

## Special Feature A

# Shifts In Asia's Demand And Production Structure: A Value-Added Approach

## Analysing Asian Demand Using A Value-Added Approach

With a combined real GDP of US\$14.2 trillion in 2016, emerging Asia<sup>1</sup> is already one of the world's largest economic regions.<sup>2</sup> In the next decade or so, it is set to be the fastest-growing group of economies among the developing regions of the world. As a regional business and financial hub, Singapore will stand to benefit from the economic opportunities associated with this growth.

From 2000–16, Asia's GDP growth averaged 8.1%, higher than the 2.9% recorded globally. Along with exports, domestic demand was a key driver of this growth, underpinned by steady expansions in household consumption and business investment. While the longer-term trends in demand have been well-analysed, relatively less attention has been devoted to the underlying supply chain serving the Asian market. A focus on the production value-added (VA) content of final demand will therefore provide a complementary picture of the region's market opportunities.

This Special Feature utilises the OECD's Trade in Value-Added (TiVA) database to identify the VA content of Asian final demand across 64 supplying countries and 34 supplying industries.

The first part of the analysis considers how shifts in Asia's final demand and production structures have led to changes in the VA capture across supplying industries, as highlighted by the orange boxes in Figure 1.

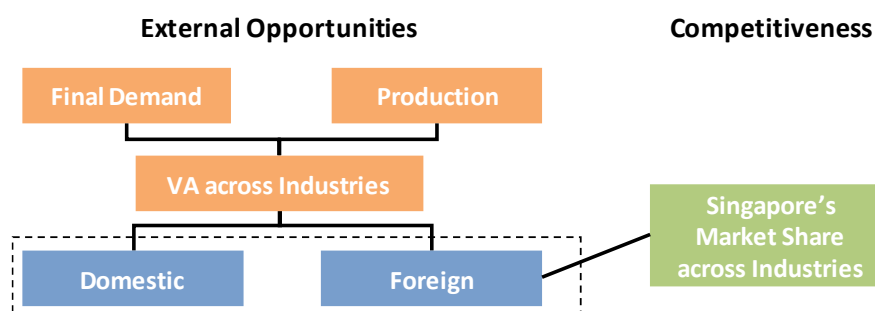
The second part analyses the distribution of the VA content of Asia's final demand across supplying countries. The VA content for each supplying industry is first separated into the portions that are domestically- and externally-sourced, as indicated by the blue boxes. The VA generated by a country accrues as domestic VA content if it is used to meet its own final demand, but as foreign VA content if it is channelled into final demand in any other country. Thereafter, this Feature considers the market share of external economies in foreign VA content, focusing in particular on Singapore, as indicated by the green box.

In the third part, the analytical framework is used to identify areas along the value chain where Singapore can tap on regional demand, given the growth potential of industries (based on trends in final demand, production structures and tradeability) as well as Singapore's revealed comparative advantage (RCA).

<sup>1</sup> In this Special Feature, Asia refers to China, India and the ASEAN-5 economies consisting of Indonesia, Malaysia, the Philippines, Thailand and Vietnam.

<sup>2</sup> Source: World Bank World Development Indicators. GDP is measured in US dollars, 2010 prices.

