East Asian Patterns of Comparative Advantage

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Introduction

- Changing trade patterns in East Asia will be driven by two forces:
 - Emergence of new demand patterns, particularly within the region (China).
 - Established and evolving patterns of comparative advantage.
- The first two papers in this series emphasized the first, demand side perspective.
- This paper examines underlying structural determinants of supply, or comparative advantage.

A New Perspective on Regional Comparative Advantage

- Exhaustive analysis of trade flow data can reveal emergent patterns of commodity trade, but not the underlying sources or ultimate effects, of comparative advantage.
- In the long run, capital is mobile and wage differentials can only be sustained by productivity differences.
- Therefore, the skill content of trade is an essential determinant of real comparative advantage.

Relative Skill Content of Output

- To elucidate this issue, trade flow data were adjusted to capture differences in embodied labor services.
- In particular, for country k and sector i, we define

$$\lambda_{i}^{k} = \frac{LVA(Skilled)_{i}^{k}}{LVA(Unskilled)_{i}^{k}}$$

where LVA denotes labor value added for each sector and country. This measure indicates the relative skill content, per unit of output, and is independent of exchange rates.

Skill-adjusted Trade Flows

We now adjust a traditional trade flow measure

$$IIC_i^{km} = \frac{E_i^{km} - E_i^{mk}}{E_i^{km} + E_i^{mk}}$$

for skill content, i.e.

$$ELT_{i}^{km} = \frac{\lambda_{i}^{k} E_{i}^{km} - \lambda_{i}^{m} E_{i}^{mk}}{\lambda_{i}^{k} E_{i}^{km} + \lambda_{i}^{m} E_{i}^{mk}}$$

an index (between -1 and 1) of the relative export or import orientation of embodied labor service trade. Here the variable E_i^{km} denotes exports from k to m of sector i goods.

Export and Import Orientation of Trade in Goods and Labor Services

JAPAN

Percentages	ELT: Embodied Labor Trade							
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total	
Strong Import	29	0	34	27	32	45	30	
	12	0	13	6	22	18	10	
Neutral	10	100	17	15	14	11	17	
	14	0	19	21	15	17	18	
Strong Export	35	0	16	30	16	7	23	

China	Japan	NIE	ASEAN	USA	EU	Total
38	0	42	34	39	46	41

IIT: Intra-industry Commodity Trade

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38	0	42	34	39	46	41
14	0	15	14	17	19	18
12	100	18	16	15	12	14
14	0	17	18	16	15	20
21	0	7	16	12	6	5

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	23	0	14	21	8	12	13
	4	0	2	0	5	9	2
Neutral	4	0	27	4	10	3	4
	3	0	50	56	51	34	14
Strong Export	66	0	7	18	25	41	66
Total	100	0	100	100	100	100	100

China	Japan	NIE	ASEAN	USA	EU	Total
54	0	25	46	27	34	35
9	0	6	4	10	15	7
3	0	57	5	16	6	9
28	0	11	44	42	35	43
6	0	0	2	4	10	5
100	0	100	100	100	100	100

Relative Export and Import Orientation, Changes 1996-2000

JAPAN

Percentages	centages ELT: Embodied Labor Trade							
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total	
Strong Import	0	0	-2	0	-8	-6	-3	
	-2	0	1	-2	4	1	-1	
Neutral	3	0	6	5	1	2	1	
	6	0	1	9	-1	1	3	
Strong Export	-7	0	-5	-12	4	2	0	

IIT: Intra-industry Commodity Trade

China	Japan	NIE	ASEAN	USA	EU	Total
-5	0	0	-2	-4	-10	-1
7	0	2	3	-3	6	-3
3	0	1	9	2	2	4
-5	0	3	-3	1	0	0
0	0	-5	-7	4	2	0

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	2	0	5	1	-2	-2	-1
	-2	0	-5	-1	0	2	0
Neutral	3	0	25	2	-24	-1	0
	-1	0	-17	53	24	-18	6
Strong Export	-1	0	-8	-54	0	19	-6
Total	0	0	0	0	0	0	0

	China	Japan	NIE	ASEAN	USA	EU	Total
	-2	0	8	0	-2	-1	0
	2	0	-6	-1	-1	8	-1
	0	0	20	2	-2	-6	3
	6	0	-17	1	4	-2	-2
	-7	0	-4	-2	1	1	0
•	0	0	0	0	0	0	0

