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Mapping the Journey of CDO Firms in Asia and Beyond

A paper by:

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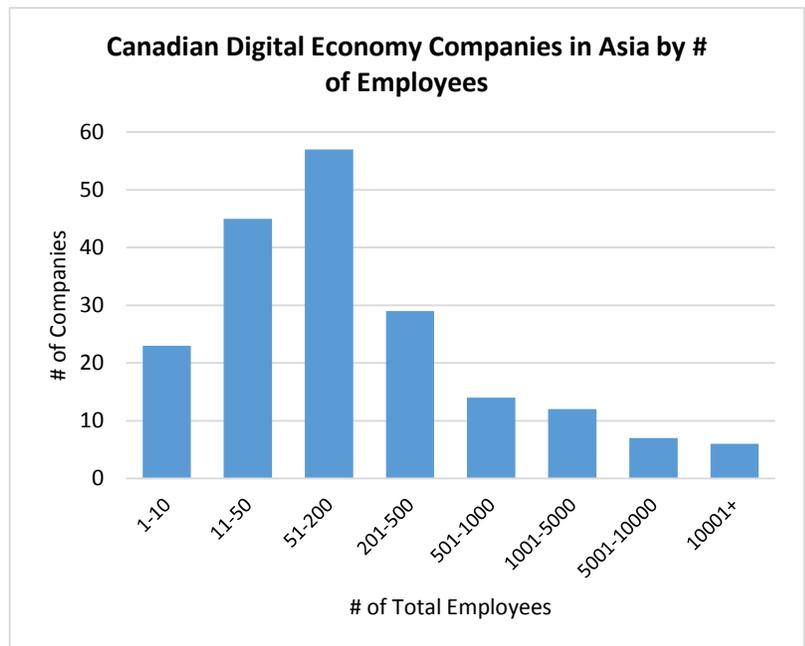
March 31, 2016

Introduction

The original research for this project was carried as part of the Munk School’s CanAsiaFootprint mapping project which tracked Canada’s presence in Asia by collecting publicly available Canadian company-level data. For the purposes of the mapping project, a sample group of countries (the “A-16”) was chosen that includes the six major Asian economies—China, Hong Kong, India, Japan, Taiwan and the Republic of Korea (South Korea)—in addition to the ten member states of the Association of Southeast Asian Nations (ASEAN). The interactive map now displays over 1800 locations in the A-16 and can be viewed on the site of the Munk School of Global Affairs and the Asia-Pacific Foundation.

This report covers a subset of this CanAsia database—those companies that are part of the digital economy, the focus of the Creating Digital Opportunity (CDO) project. This CDO dataset consists of 192 companies that have locations in Asia (A-16). Industry classifications were created by dividing companies by their three digit NAICS codes. Categorization by size was done by drawing a distinction between large firms – those with greater than 500 employees – and small and medium enterprises (SMEs) – firms with employees less than or equal to 500 employees. The 192 firms in the CDO dataset consist of 43 Large Firms and 149 SMEs also classified according to 27 different three digit NAICS categories, with 17 of these NAICS categories being represented by more than one company.

The objective of this report is to better understand how Canadian firms are participating in digital economy markets by taking a look at the first entry markets, incorporating data on the movement of these Asia-based Canadian firms between the United States, Europe and Asia – and within Asia itself. This project understands that there will be notable trends and differences due to factors such as size and industry sector, which is why we draw these divisions throughout the data analysis.

