The Employment Effects of Technology, Trade, and Consumption in Global Value Chains: Evidence for Developing Asia

Submitted by: Asian Development Bank

Workshop on Effective Domestic Policymaking for Stimulating Economic Upgrading Through Global Value Chains
1-2 March 2022

The employment effects of technology, trade, and consumption in global value chains:
Evidence for Developing Asia

Elisabetta Gentile, Ph.D.

Workshop on Effective Domestic Policymaking for Stimulating Economic Upgrading through Global Value Chains
Held online from Moscow, March 1, 2022

ADB

To find out more…

Motivation

- Between 2005 and 2015, Asia lifted 611 million people out of poverty, bringing down the headcount ratio from 25.6% to 7.0%, and Asia's share of the of the developing world's poor went from 65.0% to 36.2%--substantially lower than its share in population.

- Participation in global value chains (GVCs) has been an important part of this success story. In 2019, Asia's GVC participation was 67.4%, making it a key player in GVCs (ADB 2021).

- The adoption of Fourth Industrial Revolution (4IR) technologies may result in job losses in developing Asia through 2 mechanisms:
  1. if machines replace workers at one or more of the production tasks in the GVC;
  2. if it erodes the labor cost advantage of emerging economies, thus encouraging reshoring production to advanced economies.

- If 4IR technologies are skill-biased, their adoption may shift demand from workers with lower skills to those with higher skills, thus widening inequality.

An uncertain future ahead…

Contribution

- Structural decomposition analysis (SDA) of the ADB Multiregional Input Output (MRIO) database to examine the relationship between technology and jobs along value chains in 16 economies in developing Asia, covering 35 sectors from 2008 to 2018.
  - The 16 economies accounted for 95% of employment in developing Asia in 2018.

- We define a GVC as all activities that are directly or indirectly needed to produce a product that is used for final consumption:
  - example: the production of garments with its final assembly stage in Bangladesh, but with many of the inputs sourced from other economies.

Example: the GVC for garments

Task relocation

If the Chinese garments manufacturers decide to outsource some (routine) jobs to Cambodia, then the number of (routine) jobs is unchanged, but fewer workers are employed in China, and more in Cambodia.
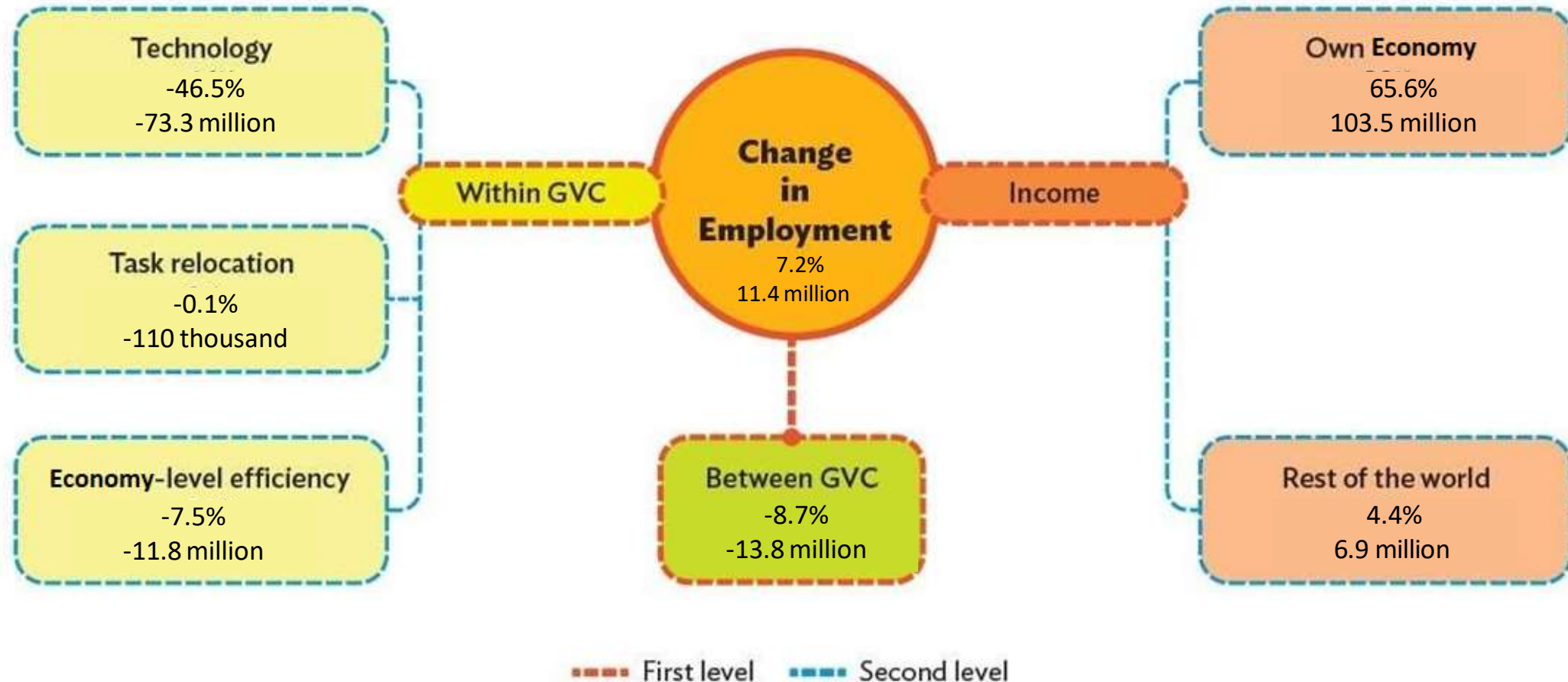
Technology within GVC

