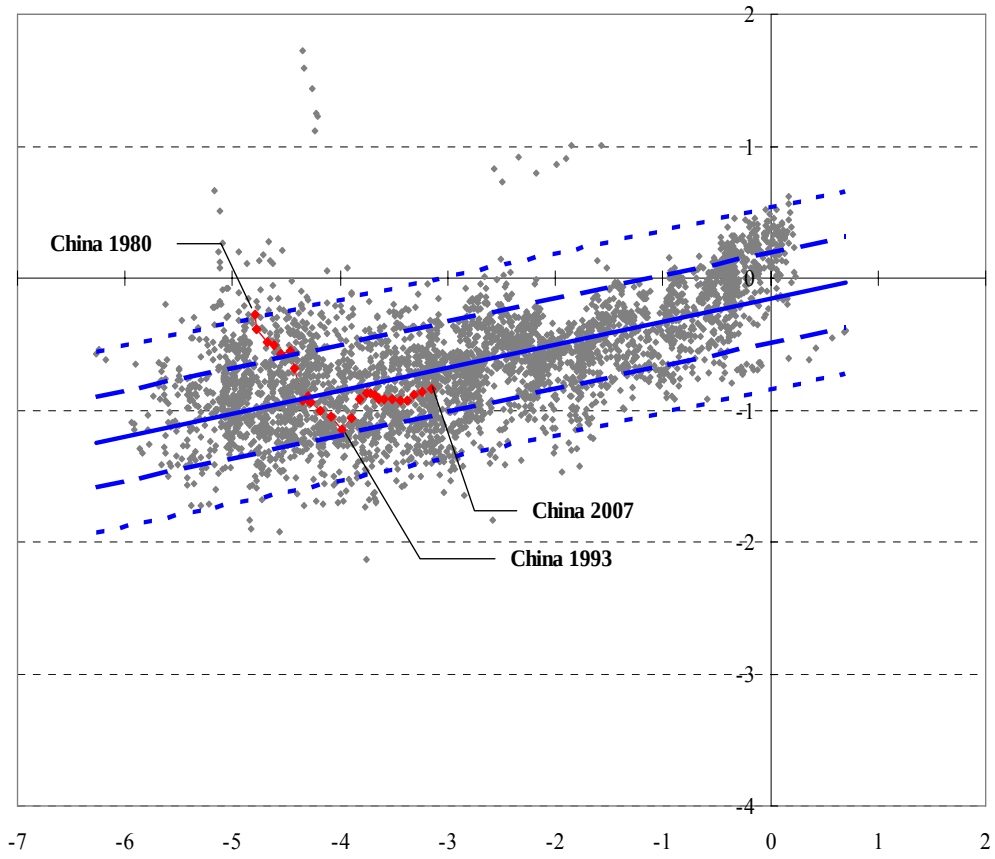
But the estimated misalignments *are* substantially different from those obtained below

Relative price level

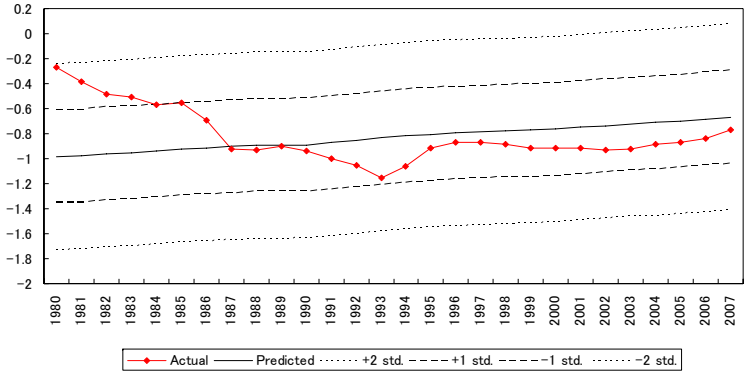


Relative per capita income in PPP terms

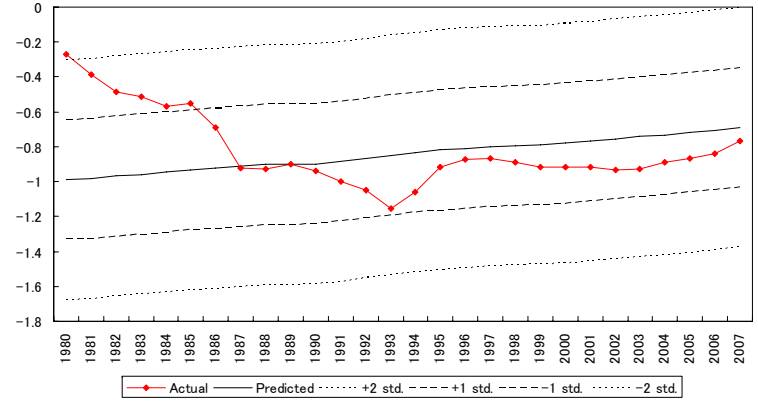
Relative price level



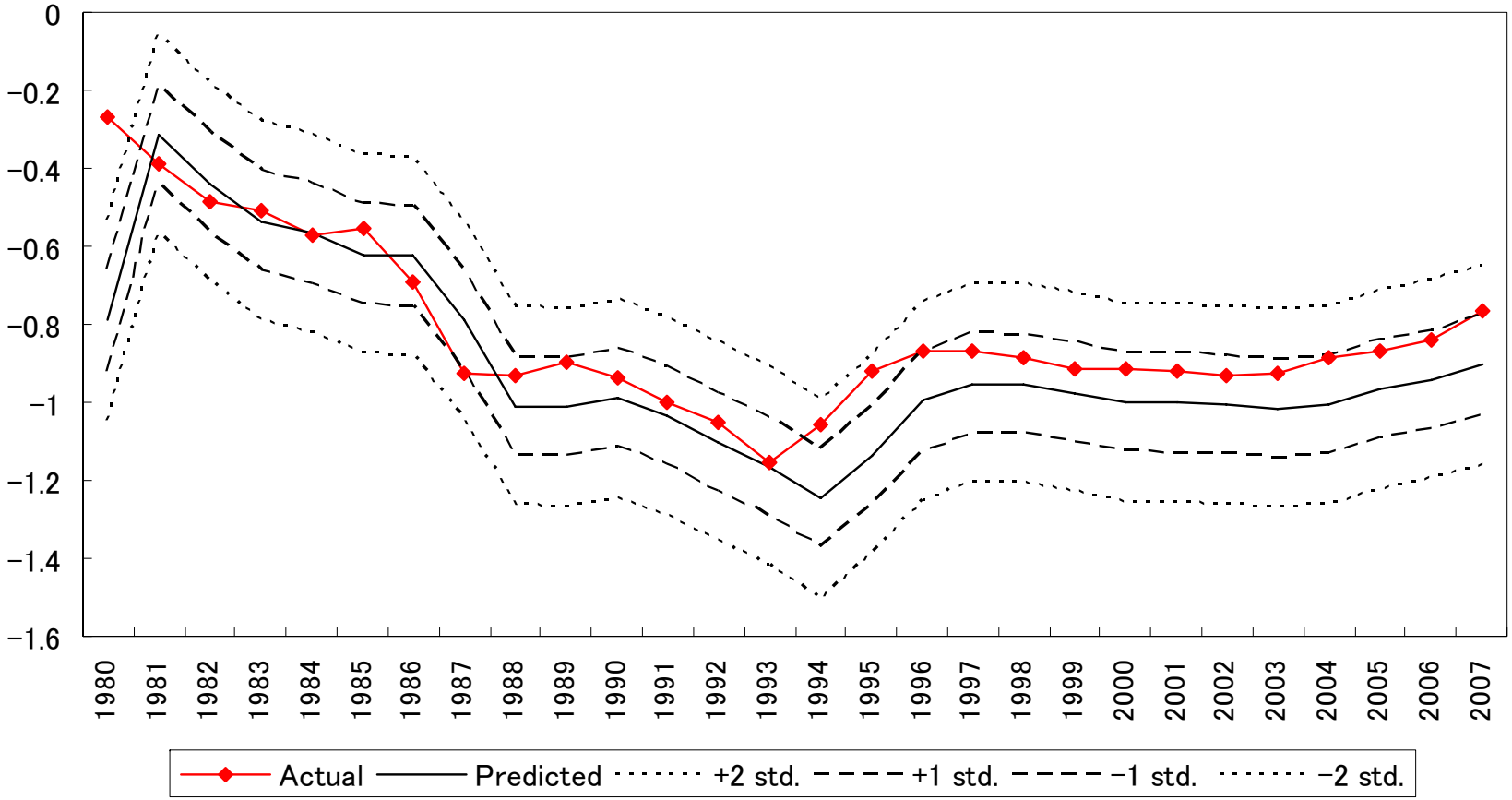
Relative per capita income in USD terms



PPP-based per capita income (November 2008 data)