Export and Import Orientation of Trade in Goods and Labor Services

CHINA

Percentages	EL	ELT: Embodied Labor Trade								
Sector Count	China	China Japan NIE ASEAN USA EU To								
Strong Import	0	35	45	18	21	35	11			
	0	14	12	15	17	23	26			
Neutral	100	10	19	18	22	9	20			
	0	12	14	21	12	13	29			
Strong Export	0	29	9	27	27	18	13			

		•		-		
China	Japan	NIE	ASEAN	USA	EU	Total
0	21	33	18	16	19	8
0	14	20	12	7	17	28
100	12	20	20	19	17	22
0	14	16	24	19	14	27
0	38	10	24	38	31	14

IIT: Intra-industry Commodity Trade

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	0	66	86	26	6	14	5
	0	3	8	56	42	54	41
Neutral	0	4	2	7	8	3	24
	0	4	1	5	7	7	23
Strong Export	0	23	2	6	38	22	7
Total	0	100	100	100	100	100	100

 China	Japan	NIE	ASEAN	USA	EU	Total
0	29	88	35	21	11	5
0	65	9	54	3	15	25
0	3	1	6	14	63	56
0	2	1	3	56	6	13
0	2	0	1	5	5	1
0	100	100	100	100	100	100

Relative Export and Import Orientation, Changes 1996-2000

CHINA

Percentages	ELT: Embodied Labor Trade						
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	0	-7	-3	2	-11	-9	-2
	0	6	-6	-5	-3	9	-3
Neutral	0	3	7	1	4	-2	-1
	0	-2	1	-4	1	2	4
Strong Export	0	0	2	6	9	0	2

IIT: Intra-industry	Commodity Trade
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China	Japan	NIE	ASEAN	USA	EU	Total
0	0	-6	1	-6	-8	-4
0	-5	-4	-3	-4	1	-2
0	3	12	-1	0	3	3
0	7	-2	0	3	-1	-3
0	-5	1	3	7	5	6

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	0	-1	4	1	-17	-17	-1
	0	-1	0	-1	8	17	-13
Neutral	0	3	-5	-1	2	-3	11
	0	-2	0	-2	3	2	2
Strong Export	0	2	1	2	4	1	0
Total	0	0	0	0	0	0	0

	China	Japan	NIE	ASEAN	USA	EU	Total
ı	0	-14	3	2	-3	-8	-2
ı	0	14	1	18	-2	-19	-13
ı	0	0	1	-19	-26	25	13
ı	0	1	-4	0	28	1	0
ı	0	-1	0	-1	2	1	1
	0	0	0	0	0	0	0

Export and Import Orientation of Trade in Goods and Labor Services

ASEAN

Percentages	EL	T: Emb	odied	Labor	abor Trade					
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total			
Strong Import	27	31	52	0	35	34	9			
	22	21	16	0	19	23	29			
Neutral	17	15	12	100	14	15	29			
	15	6	6	0	14	9	19			
Strong Export	18	27	13	0	17	17	13			

	IIT: Intra-industry Commodity Trade								
	China	Japan	NIE	ASEAN	USA	EU	Total		
ſ	24	17	46	0	21	29	11		
ı	24	18	17	0	14	14	20		
ı	20	16	12	100	21	13	33		
ı	12	14	10	0	12	14	18		
ı	18	34	14	0	31	29	16		

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	6	48	57	0	10	10	1
	5	27	24	0	42	14	8
Neutral	6	4	1	0	29	57	48
	56	0	2	0	7	6	35
Strong Export	26	21	17	0	12	14	8
Total	100	100	100	0	100	100	100

	China	Japan	NIE	ASEAN	USA	EU	Total
ľ	13	20	28	0	13	17	5
l	12	73	53	0	13	11	10
l	11	4	16	0	48	15	74
l	55	1	1	0	21	54	8
l	9	1	3	0	5	3	2
	100	100	100	0	100	100	100

Relative Export and Import Orientation, Changes 1996-2000

ASEAN

Percentages	ELT: Embodied Labor Trade						
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	6	-12	-8	0	-19	-14	-8
	-3	9	0	0	6	6	0
Neutral	0	5	7	0	7	9	1
	-5	-2	-2	0	4	-2	7
Strong Export	2	0	4	0	2	1	0

