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The Localization of Select Asian Economies in the Age of Globalization: An Agglomeration Study

Joseph Mariasingham[a], Leila Rahnema[b*], Christian Regie Jabagat
[a] *Asian Development Bank*
[b] *University of the Philippines, Cesar E.A. Virata School of Business, Diliman, Quezon City 1101, Philippines*

The world is highly interconnected, and the strength of linkages indicates an economy's ability to benefit from participation in global value chains. We utilize the concept of agglomeration to measure domestic linkages in a regional context. Using the Asian Development Bank's multiregional input–output tables and agglomeration methodology, this paper applies a select group of economies' backward and forward agglomeration indices from 2007 to 2015 and from 2015 to 2022 to gauge the degree to which value added is sourced from and absorbed by domestic sectors, respectively, from a regional perspective. The results reveal that select Asian economies such as Bangladesh, Fiji, Hong Kong, China, Indonesia, Kazakhstan, Lao PDR, Malaysia, the Republic of Korea, Singapore, and Taiwan have increased their backward agglomeration from 2015 to 2022. This suggests that the low-tech manufacturing sectors in these economies are intensifying their use of domestic inputs. Additionally, there are more Asian economies with increasing forward agglomeration indices. The rise in forward agglomeration indicates that the domestic low-tech manufacturing sectors in these economies are consuming more of their own final goods.

Keywords: linkages, agglomeration, global value chains, manufacturing, Asia, multiregional input-output table

1 Introduction

Baris et al. (2022) noted that recent decades have witnessed a transformation in the landscape of global trade, observing that many proponents argue that the era of hyperglobalization, characterized by remarkable advancements in global trade, has come to an end. Following the financial crisis of 2008, indications of a slowdown in the movement of goods and services across borders, along with reduced investment flows, marked the onset of what has been termed as "slowbalization" (European Parliament et al., 2020; D'Urbino, 2019). This has prompted discussions regarding the potential decline of global trade in the foreseeable future (D'Urbino, 2019). Factors such as trade tensions between nations, exemplified by the trade dispute between the United States and People's Republic of China (PRC), as well as instances of reshoring in manufacturing sectors, lend support to this viewpoint. However, several studies posit that current metrics used to gauge global trade fail to fully capture the breadth of trade activities (European Parliament et al., 2020). Even though certain domestic sectors may not directly engage in global trade, they indirectly contribute by providing intermediate inputs to sectors within Global Value Chains (GVCs) (Tang, Wang, & Wang, 2020). This suggests that measures of participation in GVC activities underestimate the true scope of globalization, as they overlook the involvement of domestic sectors (Mercer-Blackman, Foronda, & Mariasingham, 2017). Consequently, there emerges the possibility that rather than declining, global trade may evolve into a different form.

These discussions underscore the importance of devising a metric to assess the strength of domestic linkages. Given that only a small fraction of firms is directly involved in trade, either through exports or participation in GVCs, existing measures of GVC engagement overlook the contribution of domestic sectors to global trade activities (Bernard et al., 2007). An index that evaluates the robustness of domestic linkages can address this gap, to which Baris, et al. (2022) proposed that agglomeration indices aim to quantify the strength of domestic linkages across economy-sectors, thereby offering a more comprehensive understanding of GVC activities worldwide.

In economic geography, agglomeration is commonly described as the clustering of industries in a particular area. Agglomeration, in the literature, has been defined in the context of a small geographic entity, such as cities or regions, and specific industries. In Baris et al. (2022)'s discussion paper, they

Correspondence: lcrahnema@up.edu.ph

observed that in the United States, for example, the electronics industries cluster in Silicon Valley, while the pharmaceutical industries agglomerate in New York, and the textile and apparels industries concentrate in Carolina. GVCs, which rose in importance in the last decades, has allowed for production processes to be fragmented and shared across economies, creating a highly interconnected global economy. The clustering of activities back to the domestic economy presents a change in the organization of economic activities at a global level and highlights the potential to use the concept of agglomeration at a larger scale.