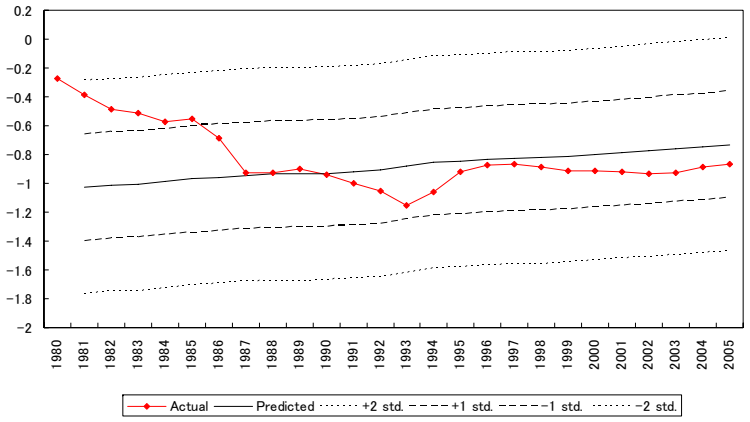
USD-based per capita income (November 2008 data)

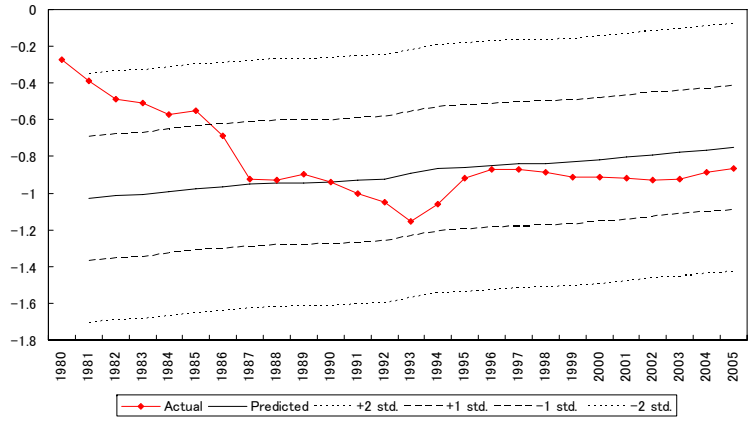


Prais-Winsten estimates, PPP-based per capita income (November 2008 data)

The Panel Estimation Results of the Trade-Balance-Augmented Model

	USD-based GDP				PPP-based GDP			
	Pooled OLS	Between	Fixed effects (Within)	Random effects	Pooled OLS	Between	Fixed effects (Within)	Random effects
GDP per capita	.181** (.014)	.187** (.014)	.316** (.011)	.217** (0.094)	.195** (.020)	.191** (.022)	.317** (.061)	.243** (.014)
Trade balance	.002** (.000)	.003† (.002)	.0007 (.0006)	.0008** (.0002)	.0018* (.0008)	.0027 (.0024)	.0007 (.0006)	.0008** (.0002)
Constant	-.162** (.041)	-.176** (.043)	-	-.074* (.037)	-.275** (.048)	-.313** (.046)	-	-.196** (.036)
Adjusted R^2	.399	.518	.718	.396	.287	.300	.718	.284
F-test Statistic			26.225**				34.923**	
Hausman test				2.919				1.636
# observations	3571				3576			





trade-balance-augmented, PPP-based/US$ per capita income (Nov 2008 data)

Conclusions

- Quantitatively large misalignments estimated in the old data set
- Undervaluation is easy to find, but hard to prove, according to statistical conventions
- Especially when accounting for serial correlation, hard to be definitive
- Basic results remain when stratifying the sample, or augmenting controls

With Revised Data

- Previously estimated misalignments disappear
- How do we incorporate data uncertainty into our analyses

Prudent, cautious FX policy

Epilogue

The “Undervaluation” Myths -

Currency manipulation, trade surplus, international reserves, FDI flows, US job depletion, policy dependence, domestic economy instability,…, etc.

- Wrong arguments for RMB appreciation
- Doesn’t mean RMB should not appreciate
- Is the current policy too conservative?
- RMB-Trade balances
- RMB-International Reserves

“Weak” evidence: under- or *no* under-val

Difficult to assess/determine the equilibrium exchange rate

- Which theoretical model?
- Which empirical specification?
- Data uncertainty

The RMB case examined here is just a translation of these difficulties

Some Recent Economic Issues Related to China

II: Does the Chinese Interest Rate Fellow the US Interest Rate?

1. Introduction

China's exchange rate policy

Praised

Condemned

Floating of Renminbi

End manipulation

Gain policy independence

The insulation property of a flexible exchange rate arrangement

- Theoretical results: nature of the shocks, capital controls, …
- Empirical evidence: exchange rate regime choice and policy interdependence

Dependence on the US policy

- Fear of floating
- Trade relationship with the US
- US has information advantages

Question: What is the relevance of the argument?

"A flexible RMB offers China policy independence"?

NO DEFINITE theoretical/empirical evidence

Question: Will FX flexibility allow China to pursue an indep monetary policy?

We do not know what is going to happen in the future

Assess the current situation

Has China lost its policy independence under the current *de facto* peg?

If it hasn't, then the argument is not relevant

Policy dependence – Interest rate dependence

Empirical Analysis

Interest rate interactions

Uncertainty about data persistence

Explore alternative empirical models

2. Data Description

1-month Chinese interbank Vs 1-month US Fed fund interest rates

Official discount rates?

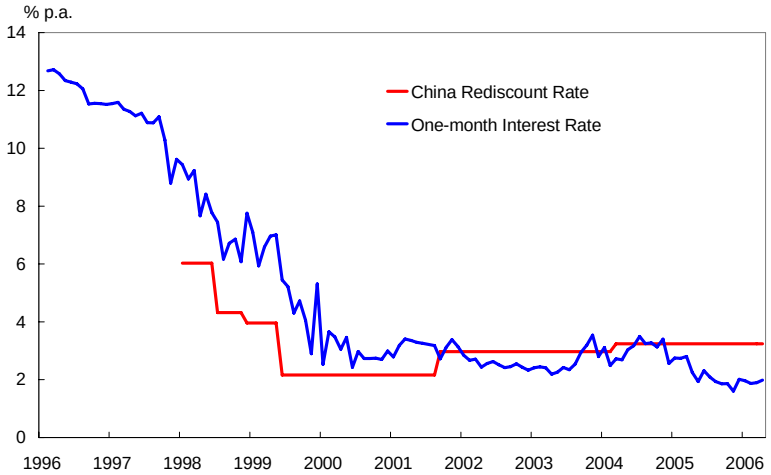
The Chinese interbank market
- A growing and efficient segment of the Chinese market
- The major change came in January 1996
- 1-month interbank rate – representative of other short-term rates

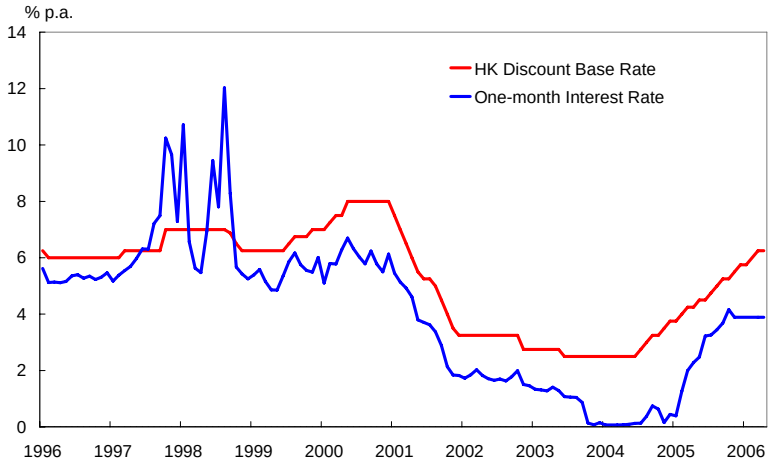
Benchmark –the HK and the US one-month interbank interest rates

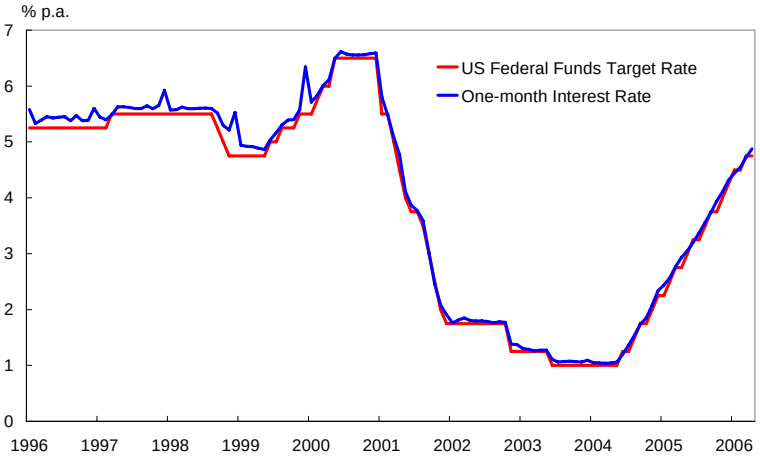
Why HK?
- A small open economy with minimal capital control
- Currency board – a *de facto* peg the US$
- Close ties with China