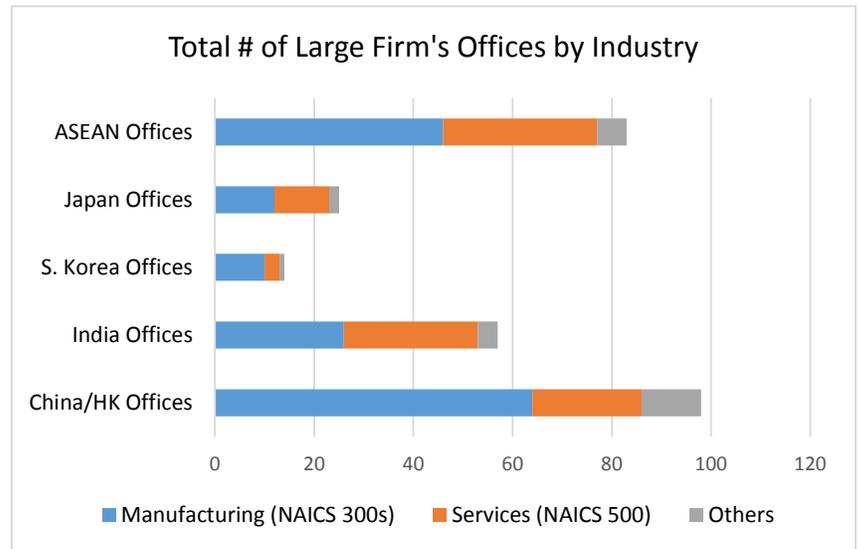


We hope that by comparing the movement patterns across markets and according to size and industry sector we will be able to draw some conclusions and reaffirm assumptions about how Canadian companies in the digital economy are participating in developed and high growth markets. In addition, it is important to bear in mind that because much of this activity is carried out by SMEs in the services sector, it is almost never captured by official trade or investment statistics, and as such this research will add to the knowledge base on Canada’s participation in the global digital economy.

Trends Across Industries

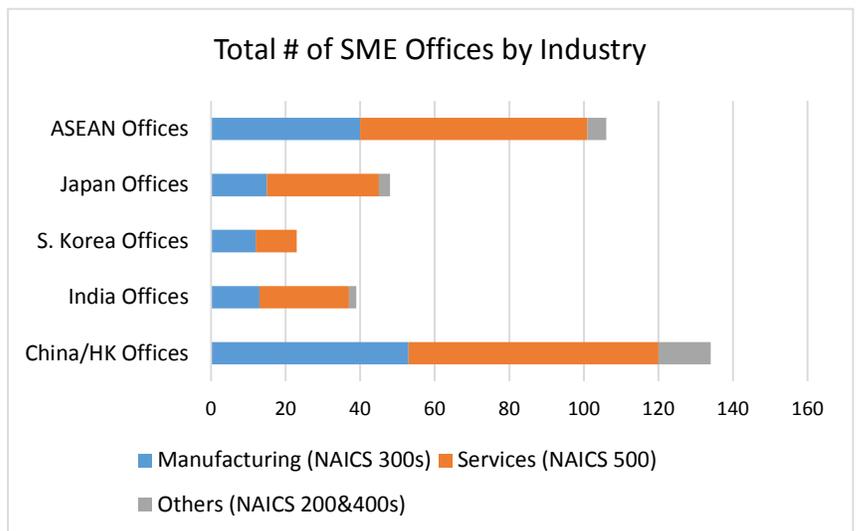
In order to begin categorizing industries there was a distinction made between firms involved in the high tech manufacturing and service sectors. The manufacturing sector consisted of all NAICS 300s entries while the service sector was limited to NAICS 500 categories. Any remaining firms were classified as other.

After looking the total number of office locations for large companies and SMEs, it becomes clear that a greater proportion of large firms are involved in manufacturing while SMEs are more services sector focused. This is not surprising, but does confirm that many of the Canadian services sector firms in Asia are significantly smaller in terms of employees and more numerous than those involved in the manufacturing sector.