**Figure 1**  
Components of a Foreign Country’s VA Content in Asia’s Final Demand



## (I) From Final Demand To Value-Added Content Across Supplying Industries

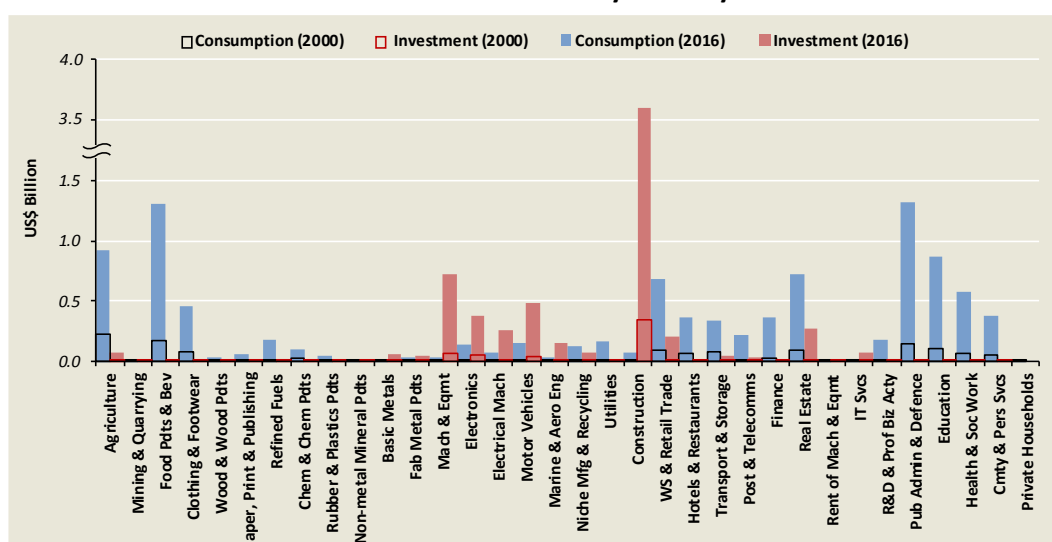
Chart 1 shows how final demand was distributed across 34 industries, ranging from primary commodities (on the left) to downstream consumer services (on the right). The black (hollow) and blue (filled) bars represent consumption (household and government) in 2000 and 2016 respectively, while the hollow and filled bars in red represent business investment in 2000 and 2016 respectively.

While approximately a quarter of Asia’s final consumption is still taken up by food-related necessities, spending on discretionary goods

and services has risen substantially over the period. This includes expenditure on electronics and retail goods, as well as finance, hotels and restaurants, healthcare, and education.

Notwithstanding the rising importance of intangible assets (reflected in computer and R&D activities), the bulk of business investment spending continues to be on physical buildings and structures, as indicated by the significant jump in construction spending and, to a lesser extent, in machinery and equipment.

**Chart 1**  
Asian Final Demand by Industry

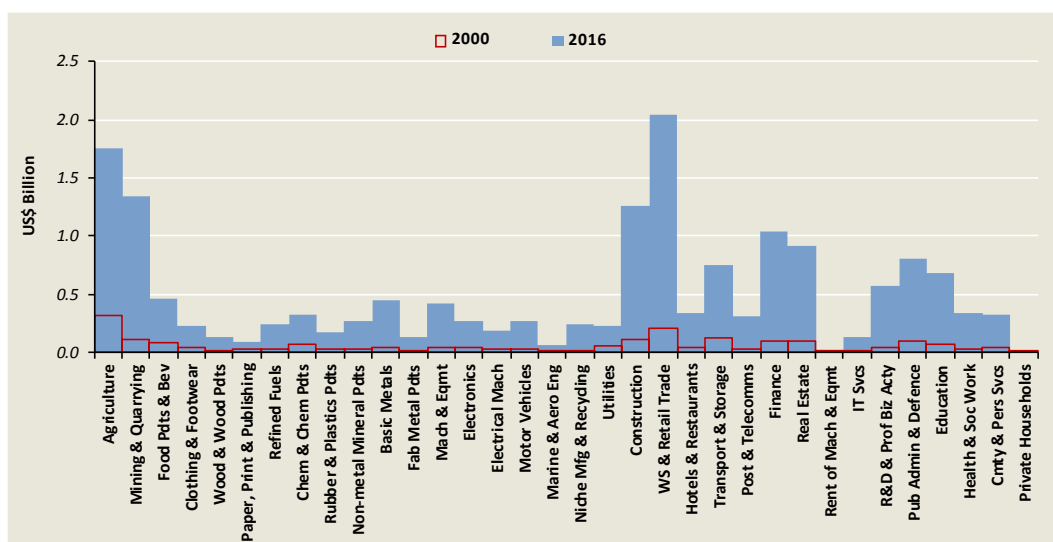


Source: OECD Inter-Country Input-Output Tables (2016) and EPG, MAS estimates

However, identifying market opportunities based solely on shifts in final demand can be misleading, as final products require intermediate inputs from other industries. The picture changes quite dramatically when the VA content of Asian final demand is examined, as depicted in Chart 2.

Although construction has the highest final demand, its dependence on other industries for raw materials implies that its VA content is much lower. Meanwhile, wholesale and retail trade emerges as the top industry in terms of VA generated, primarily due to the margins accruing to wholesale trading from across an entire range of goods and services.