We adopt the concept of agglomeration in economic geography to measure the strength of domestic linkages in GVCs using the methodology proposed by Baris et al. (2022). The incentives to agglomerate in the manner explored in this paper is consistent with the literature on agglomeration. The paper extends the working paper of Baris et al. (2022) to include data from the period 2020 to 2022 while focusing specifically on Asian Economies and analyzing their agglomeration linkages. This approach offers a nuanced insight into how economies can enhance their domestic sectors to benefit from GVC participation. The paper aligns well with existing literature on domestic linkages and GVCs, building upon the groundwork laid by Jones (2011) and Bartelme and Gorodnichenko (2015) among others. It aptly identifies a gap in the literature concerning the application of agglomeration theory to GVC analysis and endeavors to address this void.

In economic geography, the need for intermediate goods from established industries stands out as a key driving force behind agglomeration (Marshall, 1920). Baris, et al. (2022) discussed how clustering of firms in a downstream industry will create demand for intermediate goods from more upstream industries, thus creating incentives for firms in the upstream industry to move their production to a closer location. Turning to Venables (1996), Baris, et al. (2022) implied that this localization force will only take effect whenever there is some barrier to trade, such as transportation cost of the intermediate goods to the downstream industry; otherwise, there is no incentive for upstream firms to relocate (Venables, 1996). In a simple model explored in Venables (1996) and Krugman and Venables (1996), where intermediate goods production and consumption creates cost and demand linkages among firms, agglomeration dominates in areas with high trade barriers on intermediates. Apart from increased demand for intermediate goods, economies with agglomerated industries would fare better against an industry-specific demand shock than an economy with a smaller production of the same industry (Krugman & Venables 1996). The decline in output is likely to be larger for an economy where there is a smaller scale of production.

The same incentives exist in the context of GVCs, where strength of domestic linkages plays a major role. Domestic activities are indirectly associated with GVC activities through the production of intermediate goods that are later on exported. However, this contribution is often overlooked by traditional indicators of GVCs (Alvarez, et al., 2021; Mercer-Blackman, Foronda, & Mariasingham, 2017). Maximizing gains in GVC participation relies on the ability of domestic sectors to gain value added from these activities, highlighting the need for a measure of domestic linkages (Koopman, Wang, & Wei, 2008). In addition, domestic linkages play a significant role in reducing risks associated with GVC participation. In a tightly interconnected global economy, various economies become susceptible to supply chain risks, which may counterbalance the advantages of dividing production processes based on cost-related considerations (Alvarez, et al., 2021; Giuseppina & Michele, 2018). With these considerations, this paper adopts the concept of agglomeration by looking at different economies' decisions to "locate" activities domestically. Specifically, we combine the concept of agglomeration in economic geography and input-output analysis to develop an index that measures the strength of an economy's domestic linkages. The agglomeration index developed here is used to look at trends in agglomeration at a global level and to explore its implications to GVCs. The forward agglomeration index and backward agglomeration index are measures used in economic analysis to assess the degree of interconnection or clustering of economic activities within a region or economy. Forward agglomeration measures the extent to which domestic industries within an economy or region are reliant on inputs from other domestic industries. In other words, it assesses the degree to which downstream industries depend on inputs from upstream industries within the same economy. A higher forward agglomeration index suggests a stronger interdependence among industries and a greater reliance on domestic inputs. Conversely, the backward agglomeration measures the extent to which domestic industries are suppliers of inputs to other domestic industries. It assesses the degree to which upstream industries supply inputs to downstream industries within the same economy. A

higher backward agglomeration index indicates a greater role of domestic industries as suppliers of inputs to other industries within the economy. These indices are often used in input-output analysis and regional economic studies to understand the structure of an economy, identify key sectors, and assess the potential impacts of policy changes or external shocks on various industries within the economy. They can also provide insights into the level of integration and specialization within an economy's economy.

The agglomeration methodology proposed by Baris et al. (2022) proposes a refinement of the index provided by Mercer-Blackman, Foronda, and Mariasingham (2017) by constructing a base agglomeration index that measures the extent to which value added is sourced from and/or absorbed by domestic sectors. This study contributes significantly to the existing literature on domestic linkages by applying the agglomeration methodology proposed in the working appear of Baris et al. (2022) and looking at industry level agglomeration indices and linkages in a regional perspective. It also extends the scope of data until the most recent agglomeration index until the year 2022. Moreover, the indices are used to show how agglomeration relates to high value-added segments of an economy, such as manufacturing.