If machines replace workers in some of the production tasks in the supply chain of garments made in China, then this will lower the number of routine jobs in the supply chain.


2 Spinning, Knitting, or Weaving, Dyeing
Spinners use cotton from a variety of origins to produce yarn; fabric mills produce cloth

3

BRAND

1 Growing, Ginning, Trading
Ginners receive cotton from multiple growers and sell to the global market through traders.

4 Warehouse, Shipping
CMT factory ships garments wholesale to the brand that placed the orders.

5 Retail
Brand distributes garments globally to retail and online stores.

ADB

Decomposing changes in labor demand

Aggregate results

Structural decomposition analysis of changes in employment by sector, 2008-2018
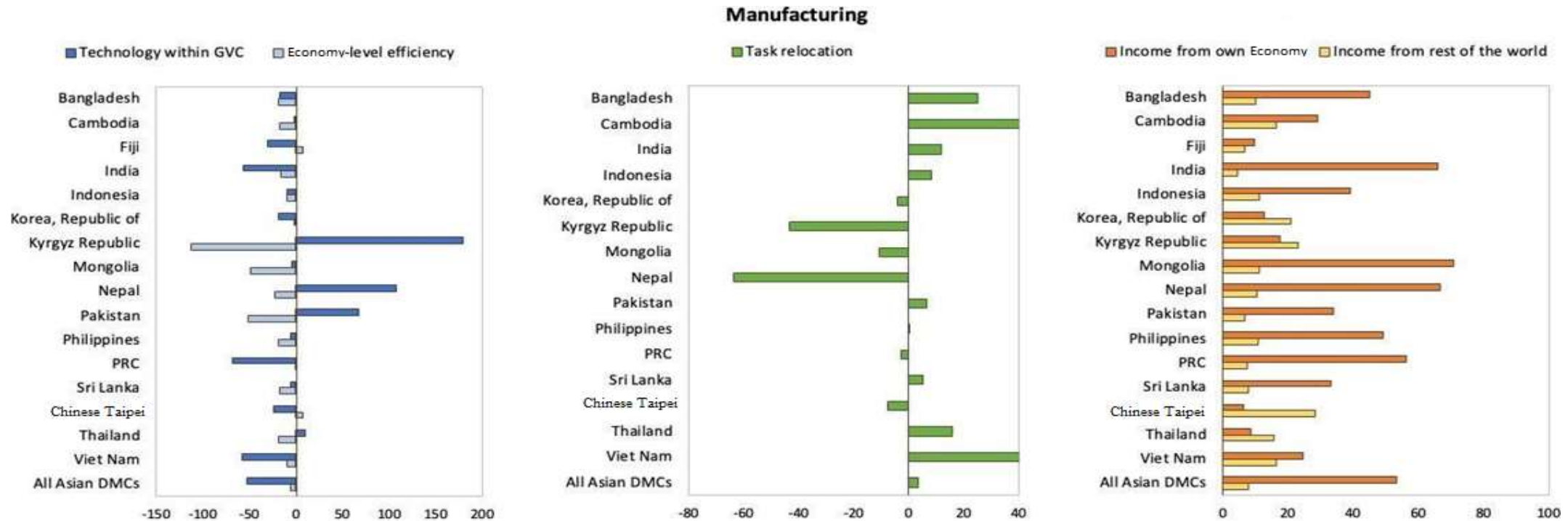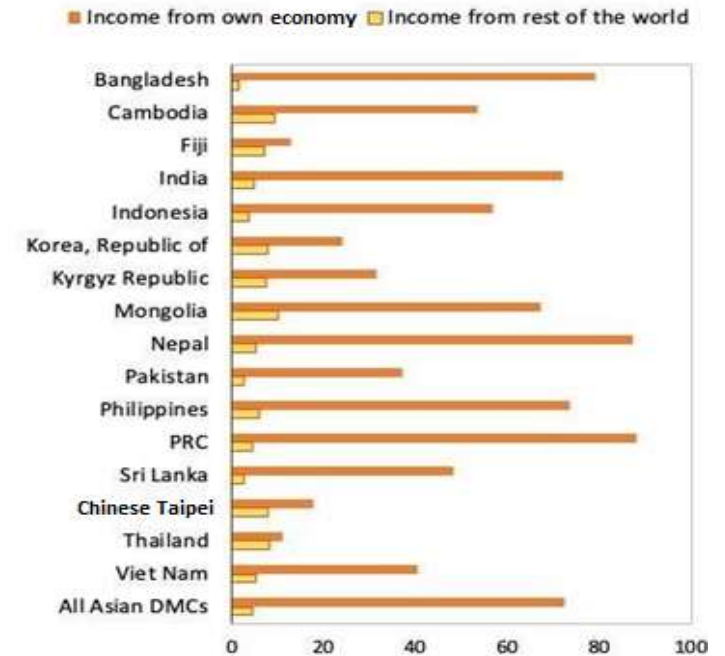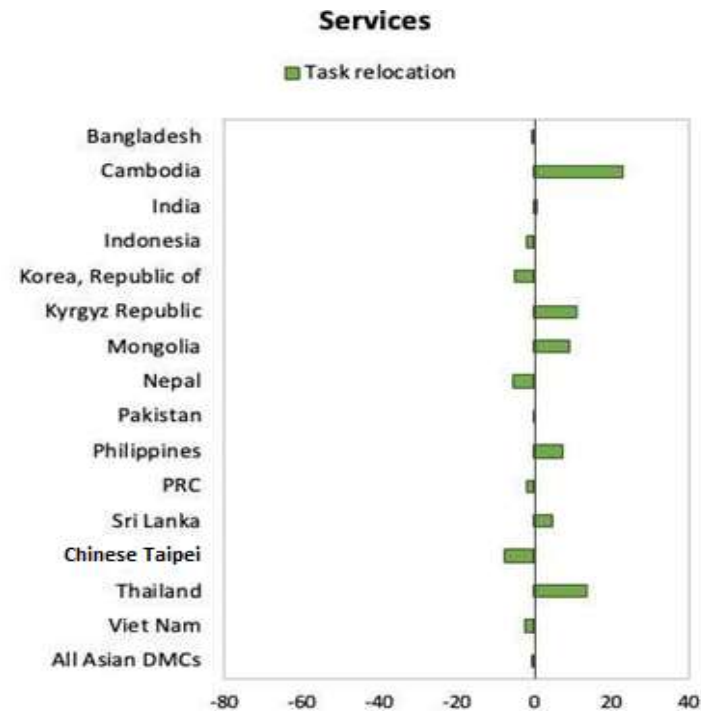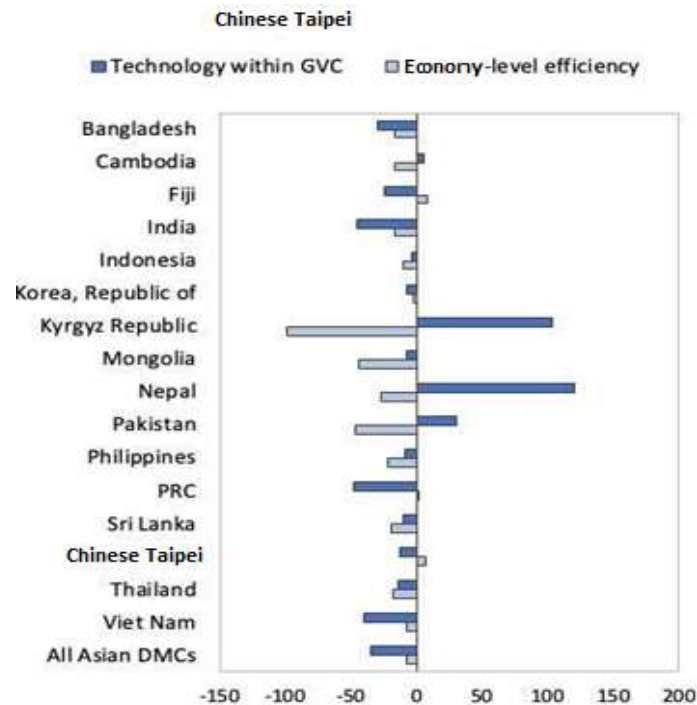