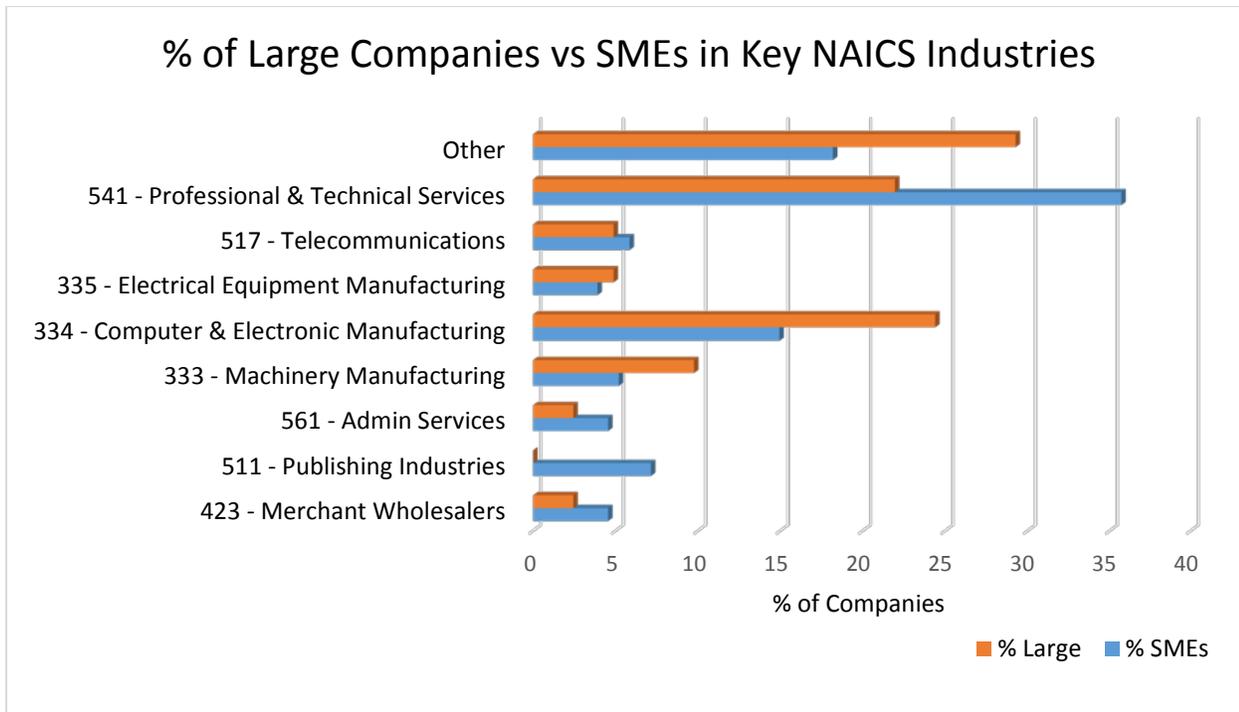


The Importance of SMEs

SMEs are an important part of this study-- approximately three quarters of the companies in the CDO dataset have 1-500 employees. The SMEs in this dataset are spread across 25 unique three digit NACIS categories and account for 149 of the firms in the dataset. The SMEs in the CDO dataset have about 15975 employees in total across all of their global locations. This study will take a look at the distribution of the SMEs and their relationships to larger companies. It will become apparent that after further analysis, that the movement patterns of SMEs will change across jurisdictions and industries which will paint a better picture of how these SMEs interact with larger players and other SMEs within the countries they operate and alongside the other companies in their industry subsectors.