Consistent with Baris, et al. (2022), we utilize the Asian Development Bank's Multiregional Input-output Tables (ADB MRIOT) which extends the input-output tables (IOT) from the World Input–Output Database (WIOD) into 62 economies plus a residual term to capture the rest of the world. The results show that the state of agglomeration is heterogenous across space and time. Higher agglomeration, especially in an economy's business services sectors, shows a positive relationship with the gross value added generated by higher value-added sectors, such as low-technology and medium-to-high technology manufacturing sectors.

The next section provides a discussion on the methodology, specifically, on how the base agglomeration indices are constructed based on the value-added decomposition approach by Wang, Wei, and Zhu (2017). Section 2 also discusses the data used in the paper. Section 3 shows the results while section 4 concludes.

2 Data and Methodology

The concept of agglomeration revolves around spatial concentration (Fujita & Thisse, 1996). When studied at the level of firms, research on agglomeration investigates the degree to which companies gather in specific regions and what factors entice them to establish operations there (Baris, et al., 2022). Moreover, the current body of literature delves into the impacts of economic activity concentration in particular areas on the domestic economy (Feldman, 1999; Koenig, 2009). The index proposed in this paper adopts the concept of global agglomeration used in economic geography and applied this into a regional setting while using the proposed methodology provided for by Baris et al. (2022). It aims to quantify the robustness of connections within an economy's economy by examining the extent to which value is contributed by or retained within domestic sectors when producing final goods in other sectors. The agglomeration indices in this paper extends the measure of domestic linkages to capture domestic concentration through backward and forward linkages. To construct the index, this study employs the value-added decomposition framework by Wang, Wei, and Zhu (2017).

This paper uses the agglomeration index constructed by Baris, et al. (2022). Equation 1 describes how value added is embodied in the final goods of sector j that comes from the domestic sectors (Y_D), activities associated with traditional trade (Y_{RT}), and GVC activities (Y_{GVC_S}, Y_{GVC_C}). While Equation 2 describes where value added is absorbed: either in the domestic sectors (V_D), activities associated with traditional trade (V_{RT}), or GVC activities (V_{GVC_S}, V_{GVC_C}).

$$\begin{aligned} Y^T = VB\hat{Y} &= VL\hat{Y}^d + VL\hat{Y}^f + VLA^f L\hat{Y}^d + VLA^f \left(B\hat{Y} - L\hat{Y}^d\right) \\ &= Y_D + Y_{RT} + Y_{GVC_S} + Y_{GVC_C} \end{aligned} \tag{1}$$

$$\begin{aligned} Va^T = \hat{V}BY &= \hat{V}LY^d + \hat{V}LY^f + \hat{V}LA^f LY^d + \hat{V}LA^f \left(B\hat{Y} - LY^d\right) \\ &= V_D + V_{RT} + V_{GVC_S} + V_{GVC_C} \end{aligned} \tag{2}$$

These calculations provide the basis for the agglomeration indices. Finally, the backward agglomeration index proposed by Baris et al (2022) is shown in Equation 3 while the forward agglomeration index is show in Equation 4.

$$AGG^{B}_{(j,r,t)} = \frac{\Theta_{(j,r,t)}}{\sum_{\tau=t-1}^{t}\sum_{r=1}^{G} 0.5\gamma_{(j,r,\tau)}\Theta_{(j,r,\tau)}} \tag{3}$$

$$AGG^{F}_{(j,r,t)} = \frac{\Phi_{(j,r,t)}}{\sum_{\tau=t-1}^{t}\sum_{r=1}^{G} 0.5\gamma_{(j,r,\tau)}\Phi_{(j,r,\tau)}} \tag{4}$$

This backward agglomeration index as first posited by Baris, et al. (2022) captures the share of Y_D to Y against the global average for that sector. A value of $AGG^{B}_{(j,r,t)} > 1$ implies that the value-added coming from the domestic sectors in the final goods production of sector j in economy r is higher than the world average, indicating high backward agglomeration. Consequently, a value less than 1 denotes low backward agglomeration. The forward agglomeration index, also adhering to Baris, et al., (2022)'s proposition, AGG^{F}, compares the value-added that is absorbed in domestic production relative to the world average. A value of $AGG^{F}_{(j,r,t)} > 1$ implies that the final goods of sector j in economy r generates more value added to the domestic sectors relative to the global average for that sector. In turn, a value below 1 indicates a scenario characterized by minimal forward agglomeration.