**Chart 2**  
VA Content of Asian Final Demand by Supplying Industry

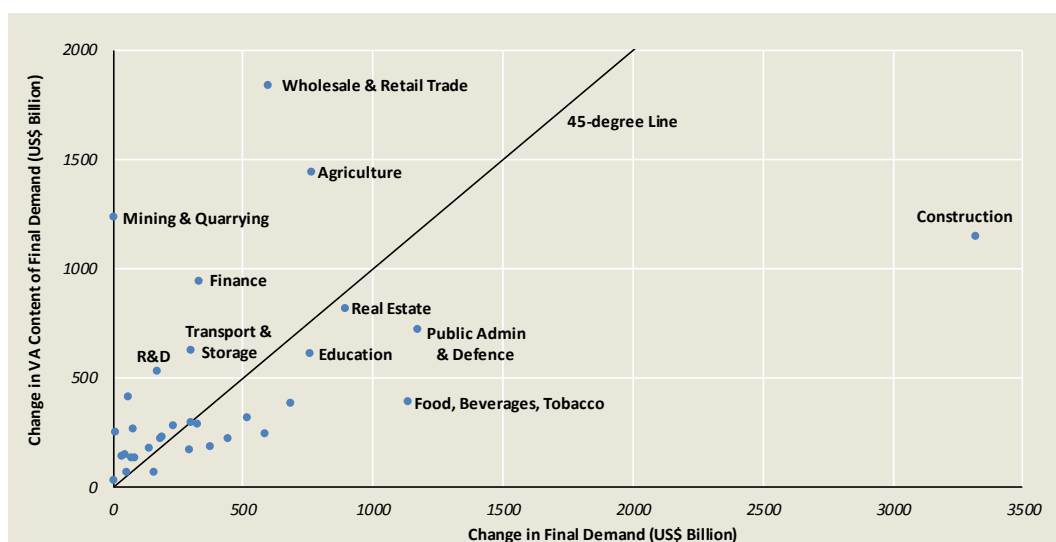


Source: OECD TiVA and EPG, MAS estimates

Chart 3 underscores this point by plotting the change in VA content supplied by industries against the change in final demand facing each industry over the period 2000 to 2016. Industries that provide significant intermediate inputs to other industries (i.e., are more upstream) lie above the 45-degree line, with the change in

VA exceeding the increase in final demand. These include horizontal services such as finance, wholesale and retail trade, R&D and transport and storage, in addition to primary commodity industries, such as agriculture and mining and quarrying.

**Chart 3**  
Change in VA Content versus Change in Final Demand (2000–16)



Source: OECD Inter-Country Input-Output Tables (2016), TiVA, and EPG, MAS estimates

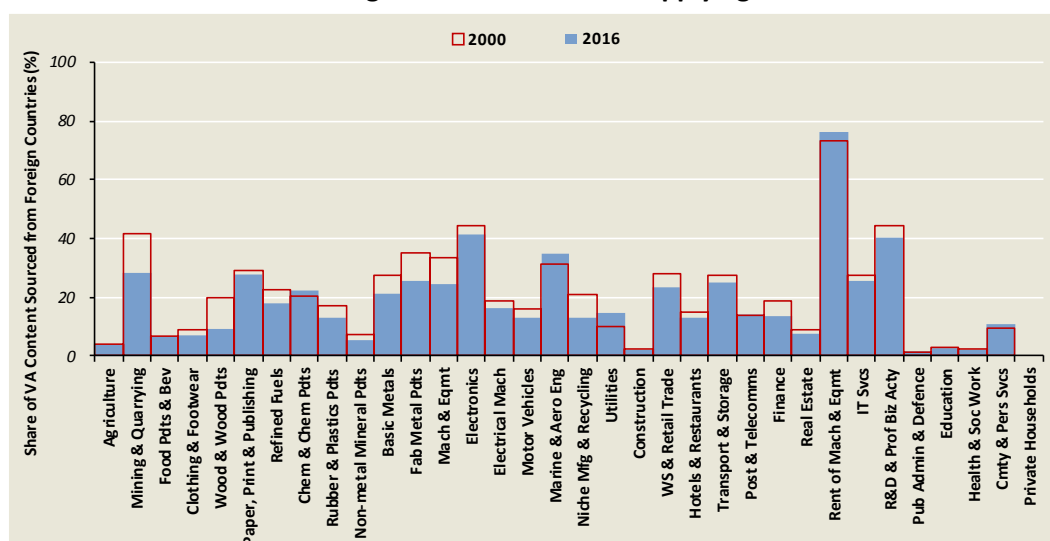
## (II) Distribution Of VA Across Supplying Countries

### Domestic versus Foreign VA

Having identified the industries with the highest VA content in Asian final demand, the next step is to ascertain how economies are positioning themselves across various segments of the supply chain. To analyse this, the VA content of final demand that is sourced domestically is first stripped out to obtain the share of foreign VA content. As of 2016, approximately 15% of VA embedded in Asia's final demand was not sourced domestically, although the share varies widely across industries, as seen in Chart 4.