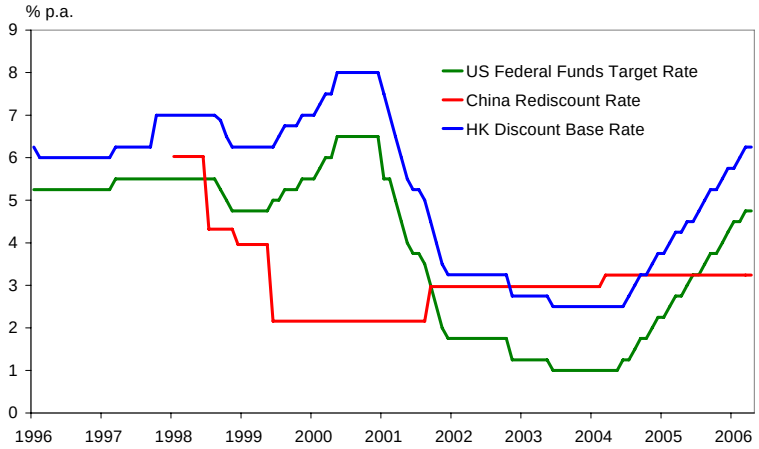
Sample period – February 1996 to April 2006
Two subsamples – 1996:2000; 2000-2006

Figure 1 to Figure 4









Two observations:

One-month interest rates move around their respective official rates

The Hong Kong and US rates Vs

The Chinese and US rates

3. Preliminary Analyses

What is the proper statistical procedure to use? Data persistence

ADF test: $\Delta Y_{it} = \omega_i + \tau_i t + \delta_i Y_{it-1} + \sum_{j=1}^{p-1} \varphi_{ij} \Delta Y_{it-j} + \varepsilon_{it}$

		1996:2 – 2006:4		1996:2 – 2000:6		2000:7 – 2006:4	
		Constant	Constant + Trend	Constant	Constant + Trend	Constant	Constant + Trend
A. China							
	ADF	-2.830**	-1.091	0.326	-5.212*	-1.489	-2.108
	Lag	2	2	2	0	1	1
B. Hong Kong							
	ADF	-1.229	-1.496	-3.479 *	-3.438**	-2.257	-0.430
	Lag	7	7	0	0	7	1
C. US							
	ADF	-1.911	-2.114	-4.708*	-3.676*	-3.009*	-1.071
	Lag	12	12	12	12	4	1

Remarks:

Ambiguous results

What is the proper statistical technique?

Try a few possible specifications

VAR, cointegration, PSS bouds test

4. Interest Rate Dependence

4.1 Cointegration

The Johansen approach; data are I(1), long run comovement

$$\Delta Y_t = C_1 + \sum_{i=1}^{p} \gamma_{1i} \Delta Y_{t-i} + \varepsilon_{1t}; \; Y_{t-p-1} = C_2 + \sum_{i=1}^{p} \gamma_{2i} \Delta Y_{t-i} + \varepsilon_{2t}$$

$$t_r = -T \sum_{j=r+1}^{2} \ln(1-\lambda_j); \; t_{r|r+1} = -T \ln(1-\lambda_{r+1}), \; 0 \le r \le 1.$$

		1996:2 – 2006:4		1996:2 – 2000:6		2000:7 – 2006:4	
		EIGENV	TRACE	EIGENV	TRACE	EIGENV	TRACE
A. China/US							
	r=1	6.1668	6.1668	0.1763	0.1763	2.5143	2.5143
	r=0	12.7248	18.8916	2.3018	2.4781	9.1555	11.6698
B. Hong Kong/US							
	r=1	2.2839	2.2839	0.0437	0.0437	4.1058	4.1058
	r=0	9.4839	11.7679	8.9298	8.9736	6.5875	10.6932

Remarks:

Very limited evidence of cointegration

One marginal rejection case

The Chinese and the US interest rates in the full sample.

However, the estimated cointegration vector is (1, 4.690)

No evidence of the Chinese interest rate's dependence on the US rate

Interest rate differentials – impose the (1, -1) restriction

		1996:2 – 2006:4		1996:2 – 2000:6		2000:7 – 2006:4	
		Constant	Constant + Trend	Constant	Constant + Trend	Constant	Constant + Trend
A. China-US							
	ADF	-2.002	-2.125	0.581	-2.152	-1.544	-0.577
	Lag	8	5	1	1	8	0
B. Hong Kong-US							
	ADF	-1.801	-2.720	-3.637**	-1.137	-2.135	-2.418
	Lag	7	7	0	6	1	1

Remarks:

Only one stationary interest rate differential series
HK-US; 1996 to 2000

In sum, there is only very weak evidence of long-run interest rate interactions between China and the US

4.2 Vector Autoregression

$Y_t = \mu + \sum_{i=1}^{p} \Gamma_i Y_{t-i} + \varepsilon_t$ Stationary

$Y_t = \mu + \tau' t + \sum_{i=1}^{p} \Gamma_i Y_{t-i} + \varepsilon_t$ Stationary, trend

$\Delta Y_t = \mu + \sum_{i=1}^{p} \Gamma_i \Delta Y_{t-i} + \varepsilon_t$ difference stationary; no cointegration

Y_t: the US and the Chinese (or U.S. and Hong Kong) interest rates

Causality test: US does not cause china

China does not cause US

US does not cause HK

HK does not cause US

	US does not cause China	China does not cause US	Lag	US does not cause HK	HK does not cause US	Lag
A. 1996:2 – 2006:4						
Model (7)	12.393 (0.088)	51.956 (0.000)	7	24.781 (0.002)	7.026 (0.534)	8
Model (8)	12.265 (0.092)	50.862 (0.000)	7	27.822 (0.001)	6.534 (0.588)	8
Model (9)	8.924 (0.112)	40.741 (0.000)	5	6.773 (0.010)	6.118 (0.410)	6
B. 1996:2 – 2000:6						
Model (7)	0.177 (0.915)	19.725 (0.000)	2	0.262 (0.609)	0.214 (0.643)	1
Model (8)	9.662 (0.290)	33.582 (0.000)	8	0.379 (0.538)	0.012 (0.912)	1
Model (9)	0.144 (0.704)	17.856 (0.000)	1	0.279 (0.597)	0.245 (0.621)	1
C. 2000:7 – 2006:4						
Model (7)	5.545 (0.063)	2.502 (0.286)	2	13.327 (0.001)	4.702 (0.095)	2
Model (8)	2.802 (0.246)	0.310 (0.856)	2	7.470 (0.024)	5.454 (0.065)	2
Model (9)	2.525 (0.112)	0.034 (0.854)	1	9.180 (0.002)	3.343 (0.068)	1

Remarks:

The China and US pair

- The US interest rate effect on China is not strong
- The Chinese interest rate affects the US
- Limited support for the view of policy dependence

The Hong Kong and US pair

- In general, US affects Hong Kong but not the other way round
- Consistent with the common wisdom: FX regime ~ policy dependence

4.3 The PSS Bounds Test

$$\Delta Y_{CN,t} = c + \varphi_{CN} Y_{CN,t-1} + \varphi_{US} Y_{US,t-1} +$$

$$\sum_{j=1}^{p-1} \psi_{CN,j} \Delta Y_{CN,t-j} + \sum_{j=1}^{q-1} \psi_{US,j} \Delta Y_{US,t-j} + \omega \Delta Y_{US,t} + \varepsilon_t$$

H_0: $\varphi_{CN} = \varphi_{US} = 0$

Main advantage

Robust to the data persistence assumption

	2/1996 – 4/2006	2/1996 – 6/2000	7/2000 – 4/2006
Constant	0.107 (1.015)	0.279 (0.147)	0.216 (1.109)
CN_{-1}	-0.052* (-2.719)	-0.018 (-0.430)	-0.088 (-1.294)
US_{-1}	-0.002 (-0.062)	-0.087 (-0.263)	0.001 (0.072)
ΔCN_{-1}	-0.583* (-6.574)	-0.659* (-4.194)	-0.228* (-2.055)
ΔCN_{-2}	-0.184* (-2.049)	-0.269 (-1.768)	-
ΔCN_{-5}	0.143 (1.828)	-	-
ΔCN_{-6}	-	-	-0.119 (-1.727)
ΔCN_{-12}	0.183* (2.301)	0.460* (2.557)	-
ΔUS_{-2}	-0.440 (-1.970)	-	-
Adjusted R^2	0.395	0.425	0.144
F-statistic	5.110	0.114	0.846

Remarks:

The F-statistic – H_0 is NOT rejected; No Level relationship

Negative US effects on changes; The US affects China?