Baris et al (2022) suggested a mapping of agglomeration indices such that the values of AGG^{B} and AGG^{F} together can form four agglomeration classes which can then be used to describe an economy-sector's state of agglomeration *(See Figure 1: The Agglomeration Map)*. Quadrants under a low agglomeration status pertain to those with low backward and forward agglomeration indices (AGG^{B}<1, $AGG^{F} < 1$). Low backward agglomeration implies that final goods of economy-sectors in this class are typically not sourced from the domestic sectors. Concurrently, low forward agglomeration imply that the value-added from these economy-sectors that is absorbed in domestic production is limited. Figure 1 shows the agglomeration map.

Meanwhile, Baris, et al. (2022) also considered that Domestic Value Added (DVA)-generating economies have high forward agglomeration but low backward agglomeration. Economy-sectors in this class generate value-added to the domestic sectors through forward linkages by producing final goods that are later used to produce output in the domestic sectors. An example would be import-dependent outsourcing sectors that lack resources within their economy but produce valuable goods and/or services for the domestic market.

Export-oriented, domestic-sourcing economies (EDS) exhibit a distinctive pattern characterized by high backward agglomeration and low forward agglomeration. Within this category, economy-sectors predominantly rely on domestic sources for their inputs, leading to a substantial portion of DVA being integrated into the final goods production process. This trend is exemplified by the recent phenomenon of manufacturing sectors relocating back to their respective domestic economies and procuring intermediate inputs domestically. A prime illustration of this dynamic can be found in resource-rich economies, where the majority of inputs are domestically sourced, while the resulting output is heavily imported by the global market. On the other hand, as also found by Baris, et al. (2022), high agglomeration economies demonstrate elevated levels of both backward and forward agglomeration. They found that sectors within this classification primarily procure inputs domestically, thereby capturing reshoring activities. Additionally, they manufacture products that serve as intermediate inputs for domestic sectors, indicating value-added generation through forward linkages. Consequently, strong domestic linkages exist in both backward and forward directions for these economy-sectors. A classic example can be seen in resource-rich economies with independent sectors that bolster and preserve local industries through protectionist measures. However, it is conceivable for sectors to opt for local input sourcing and domestic sales due to market dynamics, such as the high costs associated with export activities and the risks associated with fragmented production across multiple locations (Giuseppina & Michele, 2018).

Figure 1. The Agglomeration Map

EDS Economies $AGG^F < 1, AGG^B > 1$	**High Agglomeration** $AGG^F > 1, AGG^B > 1$
Low Agglomeration $AGG^F < 1, AGG^B < 1$	**DVA-Generating Economies** $AGG^F > 1, AGG^B < 1$

