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Functional Upgrading in Global Value Chains: Trends in Asia

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Motivation

- 1. 'Factory Asia' and (pre-mature) deindustrialization**
- 2. Increasing skill shares in GVCs: supply effect or upgrading?**



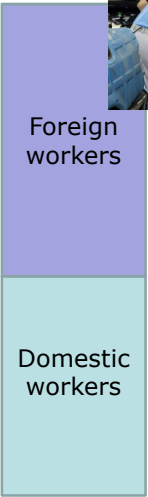
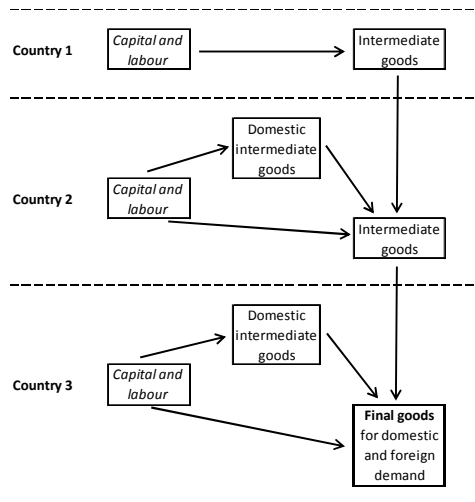
➤ **Functional upgrading in GVCs**


➤ Distinguish production and support (services) activities

➤ **Use detailed occupation data**




GVC jobs in a stylized global value chain: graphical representation




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Data

- **World Input-Output Tables**

- **Industry by occupation data**



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Stylized World Input-Output Tables

		PRC			Japan			USA			PRC			JPN			USA			Tot
		M	S	E	M	S	E	M	S	E	H	I	G	H	I	G	H	I	G	
PRC	Mining	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	Steel manuf	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Japan	Mining	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	Steel manuf	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USA	Mining	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.


	Steel manuf	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Electr. Manuf		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Value added		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Total		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Employment		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Of which:		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Occupation 1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Occupation 2		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
etc.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.



Mapping

Mapping occupations to activities

Business function	Example occupation(s)	NOS 2010	OES 2007
1. Production activities	Assemblers; Other machine operators and assemblers	61.1	57.6
2. Research and Development of Products, Services, or Technology	Architects, engineers and related professionals	5.6	6.7
3. Sales and Marketing	Business professionals	7.5	5.0
4. Transportation, Logistics, and Distribution	Transport labourers and freight handlers	5.6	9.1
5. Customer and After-Sales Services	Client information clerks	4.3	5.6
6. General and strategic management; Administration, and Back Office Functions	General managers; Office clerks	9.7	8.8
7. Technology and process development	Computing professionals	2.6	2.8
8. Facilities Maintenance	Painters, building cleaners and related trades workers	3.7	4.5



Activity content of GVC

Define number of countries as c , industries as i and business activities as b

F = Diagonal matrix with final demand levels ($ci \times ci$)

A = Intermediate input coefficients ($ci \times ci$)

(I-A)⁻¹ = Leontief inverse of world IO table ($ci \times ci$)

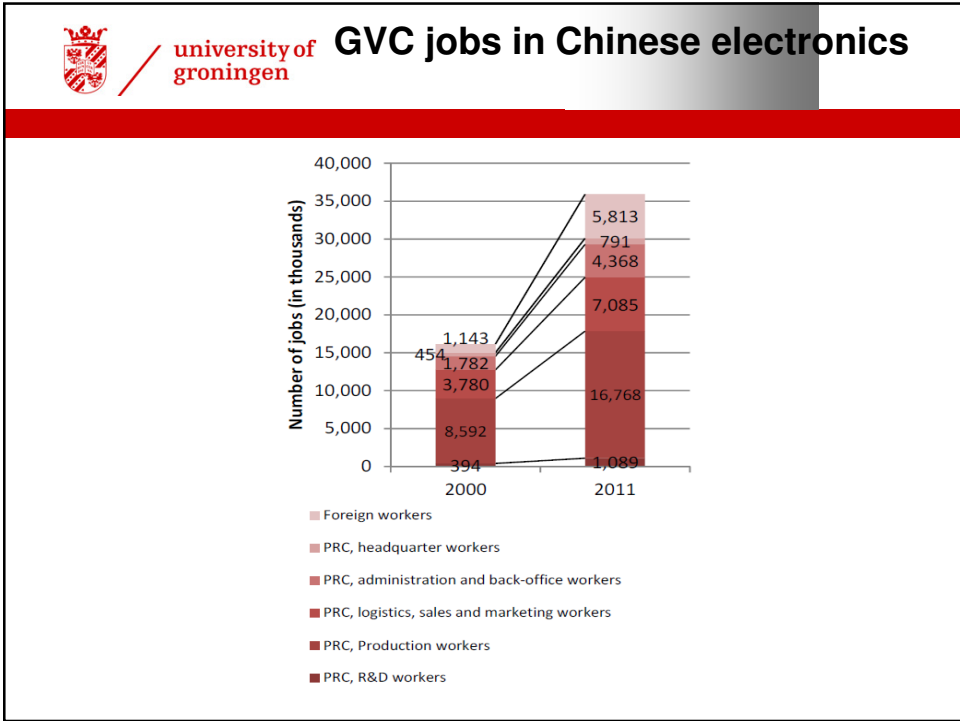
X = Matrix with gross output levels of industries in rows to meet final demand of industries in columns ($ci \times ci$)

$$\mathbf{X} = (\mathbf{I}-\mathbf{A})^{-1}\mathbf{F}$$

P = Direct workers of business activity b per unit of gross output ($bc \times ci$)


$$\mathbf{K} = \mathbf{P}\mathbf{X}$$

K = Total workers by business activity attributed to each final demand level ($bc \times ci$)



university of groningen **Manufactures GVC workers by activity, 2011 (in 000s) and % change**


	R&D workers		Production workers		Logistics, sales and marketing workers		Administration and back-office workers		Headquarter workers	
	%		%		%		%		%	
	change 2000-2011	2011	change 2000-2011	2011	change 2000-2011	2011	change 2000-2011	2011	change 2000-2011	2011
PRC	4,779	72%	178,296	15%	35,865	27%	22,007	52%	4,236	21%



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PRC	4,779	72%	178,296	15%	35,865	27%	22,007	52%	4,236	21%
India	1,507	65%	97,466	13%	19,157	23%	3,706	31%	10,334	71%
Republic of Korea	289	50%	3,943	-13%	533	17%	837	33%	156	17%



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Accounting for the drivers

In a demand-driven global input-output model, we examine the drivers of changes in job demand

- Technological change and relocation of production activities bias labor demand to more knowledge-intensive activities
- Technological change in GVCs reduces labor demand, but this is compensated by increased consumption



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Concluding remarks

- Macro: functional upgrading
- The pace of upgrading differs across Asia

Thank you for your attention
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