Manufacturing

DMC = developing member country, GVC = global value chain, PRC = People's Republic of China

Note: All Asian DMCs in the decomposition analysis is composed of Bangladesh, Cambodia, Fiji, India, Indonesia, the Kyrgyz Republic, Mongolia, Nepal, Pakistan, the People's Republic of China, the Philippines, the Republic of Korea, Sri Lanka, Chinese Taipei, Thailand and Viet Nam.

Source: ADB estimates using the ADB Multiregional Input-Output Database, Labor force surveys, various countries; World Input-Output Database – Socioeconomic Accounts (Timmer et al. 2015)

Structural decomposition analysis of changes in employment by sector, 2008-2018

DMC = developing member country, GVC = global value chain, PRC = People's Republic of China

Note: All Asian DMCs in the decomposition analysis is composed of Bangladesh, Cambodia, Fiji, India, Indonesia, the Kyrgyz Republic, Mongolia, Nepal, Pakistan, the People's Republic of China, the Philippines, the Republic of Korea, Sri Lanka, Chinese Taipei, Thailand and Viet Nam.

Source: ADB estimates using the ADB Multiregional Input-Output Database, Labor force surveys, various countries; World Input-Output Database – Socioeconomic Accounts (Timmer et al. 2015)

Routine vs. nonroutine occupations

- We use the International Standard Classification of Occupations (ISCO), version 2008 (ISCO-08), at the two-digit level;