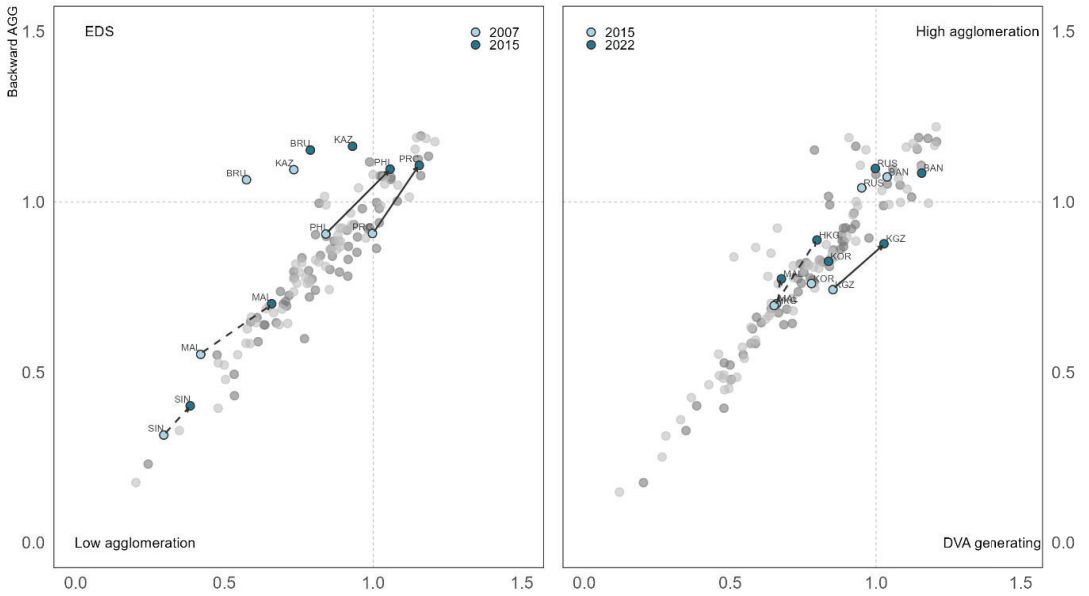
AGG^B = backward agglomeration index, AGG^F = forward agglomeration index, DVA = domestic value added
Source: Baris et al (2022), Asian Development Bank Working Paper

The agglomeration indices employ the Asian Development Bank's (ADB) Multiregional Input-output tables (MRIOT). This extends the World Input–Output Database (WIOD) by adding 19 economies from Asia and the Pacific region to the original 43 WIOD economies (Timmer et al., 2015). A residual "rest of the world" entity accounts for all other economies. Each economy in the MRIOT is comprised of 35 sectors, and the computed agglomeration indices are for years 2007-2015 and 2015-2022.

3 Results

Figure 2 maps the economy-level agglomeration indices in the agglomeration map for years 2007-2015 *(See Annex 1: Backward and forward agglomeration indices per economy, years 2007 and 2015)* and 2015-2022 *(See Annex 2: Backward and forward agglomeration indices per economy, years 2015 and 2022) (See Figure 2: Economy-Level Trends in Agglomeration, Selected Years)*. Economy-level agglomeration exhibits heterogeneity over time. From 2007 to 2015, about 40% of economies showed an increase in either backward or forward agglomeration, majority of which are Asian economies. This would include high-income economies such as the PRC, Canada, and Singapore, as well as some low- and lower middle-income economies such as Malaysia and the Philippines. This increase in agglomeration over time is consistent with expectation as economies move to interconnected trade (evident in GVCs) and increase in domestic activities. In some cases, when backward or forward agglomeration increases, it leads to a shift in an economy's agglomeration category. For instance, PRC transitioned from a DVA-generating class to a high-agglomeration economy due to such increases during the specified period. Meaning, its domestic value added from inputs (backward) relative to its import have increased.

Figure 2. Economy-Level Trends in Agglomeration, Selected Years



AGG = agglomeration index; BAN = Bangladesh; BRU = Brunei Darussalam; CAN = Canada; KAZ = Kazakhstan; KGZ= Kyrgyz Republic; DVA = domestic value added; HKG = Hong Kong, China; KOR = Republic of Korea; MAL = Malaysia; MLD = Maldives; PRC = People's Republic of China; RUS= Russia; SIN = Singapore
Note: The values are computed based on the framework presented in Section 2
Source: Asian Development Bank's multiregional input–output tables