IIT: Intra-industry	Commodity Trade
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China	Japan	NIE	ASEAN	USA	EU	Total
3	-7	-9	0	-16	-8	-8
0	-3	0	0	-4	2	-6
-1	9	6	0	9	0	8
-3	3	1	0	6	2	4
1	-2	3	0	5	4	2

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	2	-24	-21	0	-5	-10	-4
	-1	23	20	0	-24	-44	-5
Neutral	-1	2	0	0	27	52	-15
	-1	-1	0	0	0	1	30
Strong Export	1	1	0	0	1	1	-7
Total	0	0	0	0	0	0	0

China	Japan	NIE	ASEAN	USA	EU	Total
1	-6	-64	0	-6	-10	-5
0	5	49	0	0	1	-8
-17	2	15	0	5	-42	11
18	-1	0	0	-2	50	1
-1	0	0	0	3	1	0
0	0	0	0	0	0	0

Export and Import Orientation of Trade in Goods and Labor Services

NIE

Percentages	ELT: Embodied Labor Trade						
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	9	16	0	13	28	40	9
	14	19	0	6	18	12	13
Neutral	19	17	100	12	12	13	20
	12	13	0	17	11	13	29
Strong Export	45	33	0	47	31	19	28

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China	Japan	NIE	ASEAN	USA	EU	То
10	7	0	14	20	30	1

IIT: Intra-industry Commodity Trade

_	China	Japan	NIE	ASEAN	USA	EU	Total
I	10	7	0	14	20	30	12
ı	16	17	0	10	14	15	13
ı	20	18	100	12	14	12	26
ı	20	15	0	17	19	15	26
l	33	41	0	42	32	26	22

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	2	7	0	17	5	9	1
	1	50	0	2	7	5	2
Neutral	2	27	0	1	37	5	10
	8	2	0	62	29	64	44
Strong Export	86	14	0	19	23	17	43
Total	100	100	0	100	100	100	100

_	China	ina Japan		ASEAN	USA	EU	Total
ſ	14	3	0	41	13	19	4
l	10	30	0	2	17	16	5
l	8	61	0	20	4	9	23
l	17	3	0	32	44	10	59
l	52	2	0	5	22	46	9
_	100	100	0	100	100	100	100

Relative Export and Import Orientation, Changes 1996-2000

NIE

Percentages	ELT: Embodied Labor Trade						
Sector Count	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	1	-6	0	3	-12	-7	-1
	1	1	0	-2	1	-2	-4
Neutral	7	6	0	7	4	0	4
	-6	1	0	1	0	-1	1
Strong Export	-3	-2	0	-10	7	9	-1

China	Japan	NIE	ASEAN	USA	EU	Total
0	-6	0	2	-11	-4	0
-2	3	0	1	-2	-6	-9
12	1	0	6	3	1	5
-4	2	0	0	9	1	1
-6	0	0	-10	1	7	2

Trade Weighted	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	1	-8	0	0	-6	-2	0
	0	-17	0	0	2	-3	-4
Neutral	-5	25	0	0	-25	-32	2
	0	-5	0	58	17	23	-19
Strong Export	4	5	0	-59	12	13	21
Total	0	0	0	0	0	0	0

China	Japan	NIE	ASEAN	USA	EU	Total
6	-12	0	0	-11	-3	0
-14	-1	0	-1	6	-8	-13
5	12	0	19	1	6	10
4	1	0	28	-13	-37	1
0	1	0	-47	18	42	2
0	0	0	0	0	0	0

Trade Flow Analysis and Aggregation Bias

- A large proportion of empirical research on trade analysis is relatively aggregate in terms of economic activities.
- In most of this work intra-industry trade is the rule and trade growth appears to stimulate relatively uniform expansion across sectors.
- In terms of comparative advantage and structural adjustment, however, very different conclusions can emerge at more detailed activity levels.
- This aggregation bias is endemic to most economywide and global trade analysis, and indeed does not contradict its aggregate conclusions.
- However, better adjustment policies must be supported by more detailed analysis.