	2/1996 – 4/2006	2/1996 – 6/2000	7/2000 – 4/2006
Constant	-0.188 (-1.874)	-	-0.110 (-1.776)
HK_{-1}	-0.265* (-6.328)	-0.395* (-4.684)	-0.121* (-2.086)
US_{-1}	0.298* (5.304)	0.429* (4.256)	0.136* (2.282)
ΔHK_{-1}	0.128* (2.393)	0.210* (2.282)	-
ΔHK_{-2}	0.168* (3.065)	0.231* (2.486)	-
ΔHK_{-3}	-0.251* (-3.273)	-	-
ΔHK_{-11}	-	-	-0.169* (-2.013)
ΔUS	1.074* (5.198)	1.078* (2.129)	0.931* (6.270)
$Adj.R^2$	0.792	0.809	0.471
F test	20.851	12.394	2.661

Remarks:

The F-statistic – H_0 is rejected in full sample andfirst subsample

Estimates of φ_{US} and φ_{HK} - “reasonable”; “One-to-One” US effects

$$\Delta Y_{US,t} = c + \varphi_i Y_{i,t-1} + \varphi_{US} Y_{US,t-1} + \sum_{j=1}^{p-1} \psi_{US,j} \Delta Y_{US,t-j} + \sum_{j=1}^{q-1} \psi_{i,j} \Delta Y_{i,t-j} + \omega \Delta Y_{i,t} + \varepsilon_t$$

	2/1996 – 4/2006	2/1996 – 6/2000	7/2000 – 4/2006
Constant	0.047 (1.176)	1.242* (3.293)	0.185 (1.663)
CN_{-1}	0.004 (0.550)	-0.013 (-1.826)	-0.027 (-0.697)
US_{-1}	-0.017 (-1.522)	-0.205* (-2.894)	-0.040* (-3.830)
ΔUS_{-1}	0.419* (4.830)	0.310* (2.601)	0.467* (4.967)
ΔUS_{-2}	-	0.387* (3.267)	-
ΔUS_{-3}	0.208* (2.500)	0.413* (3.676)	-
ΔUS_{-4}	-	0.253* (2.438)	0.293* (3.103)
ΔUS_{-5}	-	0.322* (3.471)	-
ΔUS_{-12}	0.473* (5.575)	1.410* (10.178)	0.175* (2.313)
ΔUS_{-13}	-0.393* (-4.376)	-	-
Adjusted R^2	0.409	0.782	0.600
F-statistic	1.216	7.676	7.481

	2/1996 – 4/2006	2/1996 – 6/2000	7/2000 – 4/2006
Constant	0.059 (1.382)	0.409 (1.156)	0.104* (2.625)
HK_{-1}	0.007 (0.475)	-0.009 (-0.714)	-0.013 (-0.371)
US_{-1}	-0.022 (-1.076)	-0.061 (-0.882)	-0.027 (-0.724)
ΔUS_{-1}	0.425* (4.895)	0.556* (3.283)	0.476* (5.107)
ΔUS_{-3}	0.203* (2.465)	-	-
ΔUS_{-4}	-	-	0.302* (3.223)
ΔUS_{-12}	0.471* (5.567)	1.163* (8.233)	0.173* 2.242
ΔUS_{-13}	-0.392* (-4.336)	-0.957* (-4.177)	-
Adjusted R^2	0.408	0.722	0.598
F-statistic	1.177	1.066	7.268

Remarks:

Some F-statistics are significant –

BUT the lagged Chinese and HK interest rates are insignificant

Changes in the Chinese and HK interests have no effect on the US

5. Discussion

Interest rate pass through

- capital controls

The *de facto* peg

- Ability to manage its economy
- Cost of maintaining the peg

How to migrate from a centrally planned economy to a market-based economy?

- Gradualism; Policy credibility and stability

Exchange rate flexibility at what costs?

- Inefficient financial sector
- Ability to handle shocks

Concluding Remarks

Does the fixed rate arrangement limit China's policy choices?

Will exchange rate flexibility offers policy independence?

Our results

Given the current peg, limited evidence of China is affected by the US

Hong Kong is influenced by the US

Other policy measures to retain policy independence

Costs to maintain the peg may be high

- Still enjoy substantial economic growth
- Other factors in favour of a stable RMB

Policy independence may not be a crucial factor in deciding RMB flexibility

Preconditions for RMB to exit from the peg

- Reform the financial sector and the setting of monetary policies
- Improve non-performing loans and corporate governance
- Reduce rigidities in the labour market ….

Some Recent Economic Issues Related to China

III: China's Outward Direct Investment

1. Introduction

The re-emergence of China

A global capital provider – Inflow/outflow ratio: 18.74 (2003), 4.31 (2006)

A growing outward investor

– IBM's PC division, Unocal, …

1994 – 1999: US$ 2.2 billion (annual average), 3.4% of developing countries

2006: US$16.1 billion, 9.2% of developing countries

Rank fourth, expected leading sources of FDI

High concentration in developing countries

Our exercise:

An overall view of China's ODI

- Evolution, industry mix, country composition

Economic determinants

- Standard variables – market seeking, resources seeking
- Servicing exports
- The role of international reserves
- The agglomeration effect

Investment in African and oil-producing countries

2. Preliminary Discussions

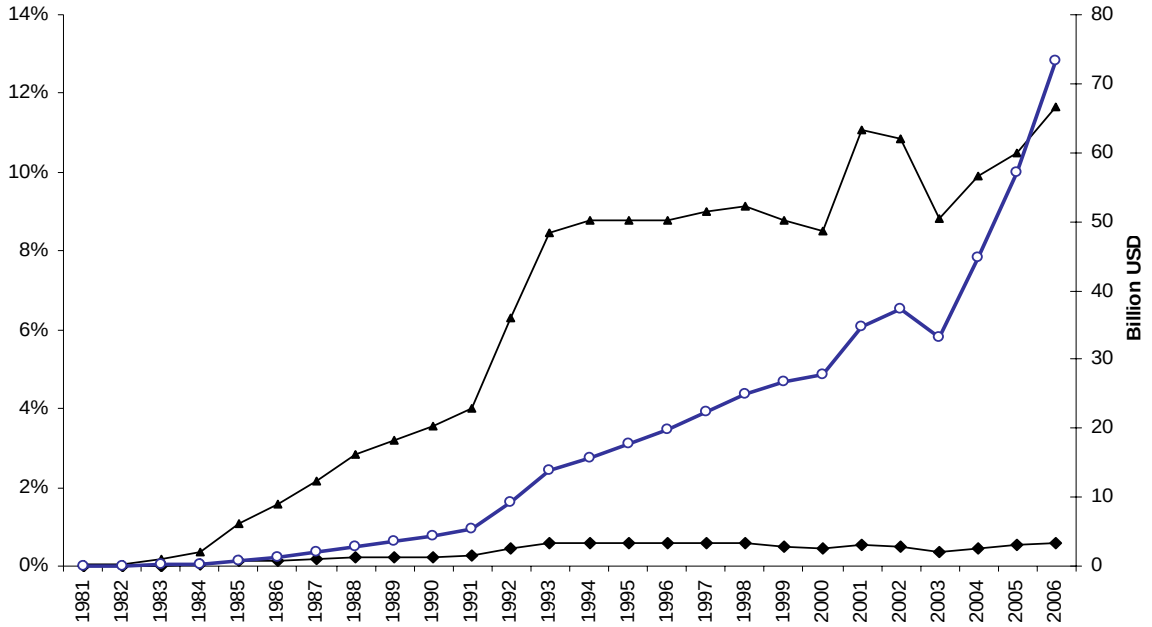
2.1 A Brief History

1978:	Open door policy; Two prongs – attract FDI, deploy abroad
1978 – 1990:	Initial phase, designing and developing ODI policy
	Small volume, politically driven, SOEs (B4 85)
1991 – 1997:	A reality check – a taste of capitalism; up and down
	Substantial losses; tightening the approval process
1998 – 2002:	Direct ODI to preferential sectors; promote China's exports
2002 – 20??:	"Going global" strategy, quite aggressive
	Approving applications, supervision, offering support services

Economic decisions ↔ Political considerations

SOEs ↔ Commercial entities

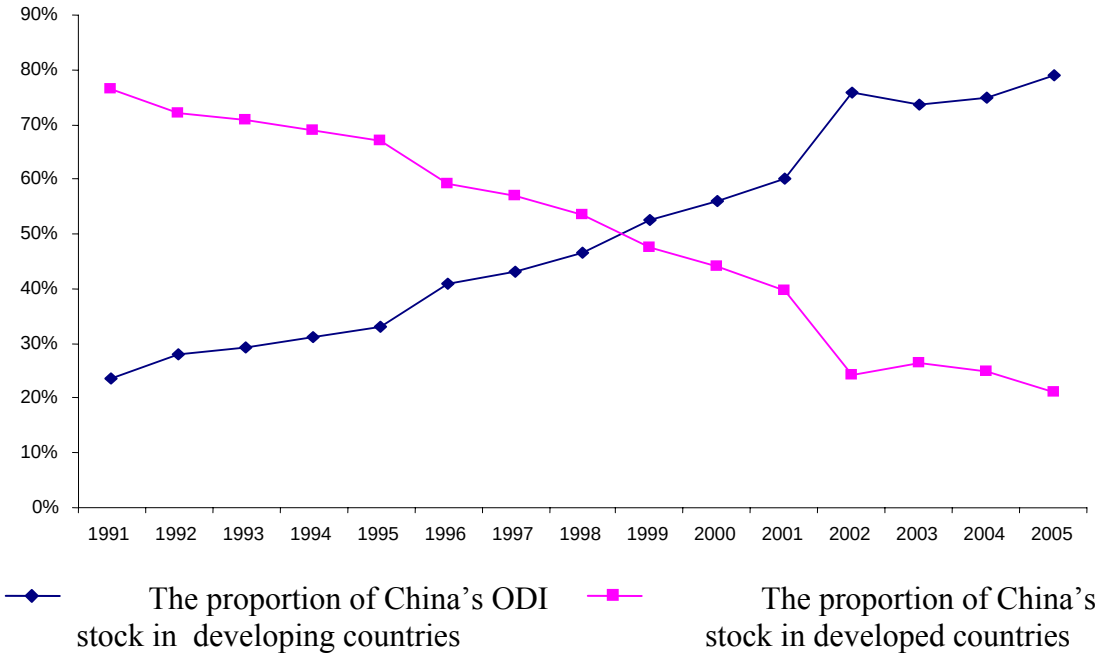
2.2 *China's ODI*



China's ODI as a percentage of the world total FDI

China's ODI as a percentage of the total FDI from developing countries (excluding offshore financial centers including British Virgin Islands, Burmuda, Cayman Islands, Hong Kong, and Singapore)

