The FDI Network, Global Value Chain Participation and Economic Upgrading

By Luna Ge Lai, Nguyen Thu Quynh and Akhmad Bayhaqi

**KEY MESSAGES**

- Foreign direct investment (FDI) represents an important internationalisation pathway to global value chain (GVC) participation.

- The APEC economies as a group have dominated as FDI recipients. The accumulated FDI stock in the APEC region grew at an annual average of 10.4 percent between 1990 and 2020. As of 2020, APEC economies accounted for nearly 52 percent of the global inward FDI stock.

- Using a (social) network analysis approach, economies such as China; India; Italy; Korea; the Netherlands; Singapore; Spain; Thailand; the UK; and the US have consistently scored high on centrality in the global FDI network. Economies that hold a central position in the FDI network tend to also be hubs in the global trade network.

- GVC participation does seem to attract investment in many emerging economies, but the relationship is by no means a clear-cut one since investment is also highly dependent on broader regulatory and institutional frameworks.

- The case studies in this brief (China; Indonesia; Viet Nam) suggest that self-sufficiency levels in various economic sectors may influence GVC participation. For example, China’s manufacturing and services sectors tend to be highly self-sufficient, that is, less dependent on international suppliers for materials or component parts. In contrast, Indonesia and Viet Nam lack self-sufficiency in advanced manufacturing industries and thus tend to be more integrated into GVCs in these sectors.

- GVC participation has provided new ways for developing economies to achieve industrialisation and economic upgrading. Economies have great incentives to move up the value chain since upstreamness (for example, by participating in activities such as product design and R&D) is generally associated with capturing a higher share of value-added along a GVC. The varying sectoral focuses and GVC upgrading experiences of China; Indonesia; and Viet Nam have important implications for other APEC developing economies.

- Some evidence suggests that firms that are more export-oriented and involved in the FDI network perform better in terms of sales, employment and productivity.
inward FDI stock and has been performing the role of the ‘factory of the world’ for more than two decades.

The discussions about the extent and desirability of developing economies attracting FDI and participating in GVCs have remained largely theoretical or are limited to individual cases. For this reason, this policy brief will focus on three East Asian developing economies – China; Indonesia; Viet Nam – with varying levels of GVC participation and upgrading (through increasing upstream activities).

This paper will also highlight the economic benefits of participating in GVCs and FDI, and explore the relationship between GVC participation and FDI. By doing so, it aims to offer a starting point for policymakers to assess their economies’ engagement and consider relevant policy options.

This paper will start with an analysis of bilateral FDI networks using the (social) network analysis framework, and, in particular, centrality measures. A network analysis framework examines the topological properties of complex economic relationships.²

An analysis of the economic structures of China; Indonesia; and Viet Nam will follow, to understand their industrial base and economic diversity. Skyline analysis will be employed to provide insights into their domestic self-sufficiency in production capacity as well as their industrial structure. The paper will go on to explore trends in GVC participation and positioning in the textile, electronics and automobile sectors for the three economies.

The paper ends with a brief analysis of the impact on sales, employment and productivity from GVCs and FDI.

**APEC and East and Southeast Asia as FDI Destinations**

The APEC economies as a group have consistently been the main recipients of FDI. By year 2000, APEC’s share of the global inward FDI stock had peaked at more than 60 percent before decreasing to nearly 52 percent as of 2020 (Figure 1). The accumulated FDI stock in the APEC region grew at an annual average of 10.4 percent between 1990 and 2020.

The East and Southeast Asia region, home to more than half of the APEC members, is becoming an increasingly attractive destination for foreign investment. While regions like the European Union (EU) and North America\(^3\) have seen their shares marginally shrinking, the East and Southeast Asia region’s share of world total inward FDI stock has grown from 13.7 percent in 1990 to 17.3 percent in 2020. The region posted a compound annual growth rate (CAGR) of 11.1 percent in total value of inward FDI stock over the 30-year period, higher than the APEC region, the EU and North America.

The rise of the APEC region, and particularly the East and Southeast Asia region, as FDI hosts can be better observed from an FDI inflow perspective. APEC economies hosted nearly 68 percent of the world’s total FDI inflows in 2020, compared to less than 50 percent in 2010. Although the accumulated stock of FDI in regions like North America and the EU still predominates, the East and Southeast Asia region is catching up quickly. The region is in fact one of the biggest recipients of investment in 2020, making up nearly 43 percent of global FDI inflows (Figure 2).