Examples of Aggregation Bias

- Using the Intra-industry Trade index discussed in the previous section, it is apparent that moving from 6digit to 2-digit trade statistics entails serious aggregation bias.
- While there is no known remedy for this, it is recommended that both types of analysis be used in tandem. More aggregate analysis captures the general growth trends, while the detailed work is necessary to identify winners and losers.

CHINA

Sector Count

Trade Weighted								
2-Digit	China	Japan	NIE	ASEAN	USA	EU	Total	
Strong Import	0	36	97	0	5	1	1	
	98	63	2	96	0	95	97	
Neutral	0	0	0	0	90	0	0	
	2	0	0	0	0	2	0	
Strong Export	0	0	2	4	5	2	2	

China	Japan	NIE	ASEAN	USA	EU	Total
0	33	50	0	17	17	17
50	33	17	33	0	50	50
0	0	17	0	33	0	0
33	33	0	0	17	17	0
17	0	17	67	33	17	33

6-Digit	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	17	63	77	60	29	45	37
	53	21	13	20	17	19	37
Neutral	25	6	5	9	13	9	14
	3	5	3	3	7	5	9
Strong Export	2	5	2	7	34	23	3
_	100	100	100	100	100	100	100

	China	Japan	NIE	ASEAN	USA	EU	Total
I	24	64	60	21	45	60	50
l	24	9	11	13	11	9	21
l	34	12	19	24	16	12	15
l	8	5	5	11	8	6	8
l	10	9	6	31	20	12	6
	100	100	100	100	100	100	100

JAPAN

<u>Trade Weighted</u>								
2-Digit	China	Japan	NIE	ASEAN	USA	EU	Total	
Strong Import	0	0	0	0	0	1	0	
	0	0	0	0	3	0	1	
Neutral	0	0	0	0	0	0	0	
	99	0	100	91	64	64	78	
Strong Export	1	0	0	9	33	35	21	

Sector (Count					
China	Japan	NIE	ASEAN	USA	EU	Total
0	0	0	0	0	17	0
17	0	17	0	17	0	17
0	100	0	17	0	17	0
50	0	67	33	50	33	50
33	0	17	50	33	33	33

6-Digit	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	11	0	13	13	4	6	3
	6	0	19	6	4	4	5
Neutral	14	0	11	10	12	15	8
	18	0	13	27	18	15	37
Strong Export	51	0	44	43	61	60	48
	100	0	100	100	100	100	100

	China	Japan	NIE	ASEAN	USA	EU	Total
Г	12	0	10	7	17	25	15
	5	0	6	4	9	9	7
	16	100	15	16	15	17	13
	11	0	13	9	14	16	21
	56	0	56	63	46	34	44
	100	100	100	100	100	100	100

ASEAN

	<u>Trade Weighted</u>									
2-Digit	China	Japan	NIE	ASEAN	USA	EU	Total			
Strong Import	0	10	1	0	2	0	0			
	0	90	2	0	1	2	4			
Neutral	100	0	97	97	58	5	96			
	0	0	0	2	38	94	0			
Strong Export	0	0	0	0	0	0	0			

Sector	Count					
China	Japan	NIE	ASEAN	USA	EU	Total
33	50	17	0	50	17	33
0	33	17	17	17	33	33
67	0	50	33	17	17	33
0	0	0	50	17	33	0
0	17	17	0	0	0	0

6-Digit	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	5	38	11	1	23	23	10
	16	30	20	7	4	4	11
Neutral	36	15	39	65	13	8	39
	30	2	20	21	31	19	31
Strong Export	13	15	10	6	29	46	9
_	100	100	100	100	100	100	100

China	a Japan	NIE	ASEAN	USA	EU	Total
30	65	53	6	57	64	35
19	11	14	9	11	9	31
25	5 11	19	28	13	10	20
13	3 4	6	32	8	6	9
13	8	8	25	12	12	5
100	100	100	100	100	100	100

NIE

Sector Count

	<u>Trade Weighted</u>						
2-Digit	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	0	4	0	0	0	3	0
	0	96	0	0	2	0	1
Neutral	0	0	60	27	51	0	86
	99	0	38	68	32	73	0
Strong Export	1	1	2	6	15	25	12

- 2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	o o a i i c					
	China	Japan	NIE	ASEAN	USA	EU	Total
Г	0	33	17	0	0	33	0
	0	33	0	0	17	0	33
	33	0	17	17	17	0	33
	50	17	17	50	17	33	0
	17	17	50	33	50	33	33