- We classify occupations into routine manual, routine cognitive, nonroutine manual, and nonroutine cognitive based on Autor, Levy, and Murnane (2003);
  - This classification is not possible for occupations in agriculture.
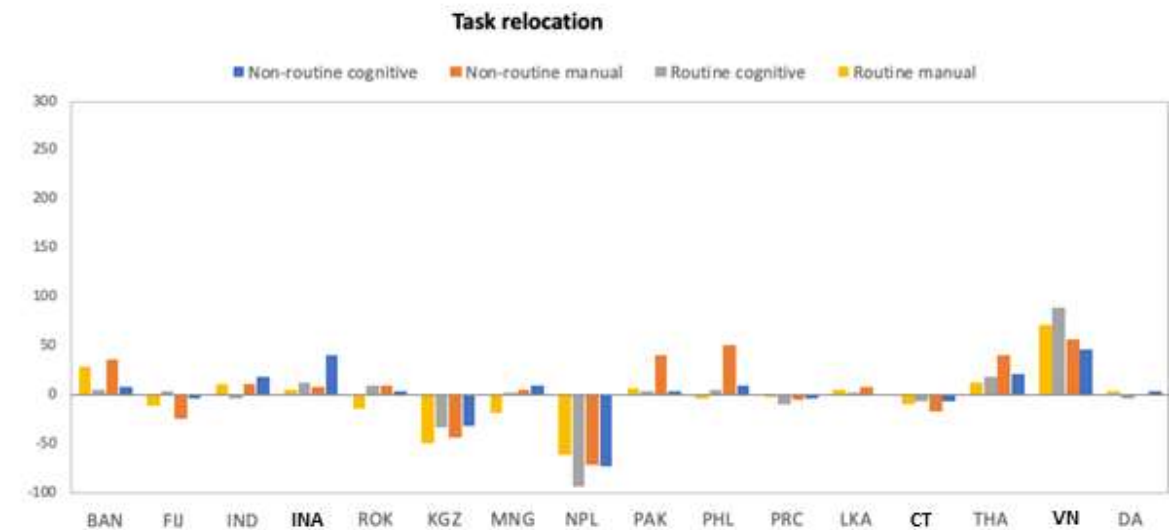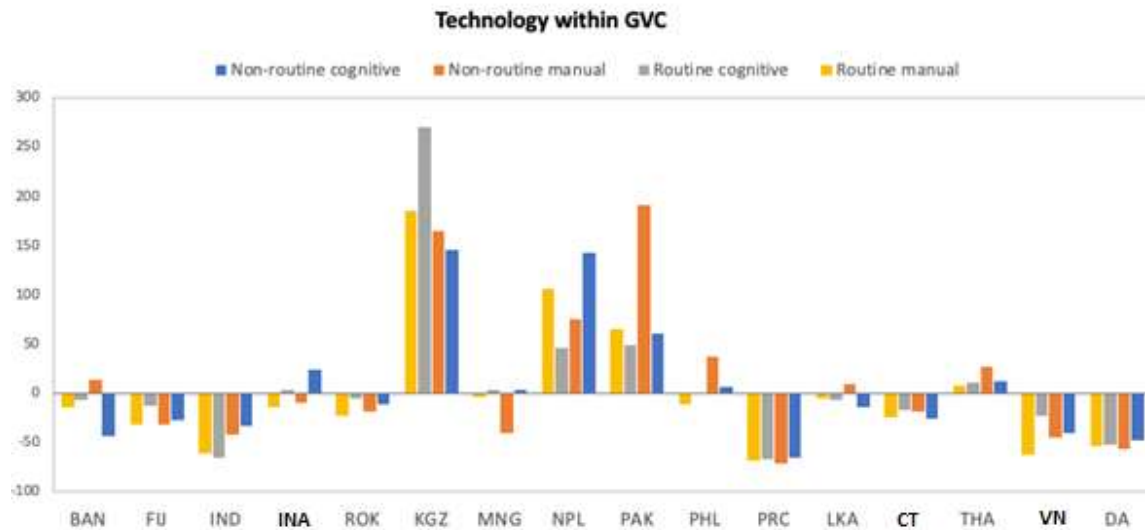
ADB

Classification of occupations

	Routine	Non-routine
Manual	Craft and related trade workers [71-75] Plant and machine operators and assemblers [81-83] Elementary occupations [91-96]*	Services and sales workers [51-54]
Cognitive	Clerical support workers [41-44]	Managers [11-14] Professionals [21-26] Technicians and associate professionals [31-35]

The numbers in brackets refer to ISCO-08 codes, excluding Agriculture [61-63] and Armed forces [01-03]. The grouping of occupations in four categories (routine manual, routine cognitive, non-routine manual, non-routine cognitive) is based on Autor et al. (2003), see Reijnders and de Vries (2017).
*Elementary occupations involve the performance of simple and routine tasks which may require the use of hand-held tools and considerable physical effort.