In a similar vein, the Philippines moved from low agglomeration to high agglomeration. In the context of industrial agglomeration in the Philippines, several policies have played a significant role in fostering economic concentration and clustering. These policies include trade liberalization, investment incentives, export processing zones and industry clustering. Trade liberalization is the opening up of trade barriers and the reduction of import restrictions have encouraged industrial growth and specialization. By facilitating access to global markets, trade liberalization has contributed to the agglomeration of industries in certain regions in the Philippines. Similarly, the Philippine government offers various incentives to attract investments. These incentives include tax breaks, exemptions, and other favorable conditions for businesses. Such policies encourage firms to establish themselves in specific areas, leading to agglomeration effects. Several export processing zones (EPZs) have been established to promote economic growth, attract foreign investments, and facilitate export-oriented industries. These EPZs are found in Clark, Bataan, Cagayan and Subic Bay. These designated zones provide a conducive environment for export-oriented industries. EPZs offer streamlined procedures, infrastructure, and tax benefits to attract foreign direct investment (FDI). The concentration of export-oriented firms within these zones contributes to industrial agglomeration. The Philippine government also actively promotes industry clusters by encouraging firms within related sectors to locate near each other. Clusters enhance collaboration, knowledge sharing, and economies of scale. Examples include technology parks, industrial estates, and specialized zones. These policies collectively shape the landscape of industrial development in the Philippines, fostering agglomeration effects that benefit both regional and national economies. On the other hand, Lao PDR changed from high to a low agglomeration classification. A study by Fujita and Phanvilay (2008) in Lao PDR highlight gaps between policy goals and actual practice such that uneven land distribution and resource access may contribute to a dispersed economic landscape which may have contributed to the lowering of Lao PDR's agglomeration. In other cases, however, increases in both indices do not necessarily result in a change in agglomeration class, as exhibited by Malaysia.

From 2015 to 2022, about 20% of the economies exhibited an increase in either backward or forward agglomeration, majority of which are Asian economies. Economies such as Kyrgyz Republic, Hong Kong, PRC, the Republic of Korea, Malaysia, Bangladesh and Sri Lanka recorded increases in both

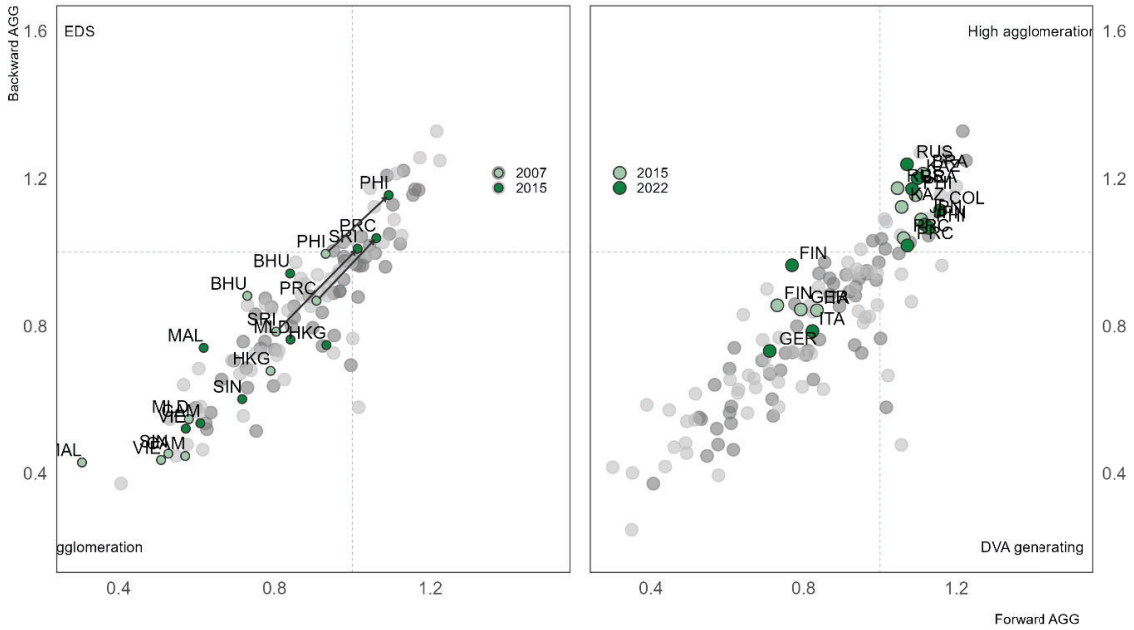
indices. Meanwhile, the increase in both indices reinforce Bangladesh as a high-agglomeration economy over the years, with its increase in forward agglomeration from 1.04 in 2015 to 1.16 in 2022. Bangladesh has maintained a high agglomeration index through the years as it experienced faster urbanization than South Asia as a whole. The share of its population living in officially classified urban settlements increased by approximately 1.69% annually between 2000-2010 (World Bank Group, 2015). Bangladesh's rapid urbanization, hidden urban pockets, and the emergence of agglomerations have collectively contributed to its sustained high agglomeration index over the years.