6-Digit	China	Japan	NIE	ASEAN	USA	EU	Total
Strong Import	5	47	10	13	14	16	9
	13	10	3	13	5	5	11
Neutral	15	25	45	5	30	2	37
	37	12	25	46	11	19	17
Strong Export	30	6	18	23	41	58	26
_	100	100	100	100	100	100	100

	China	Japan	NIE	ASEAN	USA	EU	Total
I	15	57	23	10	44	55	40
ı	7	10	5	5	10	9	21
ı	28	19	43	27	19	17	17
ı	8	5	6	8	9	5	10
l	41	9	23	50	18	13	12
	100	100	100	100	100	100	100

East-Asian Regional Trade Linkages: A Detailed Structural Analysis

- While trade flow data are reveling, they only capture direct bilateral effects.
- In the real economy, a myriad of interactions delineate the path from initial expenditure to ultimate incomes.
- This is particularly the case with trade in an era of globalization, where international supply chains are ever more elaborate and indirect linkages often represent the majority of value creation.

An International Multiplier Model of Trade Linkages

- To more fully capture these complex, trade mediated interactions, we are developing an international multiplier model based on the GTAP database.
- Detailed decomposition analysis with this model will reveal regional trade interactions at unprecedented levels of detail.

Methodology

 Consider an example of three countries, each represented by a social accounting matrix of the form

$$T_k = \begin{bmatrix} T_{kk} & F_k \\ V_k & X_k \end{bmatrix}$$

where the component matrices denote commodity flows (T), final demand (FD), value added (VA), and other domestic accounts (X).

Multilateral Social Accounting Matrix

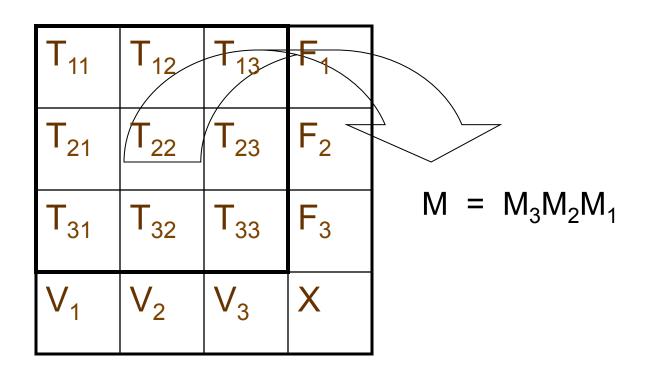
 Now compile the three country's tables into the following aggregate table

T ₁₁	<u>T₁₂</u>	<u>T₁₃</u>	F ₁
<u>T₂₁</u>	T ₂₂	<u>T₂₃</u>	F ₂
<u>T₃₁</u>	<u>T₃₂</u>	T ₃₃	F ₃
V_1	V_2	V_3	X

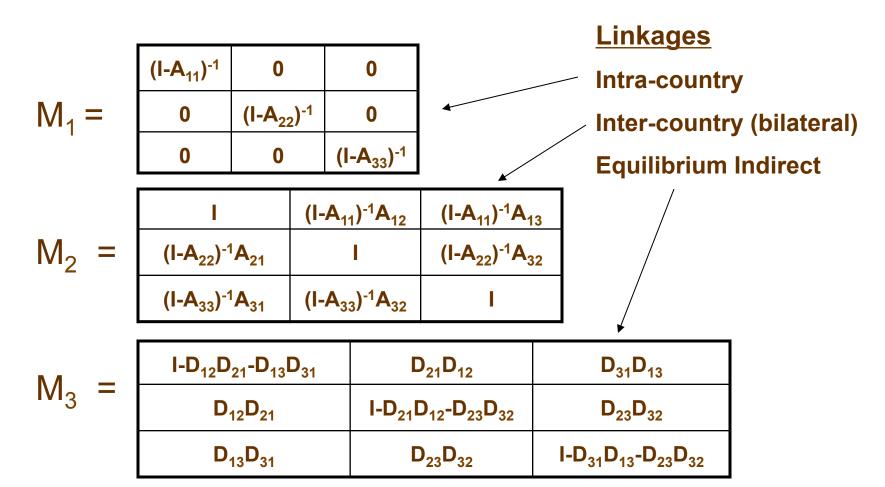
where the off-diagonal T matrices (underlined) are bilateral trade flow tables.