China's ODI stock (Right Axis)


90%
80%
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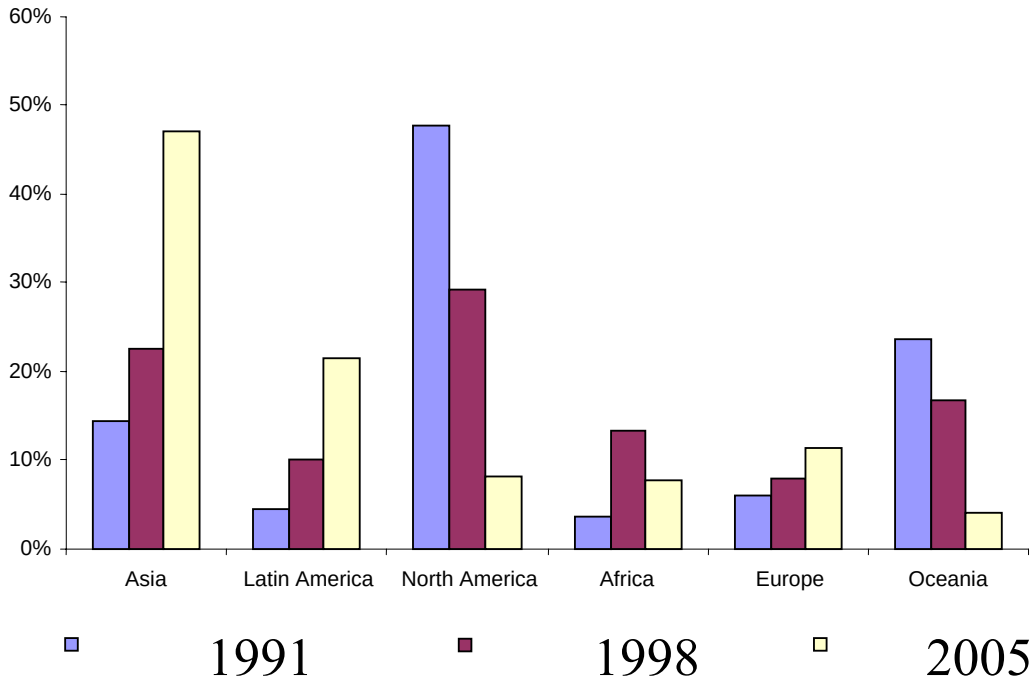
The proportion of China's ODI stock in developing countries
The proportion of China's ODI stock in developed countries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Asia
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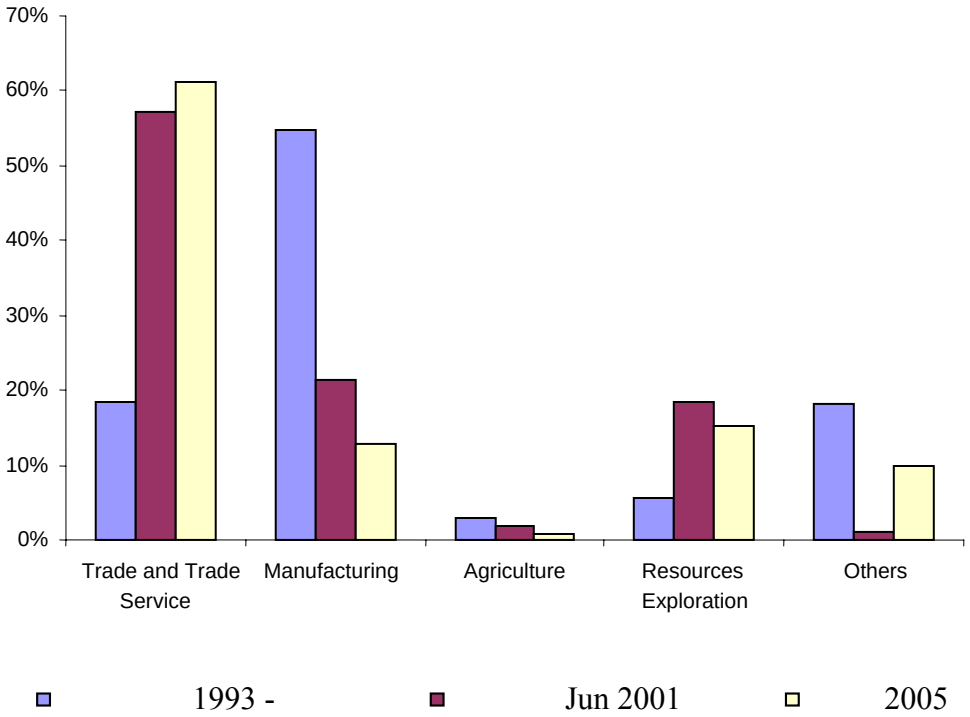
70%
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10%
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Trade and Trade Service
Manufacturing
Agriculture
Resources Exploration
Others
1993 - Jun 2001
2005

2.3 Some Data Issues

Approval data (country-specific, 1991+)

Data consistent with the OECD/IMF standard (2003 +)

Data reliability

Robustness checks

3. Empirical Determinants

3.1 A Benchmark Specification

$$ODI_{i,t} = \alpha + \mu_i + \beta_1 GDP_{i,t-1} + \beta_2 RGDPpc_{i,t-1} + \beta_3 GDPG_{i,t-1} +$$
$$\beta_4 Wage_{i,t-1} + \beta_5 Raw_{i,t-1} + \beta_6 Risk_{i,t-1} + \beta_7 Trend_t + \varepsilon_{i,t}.$$

$ODI_{i,t}$, ODI/pop

Market-seeking motive: *GDP*, $RGDP_{pc}$, *GDPG*

Resource-seeking motive: *Wage*, *Raw*

Other: *Risk*, *TREND*

Data

The approved ODI data; 1991 - 2005

Top 50 recipient countries (> 90%)

The paucity of *Wage* and *Risk* data – 21 developing, 10 developed countries

Quasi Generalized Least Squares, country-specific serial correlation

Table 1: Determinants of China's Overseas Direct Investment

	Whole	Developing	Developed
GDP	0.3400***	-0.3952	0.3414**
	(0.1229)	(0.6569)	(0.1527)
RGDPpc	-0.1158**	-0.0646	-0.2653***
	(0.0537)	(0.0481)	(0.0716)
GDPG	-0.0081	-0.0018	-0.0062
	(0.0096)	(0.0104)	(0.0319)
Wage	-0.0005***	-0.0004***	0.0033***
	(0.0002)	(0.0001)	(0.0012)
Raw	0.0432***	0.0380***	0.0904 *
	(0.0139)	(0.0126)	(0.0473)
Risk	-0.0055	0.0009	-0.0142
	(0.0057)	(0.0040)	(0.0207)
Trend	1.5399***	1.7859***	-1.2333 *
	(0.3743)	(0.4261)	(0.6693)
Adj. R-squares	0.2469	0.4211	0.2168
Observations	367	234	133

Control for Policy Changes

$D98_t \equiv$ I(t $\geq$ 1998), policy change after the 1997 Asian financial crisis

$D02_t \equiv$ I(t $\geq$ 2002), "going global" strategy

$$ODI_{i,t} = \alpha + \mu_i + \beta_1 GDP_{i,t-1} + \beta_2 RGDPpc_{i,t-1} + \beta_3 GDPG_{i,t-1} + \beta_4 Wage_{i,t-1} +$$
$$\beta_5 Raw_{i,t-1} + \beta_6 D98_t * Raw_{i,t-1} + \beta_7 D02_t * Raw_{i,t-1} + \beta_8 Risk_{i,t-1} +$$
$$\beta_9 Trend_t + \beta_{10} D98_t * Trend_t + \beta_{11} D02_t * Trend_t + \varepsilon_{i,t}.$$

Table 2: Determinants of China's ODI, with interaction variables

	Whole	Developing	Developed
GDP	0.2171**	-0.3488	0.2650 *
	(0.1052)	(0.6454)	(0.1426)
RGDPpc	-0.0435	-0.0337	-0.2751***
	(0.0440)	(0.0333)	(0.1028)
GDPG	0.0038	0.0094	0.0203
	(0.0076)	(0.0099)	(0.0270)
Wage	-0.0007***	-0.0006***	0.0061***
	(0.0001)	(0.0001)	(0.0010)
Raw	0.0438**	0.0410**	0.0494
	(0.0176)	(0.0178)	(0.0466)
Risk	-0.0077	0.0023	-0.0136
	(0.0058)	(0.0055)	(0.0133)
*D98*Raw*	0.0007	0.0039	-0.0138
	(0.0140)	(0.0163)	(0.0295)
*D02*Raw*	-0.0124 *	-0.0125 *	0.1023 *
	(0.0073)	(0.0067)	(0.0551)
Trend	0.8445***	0.9698***	-2.6607**
	(0.2233)	(0.2883)	(1.1476)
*D98*Trend*	0.0955***	0.1231**	0.0483
	(0.0366)	(0.0584)	(0.0664)
*D02*Trend*	0.3038***	0.2859***	0.2282 *
	(0.0510)	(0.0625)	(0.1288)
Adj. R-squares	0.3721	0.4500	0.5156
Observations	367	234	133