An analysis conducted at the sector level offers deeper insights into the evolution of domestic linkages within an economy over time. Among these sectors, manufacturing stands out as exemplifying the extensive interconnectedness among economy-sectors. Take, for instance, the production of t-shirts, which involves operations spanning various geographical locations. Baris et al., (2022) initially found that cotton is cultivated in the US and subsequently exported to the PRC. The PRC then utilizes these intermediate inputs to manufacture apparel, which may be further distributed by either returning them to the US for logo imprinting or finding markets in other economies, or perhaps even being repurposed as furniture padding (OECD, 2013). They then surmised that given the pivotal role of the manufacturing sector in GVCs, it is intriguing to explore the linkages it establishes with other domestic sectors. In particular, our focus lies on the low-technology manufacturing sectors, which the ADB (2020) itemized to encompass Food, Beverages, and Tobacco; Textiles and Textile Products; Leather, Leather Products, and Footwear; Wood and Products of Wood and Cork; Pulp, Paper, Paper Products, Printing, and Publishing; Rubber and Plastics; Manufacturing; Recycling; Electricity, Gas, and Water Supply; and Construction.

Figure 3 illustrates the agglomeration indices *(See Annex 3: Backward and forward agglomeration indices for low-tech manufacturing sectors, years 2015 and 2022)* for the low-technology manufacturing sectors for years 2007, 2015, and 2022 *(See Figure 3: Agglomeration Trends for the Low-technology Manufacturing Sectors, Selected Years)*. India has the highest backward agglomeration for year 2015 while Argentina and the United States for year 2022. Pakistan and India recorded the highest forward agglomeration for year 2015 while Egypt for year 2022. A discussion paper by Sasidharan and Thangavelu (2023) examining Indian firms found that urban amenities play a crucial role in driving industrial agglomeration hence its possible high backward agglomeration. Factors such as education, healthcare, energy, transportation, finance, and cultural resources positively correlate with industry concentration at the township level (Sasidharan & Thangavelu, 2023). The strategic partnership between India and the United States has implications for Pakistan because factors such as trade cooperation, investment, and military ties also contribute to forward agglomeration.

Apart from the levels, the indices can be used to analyze how domestic linkages change overtime. Figure 3 also highlights the top ten economies that recorded the highest increases in backward and/or forward agglomeration. Among the Asian economies, both the Republic of Korea's and Taiwan's low-technology manufacturing sectors show the fastest growth in backward agglomeration while Bangladesh for forward agglomeration in this period. This is followed by Singapore, and Lao PDR for backward agglomeration, and the Republic of Korea and the Malaysia for forward agglomeration. Korea and Taiwan have both witnessed the emergence of high-growth firms in knowledge-intensive industries such as machinery, automotive manufacturing, and information device manufacturing. These firms tend to be more productive and contribute significantly to job creation (Choi & Choi, 2017). Bangladesh experiences significant hidden urbanization beyond official definitions. While only about 28% of the population is classified as urban, the actual share of the population living in areas with urban characteristics is higher. The informal sector, including low-technology manufacturing, contributes to this forward agglomeration (Ochojski et al, 2017).