The share of foreign VA content in each supplying industry reflects the intrinsic tradeability of output in each sector, with consumer-facing services sectors such as education and healthcare having a significantly lower share of foreign VA content compared to manufacturing sectors and modern services, such as IT services. It also reflects the ability of Asian economies to in-source parts of the value chain, given their natural endowments and developing capabilities. Notably, the foreign VA content of many manufacturing segments has declined since 2000, including machinery and equipment, alongside increasing industrialisation within the Asian economies themselves.

**Chart 4**  
Share of Foreign VA Content across Supplying Industries



Source: OECD TiVA and EPG, MAS estimates

### Source of Foreign VA

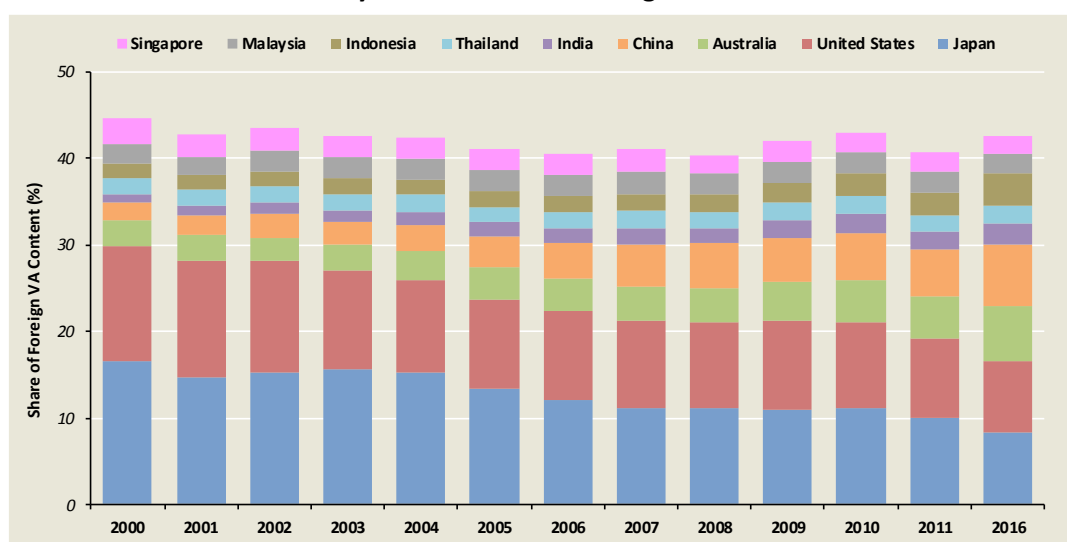
Chart 5 shows the market share of the top countries that supply foreign VA to Asia's final demand. Japan, the United States and China rank as the top three in terms of foreign VA content embedded in Asian final demand.

Over time, Chinese, Australian and Indonesian companies have gained significant ground at the expense of Japanese and American multinationals

in the region. From 2000 to 2016, China's, Australia's and Indonesia's market shares in the Asian supply chain increased by 5.2%, 3.2% and 2.0% points, respectively, while those of Japan and the US declined by 8.2% and 5.0% points, respectively.

Meanwhile, Singapore's market share remained broadly stable over the decade at around 2–3%, supported largely by higher regional final demand, rather than deeper market penetration.

**Chart 5**  
**Country Market Share of Foreign VA Content**



Source: OECD TiVA and EPG, MAS estimates

Note: OECD TiVA data is only available up to 2011. 2016 data has been projected by EPG, MAS.

### Market Share and Revealed Comparative Advantage

Beyond these aggregate numbers, it would be useful to consider how each country's market share varies across industries. This will shed light on the country's comparative advantage within the regional supply chain.