3.2 An Extended Specification

XShare: the Chinese/world's exports to the host-country

Reserve: China's total international reserves/its GDP

Aggl: China's ODI to a host country/China's total ODI

$$ODI_{i,t} = \alpha + \mu_i + \beta_1 GDP_{i,t-1} + \beta_2 RGDPpc_{i,t-1} + \beta_3 GDPG_{i,t-1} + \beta_4 Wage_{i,t-1} + \beta_5 Raw_{i,t-1} + \beta_6 Risk_{i,t-1} + \beta_7 Trend_t + \gamma_1 XShare_{i,t-1} + \gamma_2 Reserve_{t-1} + \gamma_3 Aggl_{i,t-1} + \varepsilon_{i,t}$$

$$\begin{aligned} ODI_{i,t} = {} & \alpha + \mu_i + \beta_1 GDP_{i,t-1} + \beta_2 RGDPpc_{i,t-1} + \beta_3 GDPG_{i,t-1} + \beta_4 Wage_{i,t-1} + \\ & \beta_5 Raw_{i,t-1} + \beta_6 D98_t * Raw_{i,t-1} + \beta_7 D02_t * Raw_{i,t-1} + \beta_8 Risk_{i,t-1} + \\ & \beta_9 Trend_t + \beta_{10} D98_t * Trend_t + \beta_{11} D02_t * Trend_t + \\ & \gamma_1 XShare_{i,t-1} + \gamma_2 D98_t * XShare_{i,t-1} + \gamma_3 D02_t * XShare_{i,t-1} + \\ & \gamma_4 Reserve_{t-1} + \gamma_5 D98_t * Reserve_{t-1} + \gamma_6 D02_t * Reserve_{t-1} + \\ & \gamma_7 Aggl_{i,t-1} + \gamma_8 D98_t * Aggl_{i,t-1} + \gamma_9 D02_t * Aggl_{i,t-1} + \varepsilon_{i,t} \end{aligned}$$

Table 3: An Augmented China's ODI Specification

	Whole	Developing	Developed
GDP	0.0619	0.3330	0.3826 *
	(0.0806)	(0.4560)	(0.2239)
RGDPpc	0.0236	0.0762 *	-0.3606
	(0.0319)	(0.0407)	(0.2335)
GDPG	-0.0121	-0.0078	-0.0169
	(0.0084)	(0.0092)	(0.0256)
Wage	-0.0004***	-0.0002**	0.0019 *
	(0.0001)	(0.0001)	(0.0011)
Raw	0.0234 *	0.0207 *	0.0542
	(0.0120)	(0.0117)	(0.0465)
Risk	-0.0150***	-0.0037	-0.0302
	(0.0057)	(0.0055)	(0.0222)
Trend	1.2576***	2.1429***	-2.5160
	(0.2449)	(0.3397)	(2.0855)
XShare	5.3420**	5.3375**	-38.6226
	(2.2803)	(2.5362)	(35.3132)
Reserve	5.3169***	2.9204 *	7.1587***
	(1.2463)	(1.5655)	(1.8873)
Aggl	4.5294***	4.7214***	10.2120***
	(1.1910)	(1.8053)	(3.8470)
Adj. R-squares	0.4051	0.6161	0.4037
Observations	376	243	133

Table 4: An Augmented China's ODI Specification, with interaction variables

	Whole	Developing	Developed
GDP	0.1673 *	0.0455	0.1549 *
	(0.0954)	(0.4869)	(0.0889)
RGDPpc	-0.0087	0.0924***	-0.2350
	(0.0365)	(0.0347)	(0.2004)
GDPG	-0.0074	0.0087	0.0186
	(0.0082)	(0.0103)	(0.0291)
Wage	-0.0005***	-0.0005***	0.0011
	(0.0001)	(0.0001)	(0.0022)
Raw	0.0305 *	0.0115	0.0441
	(0.0178)	(0.0169)	(0.0713)
*D98*Raw*	-0.0019	0.0115	0.0226
	(0.0181)	(0.0147)	(0.0381)
*D02*Raw*	-0.0211***	-0.0148 **	-0.0327
	(0.0074)	(0.0071)	(0.0436)
Risk	-0.0025	-0.0023	-0.0542 **
	(0.0057)	(0.0062)	(0.0254)
Trend	0.8560***	1.0153***	-1.1266
	(0.2956)	(0.2792)	(2.3934)
*D98*Trend*	0.0316	0.0256	0.4346 *
	(0.0496)	(0.0722)	(0.2620)
*D02*Trend*	0.0911	0.1164 *	0.0937
	(0.0621)	(0.0677)	(0.1650)
XShare	0.0683	-5.5738	-29.1614
	(3.5412)	(4.3088)	(30.9261)
*D98*XShare*	-2.3133	6.9324 **	-2.5050
	(1.5932)	(3.2317)	(6.7531)
*D02*XShare*	3.0170	10.2222***	-10.1022
	(3.2361)	(3.8911)	(11.6359)
Reserves	-0.1599	-0.7287	-0.6038
	(1.1056)	(1.7250)	(3.5593)
*D98*Reserves*	2.3706	2.0529	-9.4953
	(1.5576)	(2.0151)	(7.4216)
*D02*Reserves*	4.3220 **	1.9467	14.9865 *
	(1.7614)	(1.7768)	(8.8401)
Aggl	11.5792***	33.3347***	16.8765***
	(2.6537)	(8.5776)	(5.0529)
*D98*Aggl*	1.3921	-13.4679 **	6.6309 **
	(2.1282)	(6.3053)	(2.6525)
*D02*Aggl*	-9.9225***	-19.2420***	-8.3877
	(2.2906)	(5.5641)	(10.2744)
Adj. R-squares	0.5774	0.6973	0.5727
Observations	367	234	133

4. Additional Analyses

4.1 Natural Resources Seeking Motive

Dummy variables

DAfr, *DOil* – 0, 1

Interaction variables

*Raw*DAfr*, *D98*Raw*DAfr*, *D02*Raw*DAfr*

*Fuelx*DOil*, *D98* Fuelx*DOil*, *D02*Fuelx*DOil*

*Fuelx*DAfr*, *D98* Fuelx*DAfr* and *D02*Fuelx*DAfr*.

Drop *Wage*

Table 5: Natural Resources Seeking in African and Oil-Producing Countries

African		Fuel/African		Fuel/Oil-Producing	
GDP	0.2014 * (0.1096)	*GDP*	0.2146** (0.1079)	*GDP*	0.1626 * (0.0973)
RGDPpc	-0.0375 (0.0297)	*RGDPpc*	-0.0365 (0.0296)	*RGDPpc*	-0.0359 (0.0283)
GDPG	-0.0020 (0.0062)	*GDPG*	-0.0032 (0.0061)	*GDPG*	-0.0026 (0.0060)
Raw	0.0165 (0.0133)	*Fuelx*	0.0299*** (0.0110)	*Fuelx*	0.0781*** (0.0248)
*D98*Raw*	-0.0044 (0.0042)	*D98*Fuelx*	-0.0073** (0.0034)	*D98*Fuelx*	-0.0337** (0.0132)
*D02*Raw*	0.0002 (0.0035)	*D02* Fuelx*	0.0016 (0.0034)	*D02* Fuelx*	-0.0011 (0.0125)
*Raw*DAfr*	-0.0439 * (0.0232)	*Fuelx *DAfr*	-0.0547** (0.0225)	*Fuelx *DOil*	-0.0742*** (0.0249)
*D98*Raw*DAfr*	0.0320** (0.0155)	*D98* Fuelx *DAfr*	0.0301** (0.0122)	*D98* Fuelx *DOil*	0.0289** (0.0122)
*D02*Raw*DAfr*	-0.0022 (0.0076)	*D02* Fuelx *DAfr*	0.0066 (0.0136)	*D02* Fuelx *DOil*	0.0040 (0.0121)
Risk	-0.0073 * (0.0044)	*Risk*	-0.0085** (0.0040)	*Risk*	-0.0067 (0.0047)
Trend	0.9938*** (0.1759)	*Trend*	0.9779*** (0.1686)	*Trend*	0.9080*** (0.1653)
*D98*Trend*	-0.0389 (0.0500)	*D98*Trend*	-0.0333 (0.0494)	*D98*Trend*	-0.0547 (0.0473)
*D02*Trend*	0.0792 * (0.0490)	*D02*Trend*	0.0784 * (0.0472)	*D02*Trend*	0.0845 * (0.0469)
XShare	4.5732 (3.5319)	*XShare*	5.1147 (3.1816)	*XShare*	4.8425 (3.4409)
*D98*XShare*	-2.7951 (1.7547)	*D98*XShare*	-3.3744** (1.6545)	*D98*XShare*	-3.5266 * (1.8306)
*D02*XShare*	2.0866 (2.6588)	*D02*XShare*	3.6463 (2.5921)	*D02*XShare*	1.8546 (2.8449)
Reserves	1.0120 (1.0004)	*Reserves*	0.9415 (0.9567)	*Reserves*	0.6351 (1.1146)
*D98*Reserves*	2.4220** (1.1927)	*D98*Reserves*	3.2937*** (1.2255)	*D98*Reserves*	4.1078*** (1.3146)
*D02*Reserves*	1.5771 (1.4949)	*D02*Reserves*	0.4491 (1.5061)	*D02*Reserves*	0.6526 (1.4781)
Aggl	12.4068*** (2.1806)	*Aggl*	12.5090*** (2.0610)	*Aggl*	10.3204*** (2.3113)
*D98*Aggl*	-0.3648 (1.7378)	*D98*Aggl*	-0.9203 (1.6283)	*D98*Aggl*	0.3594 (1.8475)
*D02*Aggl*	-8.4658*** (2.2540)	*D02*Aggl*	-8.6840*** (2.1686)	*D02*Aggl*	-6.6989*** (2.5363)
Adj. R-squares Observations	0.5556 527	*Adj. R-squares* *Observations*	0.5859 527	*Adj. R-squares* *Observations*	0.5536 527