Analysis of FDI Network

Methodology

We adopt a (social) network analysis approach to explore patterns of bilateral FDI and support a better understanding of the connection between FDI and GVC participation.

This approach helps to identify the hubs in the FDI network, that is, the nodes in the network with high centrality (in the analysis here, each node represents an economy).\(^5\)

---

\(^3\) In this brief, North America includes the United States and Canada.

\(^4\) In this brief, the ‘East and Southeast Asia region’ refers to East Asia (China; Democratic People’s Republic of Korea; Republic of Korea; Macao, China; Mongolia; Chinese Taipei) and Southeast Asia (Brunei Darussalam; Cambodia; Indonesia; Laos; Malaysia; Myanmar; the Philippines; Singapore; Thailand; Timor-Leste; Viet Nam).

The centrality measures used to analyse and discuss the bilateral FDI networks are degree centrality, betweenness centrality, closeness centrality and eigenvector centrality.

- **Degree centrality**: This provides information on the number of bilateral investment linkages that an economy has. The more linkages an economy has, the more connected and thus ‘central’ it is. Since bilateral FDI networks are direction-dependent, that is, each investment is made by a home economy (source) to a host economy (recipient), the degree centrality can be decomposed into in-degree and out-degree. In-degree refers to the number of connections that point toward a node (inward flow of investment into an economy) and out-degree refers to the number of connections that stem from that node (outward flow of investment from an economy) (Figure 3).

- **Betweenness centrality**: This is ‘the number of shortest paths among all other nodes that pass through this node’. The more often a node mediates paths between other nodes, the more central it is. In Figure 3, node F has the highest degree of betweenness centrality, while node D has a zero score (since node D does not bridge any network relations).

- **Closeness centrality**: This is how central a node is as measured by its distance to all other nodes in the network. The node with the shortest distances to the rest of the nodes is the most central. In Figure 3, node F has the highest closeness centrality in the network.

- **Eigenvector centrality**: This measures the influence of a node based on its connections to important (high-scoring) nodes. The highest eigenvector centrality score in the example network in Figure 3 rests with node E.

**Data**

For the bilateral FDI network analysis, we use inward direct investment position (stock) data for 2020 from the Coordinated Direct Investment Survey (CDIS) by the International Monetary Fund (IMF). This is the most comprehensive and up-to-date dataset available, covering 129 reporting (host) economies and 246 partner (home) economies, with data up to 2020. We analyse FDI stock data rather than flow data to address intermittent fluctuations in FDI flows due to disruptive events such as the COVID-19 pandemic. The use of stock data also recognises that GVCs

---

Figure 3. Example of degree centrality

![Figure 3. Example of degree centrality](https://brandenberger.github.io/sna_primer/centrality.html)

---


8 Reporting economies are those that report their inward FDI in the CDIS database. Partner economies are those cited by the reporting economies as the sources of investment.
participation generally develops over time as investments accumulate.

Using the CDIS data, a network of 5,946 investment links between 230 economies is identified. The total of all the bilateral FDI values in this network covers 98.7 percent of the world’s total inward FDI stock in 2020 presented in the original CDIS dataset, which provides confidence that the network is representative of the overall FDI data.

Table 1. Descriptive statistics for centrality measures, FDI (stock) network 2020

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Median</th>
<th>p75</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-degree</td>
<td>230</td>
<td>25.85</td>
<td>34.48</td>
<td>0</td>
<td>150</td>
<td>0</td>
<td>126</td>
</tr>
<tr>
<td>Out-degree</td>
<td>230</td>
<td>25.85</td>
<td>26.57</td>
<td>1</td>
<td>108</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Betweenness</td>
<td>230</td>
<td>96.26</td>
<td>295.29</td>
<td>0</td>
<td>2247.44</td>
<td>0</td>
<td>1391.43</td>
</tr>
<tr>
<td>Closeness</td>
<td>230</td>
<td>0.53</td>
<td>0.38</td>
<td>0.79</td>
<td>0.52</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>Eigenvector</td>
<td>230</td>
<td>0.05</td>
<td>0.04</td>
<td>0.15</td>
<td>0.04</td>
<td>0.14</td>
<td></td>
</tr>
</tbody>
</table>

N = number of economies in the network.
Source: Calculated by author using Stata.