Country  $c$ 's RCA in an industry is calculated by taking the ratio of (i) its market share of foreign VA (FVA) content in industry  $i$  to (ii) its overall market share in total FVA content embedded in Asian final demand:

$$RCA_{i,c} = \frac{FVA_{i,c}}{FVA_i} \div \frac{FVA_c}{FVA} \quad (1)$$

This measure is commonly applied to gross exports, but further insights can be gleaned by applying it directly to value-added flows. An RCA larger than unity suggests that a country has a comparative advantage within a segment of the supply chain.

Conversely, a country's market share in a supplying industry can be obtained by multiplying its RCA in the industry by its overall market share in the region:

$$\frac{FVA_{i,c}}{FVA_i} = RCA_{i,c} \times \frac{FVA_c}{FVA} \quad (2)$$

Table 1 shows the computed RCA scores for the group of top supplying countries across the various industries in 2016, with each country's overall market share included in the last row.<sup>3</sup> A green cell indicates that a country has a comparative advantage in the industry ( $RCA > 1$ ), while a red cell indicates that it does not ( $RCA < 1$ ). Cells shaded white indicate the break-even point, where RCA is equal to unity. Other than Singapore, the countries are ranked according to their market share.

Table 2 presents, in a similar format to Table 1, the change in RCA over 2000 to 2016. Green cells indicate an increase in RCA, while red cells show a decline.

<sup>3</sup> Using equation (2) above, a country's market share in a particular industry can be obtained by multiplying its RCA in the industry with its overall market share found in the last row of the table.

**Table 1**  
**Revealed Comparative Advantage in Supplying to Asian Final Demand, 2016**

VA Source Industry	SGP	JPN	USA	CHN	SAU	DEU	KOR	IDN	IND	TWN	MYS	THA	HKG	GBR
Agriculture														
Mining & Quarrying														
Food Products & Beverages														
Clothing & Footwear														
Wood & Wood Products														
Paper, Print & Publishing														
Refined Fuels														
Chemicals & Chemical Products														
Rubber & Plastics Products														
Non-metal Mineral Products														
Basic Metals														
Fabricated Metal Products														
Machinery & Equipment														
Electronics														
Electrical Machinery														
Motor Vehicles														
Marine & Aero Engineering														
Niche Mfg & Recycling														
Utilities														
Construction														
Wholesale & Retail Trade														
Hotels & Restaurants														
Transport & Storage														
Post & Telecomms														
Finance														
Real Estate														
Rental of Machinery & Equipment														
IT Svcs														
R&D & Prof Business Activity														
Public Admin & Defence														
Education														
Health & Social Work														
Community & Personal Svcs														
<b>2016 Overall Market Share (%)</b>	<b>2.1</b>	<b>8.4</b>	<b>8.2</b>	<b>7.2</b>	<b>4.7</b>	<b>4.7</b>	<b>4.4</b>	<b>3.7</b>	<b>2.4</b>	<b>2.4</b>	<b>2.3</b>	<b>2.0</b>	<b>1.8</b>	<b>1.7</b>

Source: OECD TiVA and EPG, MAS estimates

**Table 2**  
**Change in Revealed Comparative Advantage in Supplying to Asian Final Demand (2000–16)**

VA Source Industry	SGP	JPN	USA	CHN	SAU	DEU	KOR	IDN	IND	TWN	MYS	THA	HKG	GBR
Agriculture														
Mining & Quarrying														
Food Products & Beverages														
Clothing & Footwear														
Wood & Wood Products														
Paper, Print & Publishing														
Refined Fuels														
Chemicals & Chemical Products														
Rubber & Plastics Products														
Non-metal Mineral Products														
Basic Metals														
Fabricated Metal Products														
Machinery & Equipment														
Electronics														
Electrical Machinery														
Motor Vehicles														
Marine & Aero Engineering														
Niche Mfg & Recycling														
Utilities														
Construction														
Wholesale & Retail Trade														
Hotels & Restaurants														
Transport & Storage														
Post & Telecomms														
Finance														
Real Estate														
Rental of Machinery & Equipment														
IT Svcs														
R&D & Prof Business Activity														
Public Admin & Defence														
Education														
Health & Social Work														
Community & Personal Svcs														

Source: OECD TiVA and EPG, MAS estimates

Within the manufacturing sector, China has made significant inroads across segments ranging from basic manufactures to more sophisticated machinery and equipment over the past decade. The emerging ASEAN economies—Indonesia, Thailand and Malaysia—have maintained their comparative advantage in mid-tier manufacturing, with evidence of continued movement up the value chain (e.g., metal products and motor vehicles). The advanced economies—Japan, US, Germany, Korea, Taiwan and Singapore—retain a strong comparative advantage in higher-end manufacturing, including electronics.