4.2 Excluding the Wage Variable

Table 6: The China's ODI Equation without the *Wage* Variable

	Whole	Developing
GDP	0.2220**	0.3480
	(0.1104)	(0.5036)
RGDPpc	-0.0418	0.0632**
	(0.0296)	(0.0273)
GDPG	-0.0012	0.0002
	(0.0060)	(0.0074)
Raw	0.0039	0.0002
	(0.0070)	(0.0068)
*D98*Raw*	-0.0026	-0.0004
	(0.0041)	(0.0053)
*D02*Raw*	-0.0014	0.0019
	(0.0036)	(0.0029)
Risk	-0.0058	-0.0034
	(0.0045)	(0.0055)
Trend	0.9099***	1.4316***
	(0.1797)	(0.2680)
*D98*Trend*	-0.0031	-0.0464
	(0.0470)	(0.0616)
*D02*Trend*	0.0766 *	0.0623
	(0.0439)	(0.0472)
XShare	4.7450	0.1625
	(3.4228)	(3.9274)
*D98*XShare*	-3.0119 *	3.6325
	(1.6808)	(2.3678)
*D02*XShare*	2.0761	4.7055 *
	(2.5941)	(2.8103)
Reserves	0.8875	0.2040
	(1.0084)	(1.4537)
*D98*Reserves*	2.3433**	3.3759**
	(1.2028)	(1.4744)
*D02*Reserves*	1.8503	-0.4168
	(1.4379)	(1.4534)
Aggl	12.6405***	27.3350***
	(2.2196)	(8.4307)
*D98*Aggl*	-0.7819	-9.8328**
	(1.7542)	(4.8429)
*D02*Aggl*	-8.3826***	-13.4451**
	(2.2825)	(6.2612)
Adj. R-squares	0.5515	0.6835
Observations	527	388

4.3 Alternative ODI data

ODI data, the IMF-OECD format, 2003, 2004, and 2005.
China's ODI data from OECD countries

Table 7: The China's ODI Equation – An Alternative Data Source

	Whole	Developing	Developed
Panel A			
GDP	0.6389 *	18.2407	-0.5105
	(0.3662)	(16.3719)	(0.6355)
RGDPpc	-0.1774	-1.0379	-0.0491
	(0.1360)	(0.8254)	(0.2733)
GDPG	0.0701	0.0958	0.0297
	(0.0474)	(0.1052)	(0.1269)
Wage	0.0091	0.6601	0.0047
	(0.0098)	(0.7229)	(0.0057)
Raw	0.0432	-0.0148	0.0615
	(0.0320)	(0.0736)	(0.0760)
Risk	0.0813	0.1056	-0.0316
	(0.0528)	(0.0820)	(0.0556)
Trend	-0.5498	0.1236	0.1087
	(2.1802)	(4.9784)	(2.7544)
XShare	23.7449 **	32.5584 *	1.7704
	(8.4813)	(15.3697)	(22.2235)
Reserves	4.3335	1.5204	-0.9752
	(22.0537)	(50.1933)	(29.5455)
Aggl	19.8168 **	25.5190	549.1461 **
	(8.6648)	(13.3713)	(126.8308)
Adj. R-squares	0.7723	0.8014	0.9275
Observations	54	30	24
Panel B			
GDP	-0.0888	0.7725	0.2918
	(0.3817)	(4.7270)	(0.3098)
RGDPpc	0.2539 **	0.6038	-0.2636
	(0.1165)	(0.3814)	(0.1596)
GDPG	-0.0226	-0.0292 *	0.0157
	(0.0145)	(0.0154)	(0.0470)
Raw	-0.0027	-0.0023	0.0112
	(0.0053)	(0.0056)	(0.0207)
Risk	0.0510	0.0483	0.0263
	(0.0360)	(0.0420)	(0.0235)
XShare	25.1330 **	26.4219 **	12.4863
	(10.7382)	(12.3850)	(19.2589)
Reserves	7.6416***	8.2744***	-2.4844
	(2.0569)	(2.3969)	(3.9121)
Aggl	24.9875 **	22.5073 **	258.2925***
	(9.8843)	(9.8927)	(62.0990)
Adj. R-squares	0.4521	0.4448	0.8126
Observations	114	84	30

5. Summary and Remarks

Different investment approaches toward developed and developing countries

Subject to the differences:

- Seeking market and resources
- Servicing the Chinese exports (developing countries)
- China's FX reserves promote ODI (developed countries)
- Agglomeration – developed countries; "diversify" – developing countries

Changes in China's overseas investment policy

No "extra" resources-seeking effort in African and oil-producing countries

Similar results from alternative ODI data sources - data quality(?)

In 2005, China ranked

27th among all the outward investors and

4th among developing countries excluding offshore finance centers

61st, *Outward FDI Performance Index*

Great potential to expand direct investment abroad

Trade surplus, international reserves holding

Perceived to be an important source of financing for developing countries

Actively promote its overseas investment activity

"Going global" policy

Portfolio inv., qualified domestic institutional investors (QDII) program

Sovereign wealth fund – China Investment Corp.

Some Recent Economic Issues Related to China

IV: A Currency Union in Asia: An Output Perspective

1. Introduction

The recent Asian Crisis

Fostering monetary and financial cooperation

- Improved communications
- Chiang Mai Initiative
- Asian Monetary Fund
- Peg collectively
- Asian currency unit

Do the (Southeast) Asian countries meet the preconditions of an OCA?

Criteria for an optimum currency area

- Business cycle synchronization
- Trade pattern
- State of economic development
- Trade and financial integration
- Factor mobility

Business cycle synchronization

- The contemporaneous correlation of output shocks
- Detrend, shocks to stationary components
- VAR framework - **supply** and demand shocks

Caveat - transmission mechanism

- High correlation of shocks, different transmission mechanisms
- Low contemporaneous shock correlation, similar business cycle pattern

- A Northeast Asia currency union: China, Japan, and Korea

    trade and investment, policymakers

- Our approach

    business cycle synchronization

        long-run and short-run output synchronization

    output losses of establishing a currency union, relinquishing policy autonomy

        macro model, shock estimation, policy objective

2. Recent Developments

- Until recently, China, Japan and Korea: “individualistic”
- After the 1997 financial crisis, move to improve coordination
- Japanese Cabinet Office (2001): China-Japan-Korea FTA

    Tri-lateral program: DRC, NIRA, KIEP

- Progress in bilateral trade (Table 1)
- Results:
    faster than the world trade growth
    China-Korea faster than China-Japan
    Japan, a higher proportion
    1.16% (1.455) of the world trade

Table 1. China's Trade with Selected Economies, in Millions of US Dollars

		Japan	Korea
A. Exports			
	1991	10252	2179
	2002	48483	15508
Proportion			
	1991	0.142	0.030
	2002	0.149	0.048
Growth Rate			
	91-02	13.85	57.06
B. Imports			
	1991	10032	1066
	2002	53489	28581
Proportion			
	1991	0.157	0.017
	2002	0.181	0.097
Growth Rate			
	91-02	14.41	62.55
C. Total Trade with China			
	1991	20284	3245
	2002	101972	44089
Proportion			
	1991	0.149	0.024
	2002	0.164	0.071
Growth Rate			
	91-02	13.69	57.92

- FDI in China (Table 2)
- Results:
    substantial growth
    concentration, electronics, manufacture
    significant investors

Table 2. Foreign Direct Investment Inflow to China (in Millions of US Dollars)

		Korea		Japan
Inflow to China				
	1991	119	*	533
	2002	2721		4190
Proportion				
	1991	0.01	*	0.12
	2002	0.05		0.08
Growth Rate				
	91-02	48.11	+	23.14

3. Data and Preliminary Analyses

- China, Japan, and Korea: real *per capita* GDPs
- 1993:IV to 2001:IV
- The augmented Dickey-Fuller test (Table 3)
- Results:

    I(1) series

Table 3. Augmented Dickey-Fuller Test Results

	Levels		First Differences	
	Test Statistic (lags)	Q(4); Q(8)	Test Statistic (lags)	Q(4); Q(8)
China GDP	-2.08 (4)	2.67; 8.87	-8.54** (3)	4.39; 9.04
Japan GDP	-1.56 (3)	0.09,7.52	-5.14** (2)	0.08; 5.67
Korea GDP	-2.09 (1)	2.70; 9.61	-2.49** (1)	2.44; 4.02