Analysis

The centrality measures for the network are then calculated using Stata. A summary of the results is found in Table 1. The statistical analysis shows that each economy in the network has 25.85 inward and 25.85 outward investment links on average. It should be noted, however, that the distributions of the degree centrality measures are skewed by data unavailability. The betweenness centrality measure also has a skewed distribution with large

Table 2. Centrality measures for 20 economies with highest centrality scores (based on betweenness centrality measures), FDI (stock) network 2020

<table>
<thead>
<tr>
<th>Economy</th>
<th>In-degree</th>
<th>Between-ness</th>
<th>Closeness</th>
<th>Eigenvector</th>
<th>Rank In-degree</th>
<th>Rank Between-ness</th>
<th>Rank Closeness</th>
<th>Rank Eigenvector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>142</td>
<td>2247.44</td>
<td>0.78</td>
<td>0.15</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>150</td>
<td>2002.36</td>
<td>0.79</td>
<td>0.15</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>UK</td>
<td>97</td>
<td>1396.34</td>
<td>0.74</td>
<td>0.14</td>
<td>11</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Mauritius</td>
<td>149</td>
<td>1391.43</td>
<td>0.76</td>
<td>0.13</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Italy</td>
<td>126</td>
<td>1356.58</td>
<td>0.74</td>
<td>0.14</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Belgium</td>
<td>86</td>
<td>1093.83</td>
<td>0.68</td>
<td>0.12</td>
<td>16</td>
<td>6</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>USA</td>
<td>86</td>
<td>1091.65</td>
<td>0.70</td>
<td>0.14</td>
<td>16</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Singapore</td>
<td>112</td>
<td>1012.89</td>
<td>0.70</td>
<td>0.13</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Spain</td>
<td>98</td>
<td>708.04</td>
<td>0.69</td>
<td>0.13</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>India</td>
<td>107</td>
<td>705.59</td>
<td>0.70</td>
<td>0.13</td>
<td>9</td>
<td>10</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Korea</td>
<td>95</td>
<td>658.59</td>
<td>0.68</td>
<td>0.13</td>
<td>12</td>
<td>11</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Thailand</td>
<td>122</td>
<td>647.12</td>
<td>0.68</td>
<td>0.12</td>
<td>5</td>
<td>12</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>France</td>
<td>72</td>
<td>546.14</td>
<td>0.68</td>
<td>0.13</td>
<td>29</td>
<td>13</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Cyprus</td>
<td>80</td>
<td>480.49</td>
<td>0.65</td>
<td>0.12</td>
<td>20</td>
<td>14</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Russia</td>
<td>110</td>
<td>478.98</td>
<td>0.67</td>
<td>0.13</td>
<td>8</td>
<td>15</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>75</td>
<td>443.65</td>
<td>0.68</td>
<td>0.13</td>
<td>24</td>
<td>16</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>South Africa</td>
<td>77</td>
<td>428.69</td>
<td>0.63</td>
<td>0.10</td>
<td>21</td>
<td>17</td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>Germany</td>
<td>73</td>
<td>392.60</td>
<td>0.68</td>
<td>0.14</td>
<td>28</td>
<td>18</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Portugal</td>
<td>61</td>
<td>319.69</td>
<td>0.59</td>
<td>0.09</td>
<td>36</td>
<td>19</td>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td>Nigeria</td>
<td>76</td>
<td>269.33</td>
<td>0.61</td>
<td>0.09</td>
<td>23</td>
<td>20</td>
<td>36</td>
<td>53</td>
</tr>
</tbody>
</table>

Source: Calculated by author using Stata.

9 The CDIS does not have any data on inward FDI stock for four APEC economies, namely, Papua New Guinea; Peru; Chinese Taipei; and Viet Nam (Peru is among the 129 reporting economies, but has not reported any data). The data for these four economies are thus mirrored from their outward FDI stock data. Confidential (undisclosed by the reporting economy) or missing data are dropped. Small bilateral FDI stock valued under USD 1 million is also not included, following Bolivar et al., “Global Foreign Direct Investment.”

10 Of the 230 economies in the network, 117 do not have any inward investment (in-degree) reported. The reason for this is that there are only 129 reporting economies in the IMF’s CDIS data, therefore those that are non-reporting only have outward investment data (out-degree). Data unavailability underestimates the out-degree centrality measures of some economies.
standard deviation. Among the five centrality measures, closeness centrality displays the least skewed distribution.