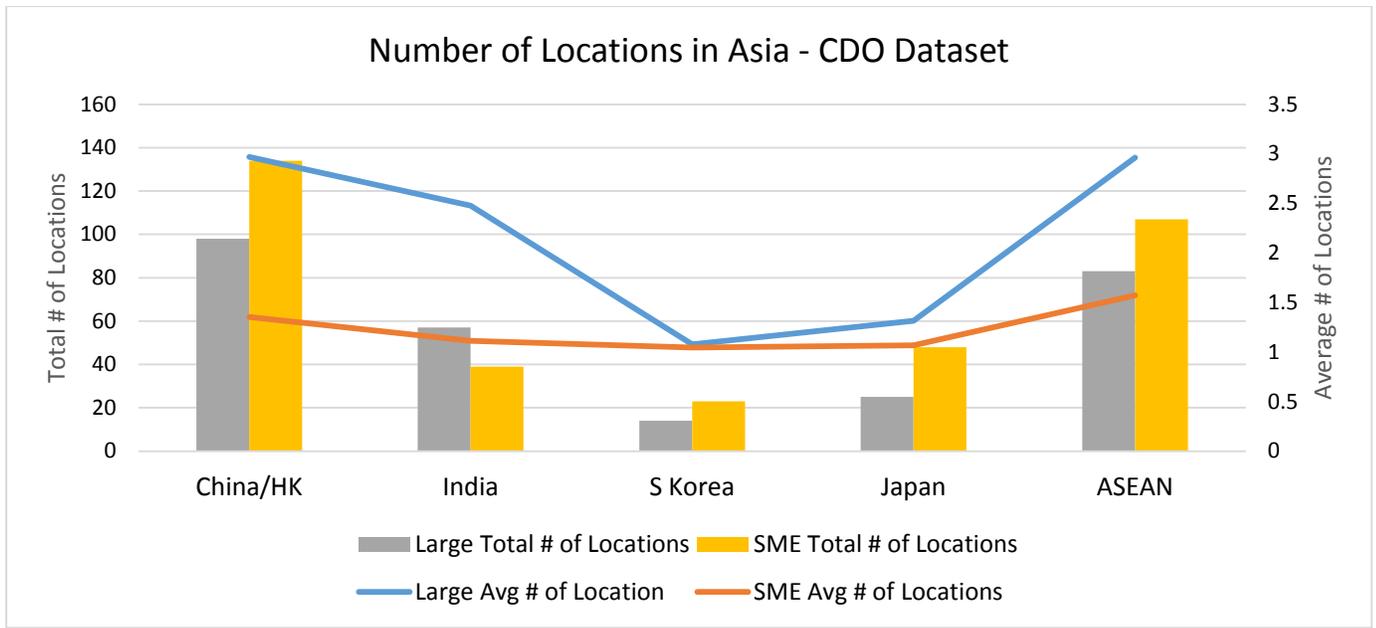
Another key element is the importance of services in the CDO dataset in relation to the size of company. As might be expected, large industries are more likely than SMEs to be involved in the manufacturing of components and systems (NAICS 300s), while SMEs are much more concentrated in the service based industries (NACIS 500s). This trend is expressed in the graph below.