Turning to trade-related services, Singapore, with its long history as an entrepôt, has a strong comparative advantage in the wholesale trade and transport and storage industries. The country has also established itself in some modern services industries, such as finance. Indeed, Singapore's RCA in finance increased sharply

over 2000–16, alongside intensive efforts to develop as a key business and financial hub within the region.

In knowledge-intensive upstream business services, such as computer-related and R&D activities, Western economies such as the US, Germany and the UK continue to have a strong presence. India has the highest RCA in IT services, while Korea has also gained a comparative advantage in this area given its home-grown tech conglomerates.

Finally, for consumer-facing services, the US and the UK have the strongest advantage as education providers for students in the region. While Singapore remains an attractive destination for tourists from the region, as evidenced by the increase in RCA in hotels and restaurants, its attractiveness as a place for medical tourism has waned somewhat in relative terms.

### (III) Singapore's VA Content

The analysis above shows that shifts in a country's value-added in any supplying industry serving Asia's final demand can be broken up into changes in:

- (i) the VA content of the supplying industry, in turn linked to shifts in final demand and production structures;
- (ii) the share of foreign VA content in the supplying industry;
- (iii) the country's market share in each industry.

Table 3 brings these components together to analyse Singapore's VA content in Asian final demand, which amounted to 21.9% of its GDP in 2016. The bulk of this VA has accrued to hub-related services industries—namely wholesale and retail, transport and storage, and finance—owing to Singapore's strong comparative advantage in these areas as well as the upstream importance of these sectors to a broad range of final demand industries. At the same time,

Singapore has also benefitted from specific clusters of high-end manufacturing, namely chemicals and electronics.

Singapore will need to maintain its strengths in advanced manufacturing and trade-related activities. With increasing digitalisation, upstream modern services sectors such as computer-related activities, R&D and other business activities will also continue to gain importance.

Based on the share of foreign VA content, these modern services sectors are also highly tradeable. Singapore does not yet have a strong RCA in these areas relative to its dominance in the traditional trade-related industries. In such knowledge-based industries, developing human capital is critical—continuous upgrading of Singapore's labour force alongside an appropriate strategy to attract skilled workers from abroad will be necessary. There are also opportunities to further develop Singapore's VA content in domestic-oriented services, such as education and healthcare, to cater to burgeoning regional demand. Capturing

this segment of the supply chain would likely require internationalisation, with companies moving beyond Singapore's shores for greater access to the region's domestic markets.

Finally, differences in RCA profiles between Singapore and neighbouring ASEAN countries (Table 1) indicate that there are significant opportunities for a complementary division of

labour across the region. For instance, many regional economies have high RCAs in commodity- and manufacturing-related segments, while Singapore's comparative advantage lies primarily in the trade-related services. ASEAN's value as a regional production network can therefore be enhanced by leveraging on each economy's strengths.

**Table 3**  
**Factors Driving Singapore's VA Content in Asia's Final Demand, 2016**

VA Source Industry	(1) Asia Final Demand (US\$ Billion)	(2) VA Content of Asia Final Demand (US\$ Billion)	(3) Share of VA Content Sourced from Foreign Countries (%)	(4) Singapore's Market Share (%)	(2) × (3) × (4) = (5) VA Content of Asia Final Demand from Singapore (US\$ Billion)	(5) as Share of Singapore's GDP (%)
Agriculture						
Mining & Quarrying						
Food Products & Beverages						
Clothing & Footwear						
Wood & Wood Products						
Paper, Print & Publishing						
Refined Fuels						
Chemicals & Chemical Products						
Rubber & Plastics Products						
Non-metal Mineral Products						
Basic Metals						
Fabricated Metal Products						
Machinery & Equipment						
Electronics						
Electrical Machinery						
Motor Vehicles						
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Hotels & Restaurants						
Transport & Storage						
Post & Telecomms						
Finance						
Real Estate						
Rental of Machinery & Equipment						
IT Svcs						
R&D & Prof Business Activity						
Public Admin & Defence						
Education						
Health & Social Work						
Community & Personal Svcs						

Source: OECD Inter-Country Input-Output Tables (2016), TiVA, and EPG, MAS estimates