The top 20 economies based on their betweenness centrality scores in 2020 can be found in Table 2. China; India; Italy; the Netherlands; Singapore; Spain; Thailand; the UK; and the US consistently top the rankings, indicating that these economies hold central or hub positions in the FDI network. China leads the pack in terms of in-degree centrality with inward investment from 150 other economies. China is also the most ‘central’ economy in terms of closeness, i.e., it has the shortest network distances to the rest of the economies.

Toward the West, the Netherlands ranks highest in both betweenness centrality and eigenvector centrality, implying that it plays an important transit or bridging role within the network and is connected to many important economies (or hubs). Six of the 20 most central economies are APEC economies: China; Korea; Russia; Singapore; Thailand and the US.

A simplified FDI network of the 21 APEC economies is shown in Figure 4 and a summary of their centrality measures is presented in Table 3. Among the APEC economies, China; the US; Singapore; Korea; and Thailand (in order of rank) remain in the top five in terms of both betweenness and closeness centrality. Indonesia and Viet Nam, which have secured increasingly large flows of investment in recent years, and are respectively the 8th and 9th biggest recipients of FDI inflows in APEC during 2018–2020, have maintained a rather modest degree of centrality.

Advancing Free Trade for Asia-Pacific Prosperity

APEC Member Economies: Australia; Brunei Darussalam; Canada; Chile; China; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States of America; and Viet Nam.
GVC Trades in APEC

As noted earlier, GVC participation in APEC has reached 50 percent, compared to the global level of around 56 percent.

At the sectoral level, the five largest GVC trades (excluding petroleum and mining) occur in: textiles and wearing apparel; metal products; electrical and machinery; transport equipment; and financial intermediation and business activities. These sectors are also the five commodities with the largest gross export values. Among these sectors, metal products; electrical and machinery; and transport equipment demonstrate higher GVC participation rates (GVC share) than the rest. These sectors, with the exception of textiles, are considered to be mid- to high-tech sectors. Table 4 provides the value of GVC trades for each of the five products.
To explore the link between the FDI network and the trade network, we calculate the correlation between FDI centrality and trade centrality (Table 5). The two centrality measures (FDI and trade) show high correlation coefficients, ranging from 0.69 to 0.8. This could mean that economies that hold a central position in the FDI network will have a tendency to also be hubs in the global trade network. GVC participation does seem to attract investment in many emerging economies, but the relationship is by no means clear-cut since investment is highly dependent on broader regulatory and institutional frameworks. Adarov, for example, suggests that while FDI centrality has contributed to the GVC centrality of economies, FDI centrality is more determined by statutory restrictions on FDI and tax offshore regulations.

**Case Studies: China; Indonesia; Viet Nam**

As discussed, the developing economies of the East and Southeast Asia region have become popular FDI destinations in recent decades. This section zooms into three developing economies—China; Indonesia; Viet Nam—to explore their domestic economic structures and GVC participation patterns.

We chose China; Indonesia; and Viet Nam for three reasons. First, all three economies have adopted the export-oriented development model. They welcome FDI inflows to participate in GVCs and the wider international division of labour. Second, China; Indonesia; and Viet Nam differ substantially in economic size, and illustrate very different models of GVC participation. Third, the three economies began to participate in GVCs in different time periods and thus demonstrate varying patterns in GVC upgrading, serving as a significant reference for latecomers.

We started with a close look at their sectoral economic structures. Several representative manufacturing sectors—textiles, electronics, and automobiles—were chosen to observe their GVC participation rates and positions. These sectors were also the main recipients of greenfield investment in manufacturing in 2019.

---


---

13 Manufacturing (excluding petroleum), electronics and automotive are the two largest contributors in 2019, with 15 percent of the greenfield FDI projects flowing to automotive and 13 percent to electronics. Textiles contributes around 6 percent and is also a major source of employment in the domestic economy. See: United Nations Conference on Trade and Development (UNCTAD), “World Investment Report,” accessed 22 February 2022, https://unctad.org/topic/investment/world-investment-report
**Sectoral economic structures**

Using the Ray skyline map generating tool\(^\text{14}\) and data from the Input-Output Tables by the Organisation for Economic Co-operation and Development (OECD),\(^\text{15}\) we described the sectoral economic structures of China; Indonesia; and Viet Nam (Figures 5, 6 and 7). The names of each of the sectors (c1–c44) can be found in the Annex.