SDA of changes in employment by sector and occupation type, 2008-2018
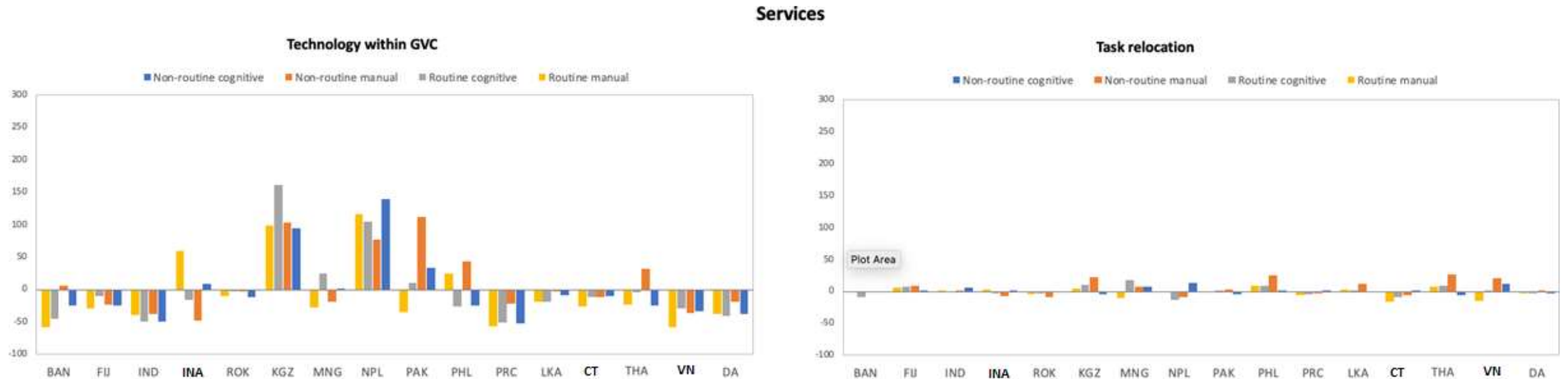
Manufacturing

BAN = Bangladesh, FIJ = Fiji, IND = India, INA = Indonesia, ROK = Republic of Korea, KGZ = Kyrgyz Republic, MNG = Mongolia, NPL = Nepal, PAK = Pakistan, PHL = Philippines, PRC = People's Republic of China, LKA = Sri Lanka, CT = Chinese Taipei, THA = Thailand, VN = Viet Nam, DA = All Asian DMCs

Note: All Asian DMCs in the decomposition analysis is composed of Bangladesh, Cambodia, Fiji, India, Indonesia, the Kyrgyz Republic, Mongolia, Nepal, Pakistan, the People's Republic of China, the Philippines, the Republic of Korea, Sri Lanka, Chinese Taipei, Thailand and Viet Nam.

Source: ADB estimates using the ADB Multiregional Input-Output Database, Labor force surveys, various countries; World Input-Output Database – Socioeconomic Accounts (Timmer et al. 2015)

SDA of changes in employment by sector and occupation type, 2008-2018

Services

BAN = Bangladesh, FIJ = Fiji, IND = India, INA = Indonesia, ROK = Republic of Korea, KGZ = Kyrgyz Republic, MNG = Mongolia, NPL = Nepal, PAK = Pakistan, PHL = Philippines, PRC = People's Republic of China, LKA = Sri Lanka, CT = Chinese Taipei, THA = Thailand, VN = Viet Nam, DA = All Asian DMCs

Note: All Asian DMCs in the decomposition analysis is composed of Bangladesh, Cambodia, Fiji, India, Indonesia, the Kyrgyz Republic, Mongolia, Nepal, Pakistan, the People's Republic of China, the Philippines, the Republic of Korea, Sri Lanka, Taipei, China, Thailand and Viet Nam.

Source: ADB estimates using the ADB Multiregional Input-Output Database, Labor force surveys, various countries; World Input-Output Database – Socioeconomic Accounts (Timmer et al. 2015)

Conclusion

- In the 2008-2018 period, the implementation of technology along the GVCs has been associated with a decrease in both routine and nonroutine employment *levels.*

- Demand for goods and services from a new Asian middle class has been associated with an increase in both routine and nonroutine employment levels that more than offsets the negative impacts of technology.

ADB

Policy implications

- Technological advances are likely to aggravate skills mismatches in developing Asia:
  - Skilling / reskilling of the labor force;
  - Labor regulations and social protection;
  - Tax and expenditure policies.
- Technology, which has created 'the problem,' can also be the solution: embrace it:
  - Provide the necessary support infrastructure;
  - Create an environment conducive to innovation.

THE END