4. Common Long-Run and Short-Run Cycles

4.1 Common Stochastic Trends

- I(1) GPD series; long-run comovement

- Johansen cointegration test: $\mathbf{X}_t = \mu + \sum_{i=1}^{p+1} \gamma_i \mathbf{X}_{t-i} + \varepsilon_t$

- Results:

  cointegrated; tend to move together in the long run

Table 4. Cointegration Test Results

	Max Statistic	Trace Statistic
r =2	1.14	1.14
r =1	13.59	14.73
r =0	37.55**	52.28**

4.2 Vector Error Correction Model

- Long-run and short-run interactions

- The VECM: $\Delta \mathbf{X}_t = \mu + \sum_{i=1}^{p} \Gamma_i \Delta \mathbf{X}_{t-i} + \alpha Z_{t-p-1} + \varepsilon_t$

- Main results:

  only China responds to the ECT

  positive cross-country effects, negative own-country effects

  Japan $\rightarrow$Korea $\rightarrow$China

Table 5. Vector Error Correction Models

	China	Japan	Korea
Constant	0.040**	-0.001	0.004
	(8.729)	(-0.095)	(0.176)
ECT	-0.051**	-0. 045	0.123
	(-3.590)	(-1.209)	(1.717)
CH GDP(-1)	-0. 696*	-0.192	0.457
	(-4.793)	(-0.500)	(0.623)
CH GDP(-2)	-0. 591**	0.069	0.730
	(-4.963)	(0.219)	(1.212)
CH GDP(-3)	-0. 597**	-0.195	-0.106
	(-4.475)	(-0.554)	(-0.157)
JP GDP(-1)	0.199*	-0.692**	1. 178*
	(1.787)	(-2.359)	(2.094)
JP GDP(-2)	0.079	-0.724**	1.748**
	(0.629)	(-2.178)	(2.745)
JP GDP(-3)	-0.065	-0.314	2. 098**
	(-0.491)	(-0.899)	(3.135)
KO GDP(-1)	0.139**	0. 225	0.164
	(2.252)	(1.380)	(0.526)
KO GDP(-2)	0.045	0.056	0.018
	(0.773)	(0.366)	(0.062)
KO GDP(-3)	0.000	0.167	-0.558**
	(0.024)	(1.187)	(-2.068)

4.3 Common Feature and Codependent Business Cycles

- Common feature test: perfectly synchronized business cycles

$$C(p,s) = -(T - p - 1)\sum_{j=1}^{s} \ln(1-\lambda_j)$$

- Codependence test: imperfectly synchronized business cycles

$$C(k,p,s) = -(T - p - 1)\sum_{j=1}^{s} \ln\left\{1-\left[\lambda_j(k)/d_j(k)\right]\right\}$$

- Results (Table 6): Both types of common business cycles

Table 6. Common Feature and Codependence Test Results

Null	Common Feature Test		Co-Dependence Test		Degree of Freedom
	Squared Canonical Correlation	Statistic C(*p*, *s*)	Squared Canonical Correlation	Statistic C(*p*,*k*, *s*)	
S = 1	0.329	10.390	0.154	3.359	8
S = 2	0.532	30.117**	0.427	17.304	18
S = 3	0.744	65.584**	0.940	75.308**	30

5. Potential Output Loss

- Benefits: economic efficiency, transaction costs, foreign exchange uncertainty
- Costs: macroeconomic management

5.1 The Model

- Ghosh and Wolf (1994), assume nominal wage rigidity
- Outside the union: individual policies to smooth adverse shocks
- In the union: common policy, imperfect fine-tuning
- percentage output loss

$$L_t = 1 - \exp[(\varepsilon_t - \varepsilon_t^c)\alpha/(1-\alpha)]$$

ε_t : shock to the economy

ε_t^c : shock to the currency union

α : labor share

5.2 The Estimated Output Cost

- Shock estimation ε_t：

  VECM

  HP

  BQ

- The currency union shock ε_t^c :

  GDP-weighted average

  simple average

- labor share parameter α :

  0.3 to 0.7

- Results, GDP-weighted average shock (Table 7):

    labor share

    output loss ranking, Korea > China > Japan

        shocks to Korea are unique?

    sensitive to shock-estimation methods

    group output loss is “small”

        uneven costs/benefits distribution

Table 7. The Average Output Losses in Percentages

		GDP-Weighted Average Shock			Simple Average Shock		
		VECM	HP Filter	BQ	VECM	HP Filter	BQ
$\alpha = 0.7$	China	0.222	0.565	0.213	0.158	0.274	0.164
	Japan	0.079	0.058	0.039	0.651	0.527	0.318
	Korea	1.355	3.185	1.750	1.060	2.228	1.314
	All	0.110	0.133	0.084	0.639	0.546	0.335
$\alpha = 0.6$	China	0.143	0.365	0.137	0.101	0.176	0.105
	Japan	0.051	0.037	0.025	0.420	0.340	0.205
	Korea	0.887	2.099	1.148	0.691	1.466	0.855
	All	0.071	0.086	0.054	0.413	0.353	0.216
$\alpha = 0.5$	China	0.195	0.245	0.092	0.068	0.118	0.070
	Japan	0.034	0.025	0.017	0.281	0.228	0.137
	Korea	0.598	1.421	0.774	0.464	0.988	0.575
	All	0.047	0.058	0.037	0.276	0.236	0.144
$\alpha = 0.4$	China	0.064	0.163	0.061	0.045	0.079	0.047
	Japan	0.023	0.017	0.011	0.188	0.152	0.091
	Korea	0.401	0.957	0.520	0.311	0.664	0.385
	All	0.032	0.039	0.024	0.184	0.158	0.096
$\alpha = 0.3$	China	0.041	0.105	0.039	0.029	0.051	0.030
	Japan	0.015	0.011	0.007	0.121	0.098	0.059
	Korea	0.259	0.620	0.337	0.200	0.429	0.249
	All	0.020	0.025	0.016	0.118	0.100	0.062

- Results, simple average shock (Table 7):
    - comparable to those based on GDP-weighted average shock
    - output loss ranking, Korea > Japan > China
    - simple average shock loss > GDP-weighted shock loss
- Issues
    - policy choice
    - strategic behavior

- Losses in US dollars, appendix

possibility of Japan to buyout the other 2 countries

Table A1. The Output Losses in US Dollars (Billions)

		GDP-Weighted Average Shock			Simple Average Shock		
		VECM	HP Filter	BQ	VECM	HP Filter	BQ
$\alpha = 0.7$	China	0.414	0.985	0.383	0.274	0.490	0.271
	Japan	3.708	2.811	1.732	29.960	25.639	14.275
	Korea	1.293	2.596	1.944	1.018	1.816	1.464
$\alpha = 0.6$	China	0.267	0.636	0.246	0.177	0.316	0.175
	Japan	2.385	1.808	1.114	19.336	16.566	9.199
	Korea	0.845	1.709	1.275	0.663	1.189	0.953
$\alpha = 0.5$	China	0.178	0.426	0.164	0.118	0.211	0.116
	Japan	1.590	1.205	0.742	12.921	11.078	6.142
	Korea	0.569	1.156	0.860	0.445	0.801	0.641
$\alpha = 0.4$	China	0.119	0.284	0.110	0.079	0.141	0.078
	Japan	1.060	0.804	0.495	8.628	7.400	4.099
	Korea	0.382	0.778	0.578	0.298	0.538	0.429
$\alpha = 0.3$	China	0.076	0.183	0.071	0.051	0.090	0.050
	Japan	0.682	0.517	0.318	5.553	4.764	2.637
	Korea	0.247	0.504	0.374	0.193	0.348	0.277

- Losses based on specific labor share figures

  0.36, China; 0.59, Japan; 0.49 for Korea

  results:

    “low” losses

    uneven distribution

Table 8. The Average Output Losses in Percentages for Specific Labor Shares

	GDP-Weighted Average Shock			Simple Average Shock		
	VECM	HP Filter	BQ	VECM	HP Filter	BQ
China	0.054	0.138	0.052	0.038	0.066	0.039
Japan	0.049	0.036	0.024	0.403	0.327	0.196
Korea	0.575	1.367	0.745	0.446	0.950	0.553
All	0.059	0.063	0.041	0.390	0.327	0.199

6. Concluding Remarks

Favorable empirical findings for a currency union between China, Japan, and Korea

- Intensified trade and investment interactions
- Synchronous long-run and short-term output movements
- Output costs seem low

Caveats

- Output loss estimates should not be taken literally
- Sensitivity of the results, implications for estimating costs/devising policies
- Beyond economic pre-conditions – tradition, institutional setting, political climate

Encouraging developments

- China-ASEAN FTA, China joined the Bangkok agreement RTA
- A FTA with Japan and South Korea?
- China, growing and booming economy, a benefit rather than a threat

Further investigation

- Costs and benefits (other costs; benefits)
- Industry-specific shocks; Resource re-allocation between sectors
- Self-validation of an exchange rate regime choice
- Recent European Union experiences
- Potential tensions in setting the union's common monetary policy
- The self-validation nature of an exchange rate regime choice
- The "imbalance" growth phenomenon in EU
- The legacies of war, occupation, communism, …,
- Antagonism against regional hegemony
- Different political structures
- The cost of adjustment
    - Agricultural trade is a contentious issue
    - Hollowing out

One thing is certain

Despite the bright promise of closer economic cooperation,

the process of economic integration will be long and involving