The skyline charts of the three economies share two significant similarities. First, their skylines (highlighted in red) are not flat. There is sizeable overproduction in several manufacturing sectors (indicated by the 'skyscrapers' being far higher than the 100 percent self-sufficiency line) and some under-production in other sectors (shown by the 'slumps' to below the 100 percent self-sufficiency line). For instance, the three economies all demonstrate a skyscraper in c7 (textiles), and by contrast, a slump in c20 (automobiles).

These skyscrapers and slumps are closely related to the nature of their export-driven development model. These economies specialise in and have built internationally competitive production capacity in key manufacturing sectors. At the same time, however, they lack self-sufficiency in sectors where they are heavily dependent on international suppliers.

Second, the sectoral structures of all three economies are generally dominated by manufacturing rather than agriculture or services. Regional production networks in their manufacturing sectors have provided an environment conducive to rapid industrial growth and the transformation of initially predominantly agricultural societies into modern industrial economies.

---


Along with the similarities, there are also distinct differences. China’s industrial profiles in manufacturing and services are comprehensive: there is huge overproduction (exceeding self-sufficiency) in manufacturing, and very little over- or underproduction in services (even though there is underproduction in agriculture). For instance, China’s chart has two tall skyscrapers in textiles (c7) and electronic equipment (c17), indicating its strong production capacity and global competitiveness in these two manufacturing sectors.

Figure 6. Sectoral structure of Indonesia, 2018

Source: Author’s compilation using the Ray skyline map generating tool and data from the OECD Input-Output Tables.

Figure 7. Sectoral structure of Viet Nam, 2018

Source: Author’s compilation using the Ray skyline map generating tool and data from the OECD Input-Output Tables.
Comparatively, Indonesia’s economy appears less globalised and less competitive. On the one hand, Indonesia has been blessed with extensive endowment of commercialisable natural resources. Its economic structure portrays a strong oil and gas sector, which may create vulnerability to fluctuations in the price of oil. Indeed, in times of low oil prices, the government had implemented major trade liberalisation reforms, recognising the urgency of diversifying its export base.¹⁶

Still, Indonesia seems to continue to have a rather weak profile in the overall manufacturing sectors. As Figure 6 shows, most of the advanced manufacturing industries show relatively low self-sufficiency. Where Indonesia is strong is in traditional industries such as food products (c6), textiles (c7), wood (c8) and paper products (c9).

Compared to China and Indonesia, Viet Nam has an unparalleled level of specialisation in textiles (see skyline of c7, Figure 7), with a self-sufficiency ratio of over 550 percent. Viet Nam’s textile industry has developed strongly and played an essential role in the growth of the domestic economy.

In sum, China; Indonesia; and Viet Nam have significant manufacturing activities, particularly in sectors such as textiles and electronics. Next, we explore their GVC participation rates in selected manufacturing sectors and the dynamics over time.

**GVC participation in textiles, electronics and automobiles**

In this section, we use backward GVC participation rates to measure the share of intermediate imports (including domestic and foreign value-added) in an economy’s final products.¹⁷ For example, if Viet Nam imports cloth from China for the production of final products such as T-shirts, then China is said to be engaging in backward GVC participation.

The backward GVC participation rate can be split into two categories: simple and complex. The simple GVC participation rate measures the level of cross-economy production sharing activities, i.e.,

**Figure 8. GVC participation of China; Indonesia; and Viet Nam – textiles**

Note: FGY_GVC refers to the absolute volume of GVC production activities, measured in million USD.


the value-added embodied in intermediate goods exports that are directly absorbed by the importer. The complex GVC participation rate measures the level of complex cross-economy production sharing activities, that is, activities involving at least two border crossings.

Figures 8, 9, and 10 compare the GVC participation rates (total, simple and complex) of China; Indonesia; and Viet Nam in the textile, electronic and automobile sectors.

In the textile sector, with an almost 140 percent self-sufficiency ratio, China demonstrates the lowest level of GVC participation, probably due to its comprehensive manufacturing structure. In contrast, both Indonesia and Viet Nam have much higher GVC participation rates. While Indonesia’s

![Figure 9. GVC participation of China; Indonesia; and Viet Nam – electronics](image)


![Figure 10. GVC participation of China; Indonesia; and Viet Nam – automobiles](image)

simple GVC participation is very similar to its complex GVC participation, Viet Nam is much more active in complex GVC participation.