Block Decomposition

To elucidate **multi-lateral** regional trade linkages, we carry out the following block multiplier decomposition:



Block Decomposition (cont.)



Note: $D_{ij} = (I-A_{ii})^{-1}A_{ij}$

Path Decomposition

In the trade account table T, each pair $\langle i,j \rangle$ is called an arc. A path is a sequence s of indices $s=\langle i,k,l,...,m,j \rangle$ that can be decomposed into consecutive arcs $\langle i,k \rangle$, $\langle k,l \rangle$,..., $\langle m,j \rangle$. Denoting the influence of i on j over a path s by $(i->j)_s$.

To measure the income effect of *i* on *j* along $\langle i,j \rangle$, consider the basic expenditure relationship $\frac{\partial y_j}{\partial y_i} = a_{ji}$

measured by entry (j,l) of the transpose of the (column normalized) expenditure share matrix A.

Along a detailed expenditure path $s = \langle i, k, ..., m, j \rangle$ we find all the constituent arcs,

$$D_{(i\to j)s}^P = a_{ki}...a_{jm}$$

in addition to direct effects, account must be taken of all the interactions along the path, i.e. total i->j induced income includes the multiplier effect

$$T_{(i\to j)s}^P = D_{(i\to j)s}^P \mu_s^P$$

Summing over all possible bilateral paths, we have

$$G_{(i\rightarrow j)s}^{P} = \sum_{s \in S} T_{(i\rightarrow j)s}^{P} = \sum_{s \in S} D_{(i\rightarrow j)s}^{P} m_{ji}^{P}$$

These Direct, Total, and Global influences are the three distinct components that make up the transmission mechanism underlying income determination.

Labor Market Determinants of China's Comparative Advantage

- We have argued that underlying comparative advantage is determined by patterns of employment.
- Labor markets are dynamic in nature, however, and changing demand and supply conditions can shift comparative advantage decisively.

Chinese Labor Markets

- In China, labor is the ultimate source of comparative advantage. Domestic labor allocation patterns appear to be changing in important ways, however:
 - Rural to Urban migration is continuing.
 Transactions costs to this activity are rising, but the opportunity cost of labor in the rural sector continues to decline.
 - Skilled labor demand is rising faster than supply. This trend is being accelerated by FDI, for which skilled labor appears to be a complement.

Prospective Research

Three components:

- 1. A comprehensive survey of recent literature and statistical resources.
- 2. Detailed matching analysis of labor trends and trade flow data to identify bottlenecks.
- 3. Dynamic simulations with varying labor market assumptions.

Conclusions 1

- Shifting commodity trade patterns in East Asia do not fully reflect underlying comparative advantages.
- In the long term, capital is mobile and wage differentials can only be sustained by skill differentials.
- For these reasons, the skills embodied in trade flows more accurately reflect underlying comparative advantages.
- Trade flow analysis that takes account of skill composition indicates very different patterns of East Asian trade advantages and disadvantages.
- In particular, over the period 1996-2000:
 - Japan is strongly export oriented in high wage sectors and remaining so.
 - ASEAN is "holding its own" in bilateral trade with China by concentrating on relatively high wage exports.
 - Korea and Taipei, China have both maintained strong regional export orientation in high wage activities.
 - China has maintained most of its export orientation in low wage activities, although a new component of high wage net exports is emerging.

Conclusions 2

- Bilateral trade flows only reveal the direct part of regional comparative advantage.
- Indirect linkages, spanning complex regional and global supply chains, often determine the majority of net gains from trade.
- We propose a new way of elucidating these complex linkages with multiplier decomposition techniques.

Conclusions 3

- China's conditions of comparative advantage are likely to experience rapid evolution for two reasons:
 - Significant and relatively sustained inbound FDI, which expands supply capacity and can significantly alter the productivity patterns of domestic factors like land and labor.
 - Labor markets are entering an important transition period:
 - Migratory patterns for unskilled labor are likely to intensify.
 - Supply conditions for skilled labor are unlikely to keep pace with demand.
 - Economic reform will adversely affect short term aggregate labor demand.