Figure 3. Agglomeration Trends for the Low-technology Manufacturing Sectors, Selected Years



AGG = agglomeration index; BAN = Bangladesh; BHU = Bhutan; BRA = Brazil; CAM = Cambodia; CAN = Canada; DVA = domestic value added; HKG = Hong Kong, China; GRC = Greece; IND = India; INO = Indonesia; IRE = Ireland; KAZ = Kazakhstan; KOR = Republic of Korea; MAL = Malaysia; MLD = Maldives; PAK = Pakistan; PRC = People's Republic of China; PHI = Philippines; SIN = Singapore; SRI = Sri Lanka; USA = United States
Note: The values are computed based on the framework presented in Section 2
Source: Asian Development Bank multiregional input–output tables

Overall, changes in agglomeration within the low-technology manufacturing sector can, as Baris et al. (2022) first observed, be attributed to supply chain changes and are unable to capture changes in product types. They also noted that increased "backward agglomeration suggests that these sectors source intermediate inputs domestically, while increases in forward agglomeration capture the extent to which domestic sectors under the low-technology manufacturing consume final goods." (p.10)

The results show that select Asian economies such as Bangladesh, Fiji, Hong Kong, China, Indonesia, Kazakhstan, Lao PDR, Malaysia, the Republic of Korea, Singapore, and Taiwan have increased its backward agglomeration from years 2015 to 2022. This shows that the low-tech manufacturing sectors for these economies increase their use of domestic inputs. Also, there are more economies with increasing forward agglomeration indices such as Bangladesh, Brunei, Fiji, Hong Kong, China, Indonesia, Japan, Kyrgyz Republic, Kazakhstan, Maldives, Nepal, PRC, Philippines, Malaysia, the Republic of Korea, and Taiwan. The increase in forward agglomeration show that these economies' domestic low-tech manufacturing sector consume more of its own final goods.

Zooming in to ASEAN economies, Viet Nam, Thailand, and Cambodia have consistently declined in both its forward and backward agglomeration indices. These may indicate greater value-added pass through to its exports and reliance to foreign inputs. This can be validated by an increase in export activities in the select low-technology manufacturing sectors. On the other hand, Malaysia's and Indonesia's low technology manufacturing sectors both have increasing backward and forward agglomeration indices indicating that these sectors source more intermediate inputs domestically, and captures more of its value-added domestically. The Philippines and Brunei show a unique trend indicating a decrease in backward but increase in forward agglomeration. Singapore and Lao PDR show the opposite trend wherein its backward agglomeration increased while its forward agglomeration decreased.

Mongolia, the Republic of Korea, and Sri Lanka all show a shift in agglomeration classification for years 2015 to 2022. Mongolia and Sri Lanka shift from a high forward and backward agglomeration

index in 2015 to a low agglomeration index in 2022. On the other hand, Korea shifts from a low to high agglomeration category in 2022.

4 Conclusion

In recent decades, there has been a noticeable increase in interconnectedness among sectors worldwide. The emergence of GVCs, facilitating the fragmentation of production processes, has intensified economies' reliance on the global market. However, evidence in recent years suggests the onset of "slowbalization", a phenomenon characterized by a deceleration in the movement of goods and services across borders (European Parliament et al., 2020; D'Urbino, 2019). In this evolving context, the significance of domestic sectors becomes more pronounced.

Domestic sectors contribute indirectly to GVC activities by supplying intermediate inputs to sectors directly engaged in GVC operations or by utilizing products from GVC sectors as intermediate inputs (Mercer-Blackman, Foronda, & Mariasingham, 2017; Beverelli et al., 2015). This paper, further extending the previous work made by Baris, et al. (2022), enhances existing literature by introducing a measure of domestic linkages based on the concept of agglomeration at a regional level. The backward and forward agglomeration indices gauge the degree to which domestic economy sectors source and/or absorb value-added from other sectors. The base agglomeration indices assess the concentration of value-added within the domestic market while the the agglomeration indices are further refined to account for the concentration of domestic activities.

Just as what Baris, et al. (2022) have done, the agglomeration indices show heterogeneity in economy-level agglomeration trends. At the sector level, the low-technology manufacturing sector exhibits high backward agglomeration across economies, indicating the growing importance of domestic sectors as input sources for low-tech manufacturing. By focusing on low-tech manufacturing and medium-to-high tech manufacturing, the paper offers initial evidence of a positive correlation between domestic linkages in business services sectors and value-added in manufacturing sectors.

From a policy perspective, the agglomeration indexes outlined in this paper can aid in identifying priority sectors for inclusion in the national agenda. As a potential for future research, greater agglomeration, particularly via forward linkages, can enable economies to capitalize on opportunities in GVCs, influencing economic growth.

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