In the electronics sector, China and Indonesia have very similar levels of total, simple and complex GVC participation. The nominal value of China’s electronics industry is far beyond the other two economies, pointing to its important role as a global hub. In comparison, Viet Nam is the most active GVC participant.

It is worth noting that, before 2008, Viet Nam was involved in both simple and complex production activities. But, after 2008, its simple GVC participation rate significantly dropped while its complex GVC participation rate rose sharply. This drastic change indicates the evolving role of Viet Nam in the GVC of electronics.

In the automobile sector, China and Indonesia have relatively low levels of total, simple and complex GVC participation, while Viet Nam has a very high GVC participation rate that is supported by an increasing GVC trade.

Variations in economic size and self-sufficiency levels may have influenced GVC participation in the three economies. Due to its size and its self-sufficiency in production capacity, China may have had a lower GVC participation rate compared to many other economies. As Indonesia’s manufacturing profile is less comprehensive, it needs to be more integrated into global production networks. Viet Nam is well integrated with global production networks. Its high GVC participation rate matches to a great extent its heavy dependence on global sourcing. Further research is required to better comprehend these phenomena.

**GVC upgrading in textiles, electronics and automobiles**

GVC participation has provided new ways for developing economies to achieve industrialisation and economic upgrading. According to UNCTAD, GVCs can be an important avenue for developing economies to build productive capacity, including through technology dissemination and skill building, thus opening up opportunities for long-term industrial upgrading.\(^\text{18}\)

GVCs tend to add more value upstream, in activities such as product design, R&D and the production of advanced parts and components, as well as downstream, through activities such as marketing and branding.\(^\text{19}\) In other words, having a GVC position nearer to the beginning of the production process may have the advantage of securing higher value-added shares as well as improving technological sophistication.

Developing economies in East Asia have been particularly enthusiastic about the upgrading prospects of integrating into GVCs. For instance, advanced economies in the region are generally located upstream in high-tech manufacturing, whereas the region’s emerging market economies are generally located downstream. This echoes the development discourse on the ‘East Asian Miracle’.

Most of the developing economies of East Asia started with specialising in labour-intensive manufacturing assembly operations, before gradually moving up the value chain (such as material and parts procurement, R&D) to achieve industrial upgrading.

To measure upgrading within the GVCs of China; Indonesia; and Viet Nam, we adopt the GVC positioning index. The index, proposed by Wang et al., measures relative ‘upstreamness’, accounting for both forward and backward linkage-based production length measures.\(^\text{20}\) The higher the value of the index, the relatively more upstream is the economic sector.

Analysing changes in the index over time provides insights into the evolution of each economy’s role and position along a particular production chain, as shown in Table 6.

We first examine the textile sector. The GVC position indexes of all three economies for this sector are relatively low compared to other sectors, indicating that their positions remain relatively downstream. This tallies with the reality that the developing economies of China and Southeast Asia have developed internationally competitive

---


In the electronics sector, the GVC position index of China increased mildly from 0.85 to 0.90, indicating some upstream movement. Indonesia’s index figures remain largely unchanged at around 0.84, indicating limited progress in GVC upgrading. Viet Nam’s pattern is more dynamic, with its GVC position index decreasing from 1.07 to 0.86. This lines up with Viet Nam emerging as an important electronics assembler.

In the automobile sector, the past two decades have witnessed a significant fall in the GVC positioning indexes of all three economies. This indicates that all three economies moved downstream. The automobile sector occupies a significant portion in all three economies due to its extensive upstream and downstream linkages to a broad range of sectors. But, compared with light industries (textiles and electronics), the automobile sector is more difficult to develop because its international competitiveness is heavily influenced by technological capability. Given the difficulties of upgrading, moving downstream is probably a more practical way for these developing economies to develop industrial production and capacity.

Overall, the evolving GVC positions of China; Indonesia; and Viet Nam demonstrate their varying performance in economic upgrading. Sectoral patterns also show substantial differences. The textile and electronics sectors saw more dynamic changes, while the automobile sector was more technology-intensive and therefore more path-dependent.

A further contribution to research on up-streaming comes from Ignatenko et al., who suggest that a better indicator is to track the share of high-tech exports in value-added exports over time. They further argue that while finance and business services are typically upstream and high-valued activities, the situation is less clear with manufacturing. For example, with the acquisition of IBM’s personal computer (PC) division, Lenovo was able to develop its R&D capabilities, including the ThinkPad brand. IBM on its part evolved from a manufacturer of PCs to a provider of technology and consulting services. Another example is that of Li Fung, an intermediary for consumer goods based in Hong Kong, China, which converted from a supply chain management firm to a marketing and branding firm after acquiring product development services. Hence, the upgrading path could be

---

21 Ignatenko et al., “Global Value Chains: What Are the Benefits and Why Do Countries Participate?”

22 OECD, “Interconnected Economies.”

23 OECD, “Interconnected Economies.”
In Indonesia, firms sue export development, which participation and position in GVC into capacity, China may have had a lower GVC Due to its size and its self-development and domestic economic structure. Of GVC participation, with differing level discussed in this benefits of GVCs and FDI. The three economies This brings opportunities for firms APEC is home to global trade and investment hubs. Conclusion

<table>
<thead>
<tr>
<th>Firm type</th>
<th>Real annual sales growth (%)</th>
<th>Annual employment growth (%)</th>
<th>Real annual labour productivity growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRC</td>
<td>INA</td>
<td>VN</td>
</tr>
<tr>
<td>Direct exports*</td>
<td>5.2</td>
<td>0.9</td>
<td>6.5</td>
</tr>
<tr>
<td>Non-exporter</td>
<td>5.4</td>
<td>-0.5</td>
<td>-1.6</td>
</tr>
<tr>
<td>Domestic</td>
<td>5.3</td>
<td>-0.5</td>
<td>-1.1</td>
</tr>
<tr>
<td>Foreign ownership**</td>
<td>8.6</td>
<td>3.5</td>
<td>6</td>
</tr>
</tbody>
</table>

PRC=China (data for 2012); INA=Indonesia (data for 2015); VN=Viet Nam (data for 2015)

Note: * Direct exports are 10% or more of sales; ** 10% or more foreign ownership.


Performance of Firms

In this section, we will look at the performance of firms, disaggregated by their exporting and FDI characteristics using data from the World Bank Enterprise Survey (Table 7). In Indonesia, firms with 10 percent or more foreign ownership performed strongly in terms of annual sales and productivity growth. Further, export-oriented firms have significantly higher employment growth compared to non-exporter and domestic firms.

In Viet Nam, firms that are more involved in exports and have 10 percent or more foreign ownership performed strongly in sales and employment. Similar results are observed in China. FDI- and export-oriented firms performed relatively better in employment and sales growth compared to their domestic and non-exporter counterparts (albeit with weaker impact). It is worth emphasising that the productivity impact of firms with foreign ownership is strongest in Indonesia, with these FDI-linked firms experiencing a 3.5 percent real annual productivity growth.

Conclusion

APEC is home to global trade and investment hubs. This brings opportunities for firms to reap the benefits of GVCs and FDI. The three economies discussed in this policy brief have significant levels of GVC participation, with differing levels of development and domestic economic structure. Due to its size and its self-sufficiency in production capacity, China may have had a lower GVC participation rate while Viet Nam is well integrated into global production networks. The nature of their participation and position in GVCs is also different, which also has an influence on the trajectory of their development. For example, moving downstream, (rather than moving up) could be a more practical way for developing economies to develop industrial production and capacity. As discussed earlier, the automobile sector is more difficult to develop because its international competitiveness is heavily influenced by technological capability.

Also, some evidence suggests that firms that are more export-oriented and involved in the FDI network will have better performance in terms of sales, employment and productivity. Moreover, FDI plays an important role since such investment brings together the capital, skills, know-how and innovation needed to win the competition in the global market—though there may be concerns over ‘hollowing out’ risks for the domestic industry.

The majority of FDIs are carried out by multinational enterprises through mergers and acquisitions (M&As) and greenfield investments. These multinational enterprises often supplement their exports by producing through their subsidiaries abroad, resulting in an increasing contribution to world trade. FDI involvement in the domestic production of the host economy creates the basis of global production networks: local firms act as suppliers and at times build strategic alliances with multinational enterprises. Increased interactions with multinational enterprises may also increase the likelihood of domestic firms becoming direct exporters. The role of FDI in the growth of GVCs highlight the importance of FDI to developing economies as they pursue export-oriented development strategies.
**Luna Ge Lai** is a fellow with the APEC Policy Support Unit (PSU) who is supported by the Hinrich Foundation.

**Akhmad Bayhaqi and Nguyen Thu Quynh** are Senior Analyst and Researcher, respectively, at the APEC PSU.

The views expressed in this Policy Brief are those of the authors and do not represent the views of APEC member economies.

This Policy Brief was produced with support from the Hinrich Foundation.

The authors thank the Enterprise Analysis Unit of the Development Economics Global Indicators Department of the World Bank Group for making the data available.

This work is licensed under the Creative Commons Attribution-NonCommercial–ShareAlike 3.0 Singapore License.

**The APEC Policy Support Unit (PSU)** is the policy research and analysis arm for APEC. It supports APEC members and fora in improving the quality of their deliberations and decisions and promoting policies that support the achievement of APEC’s goals by providing objective and high quality research, analytical capacity and policy support capability.

**Address:** 35 Heng Mui Keng Terrace, Singapore 119616

**Website:** www.apec.org/About-Us/Policy-Support-Unit

**E-mail:** psugroup@apec.org

APEC#222-SE-01.5
## Annex. The sectoral categorisations of the OECD Input-Output Tables

<table>
<thead>
<tr>
<th>Agriculture</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>c1 Agriculture, hunting, forestry</td>
<td>c23 Electricity, gas, steam and air conditioning supply</td>
</tr>
<tr>
<td>c2 Fishing and aquaculture</td>
<td>c24 Water supply; sewerage, waste management and remediation activities</td>
</tr>
<tr>
<td>c3 Mining and quarrying, energy producing products</td>
<td>c25 Construction</td>
</tr>
<tr>
<td>c4 Mining and quarrying, non-energy producing products</td>
<td>c26 Wholesale and retail trade; repair of motor vehicles</td>
</tr>
<tr>
<td>c5 Mining support service activities</td>
<td>c27 Land transport and transport via pipelines</td>
</tr>
</tbody>
</table>

**Manufacturing**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>c6 Food products, beverages and tobacco</td>
<td>c29 Air transport</td>
</tr>
<tr>
<td>c7 Textiles, textile products, leather and footwear</td>
<td>c30 Warehousing and support activities for transportation</td>
</tr>
<tr>
<td>c8 Wood and products of wood and cork</td>
<td>c31 Postal and courier activities</td>
</tr>
<tr>
<td>c9 Paper products and printing</td>
<td>c32 Accommodation and food service activities</td>
</tr>
<tr>
<td>c10 Coke and refined petroleum products</td>
<td>c33 Publishing, audiovisual and broadcasting activities</td>
</tr>
<tr>
<td>c11 Chemical and chemical products</td>
<td>c34 Telecommunications</td>
</tr>
<tr>
<td>c12 Pharmaceuticals, medicinal chemical and botanical products</td>
<td>c35 IT and other information services</td>
</tr>
<tr>
<td>c13 Rubber and plastics products</td>
<td>c36 Financial and insurance activities</td>
</tr>
<tr>
<td>c14 Other non-metallic mineral products</td>
<td>c37 Real estate activities</td>
</tr>
<tr>
<td>c15 Basic metals</td>
<td>c38 Professional, scientific and technical activities</td>
</tr>
<tr>
<td>c16 Fabricated metal products</td>
<td>c39 Administrative and support services</td>
</tr>
<tr>
<td>c17 Computer, electronic and optical equipment</td>
<td>c40 Public administration and defence; compulsory social security</td>
</tr>
<tr>
<td>c18 Electrical equipment</td>
<td>c41 Education</td>
</tr>
<tr>
<td>c19 Machinery and equipment, nec</td>
<td>c42 Human health and social work activities</td>
</tr>
<tr>
<td>c20 Motor vehicles, trailers and semi-trailers</td>
<td>c43 Arts, entertainment and recreation</td>
</tr>
<tr>
<td>c21 Other transport equipment</td>
<td>c44 Other service activities</td>
</tr>
<tr>
<td>c22 Manufacturing nec; repair and installation of machinery and equipment</td>
<td></td>
</tr>
</tbody>
</table>