CDO Companies' Entry into Asia – Examining the Trends Across 5 Study Areas

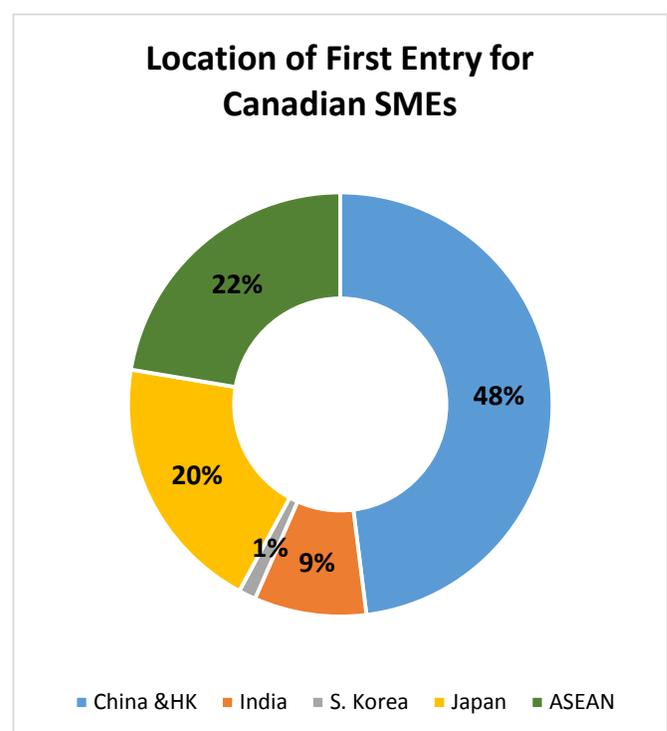
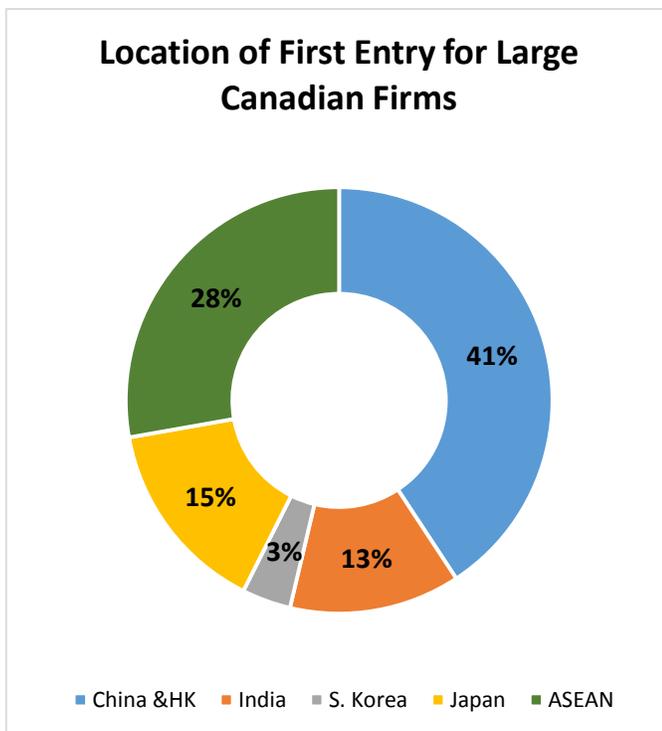
For this research we divided the A-16 into five study areas: China/HK, India, Japan, South Korea, Japan and ASEAN. The companies in the CDO dataset are all participants in one or more of these Asian markets, and we thought it would be interesting to see how firms move between different countries/regions within Asia in order to understand the regional dynamics that play out within the continent. The data in this section shows that companies are not spread out equally over the different study areas and with the result that some companies/industries are concentrated in certain markets. Here, it must be stated that because the project relies on publicly available information, access to location data of privately-owned firms is limited, and there is less data available in English in certain markets (Taiwan and South Korea, for example).

China and Hong Kong lead in terms of total number of offices and also place high for average number of locations for both SMEs and large companies (see graph below). Interestingly, the ASEAN region also has a high total number of firms and place higher than China/HK in terms of average number of offices per firm. Out of the bottom three locations (in terms of total number of offices) Japan leads for top destination for SMEs while India proves to be the more popular choice for large companies, and significantly less popular for SMEs. This is in part explained by the types of industries that each country attracts. For example, India attracts more manufacturing firms, which tend to be larger companies, while Japan dominates high tech service sector firms which are much more likely to be SMEs.



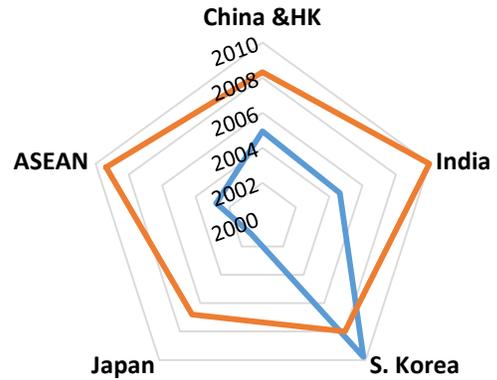
While the top three first destinations for firms are the same for both large companies and SMEs, there is a more noticeable preference for China and Hong Kong for SMEs. The distribution of large companies resembles the distribution of number of firms in each region, with India as a notable exception since it appears that large firms move to India second after establishing in another country first. It can be seen that SMEs are more numerous in Japan while in India this trend is reversed with many more subsidiaries and offices of large companies compared to that of SMEs.

The doughnut graphs below show the distribution of the location of first entry for the firms in the dataset. Through these it can be inferred that SMEs often use China/HK as a starting point before they move into either Japan or the ASEAN region.



The radar graph shows that SMEs have a much later average year of entry when compared to larger companies. This indicates the possibility that SMEs follow their larger counterparts into a new jurisdiction. Another key finding from the data is that SMEs are entering the ASEAN region much later than large companies.

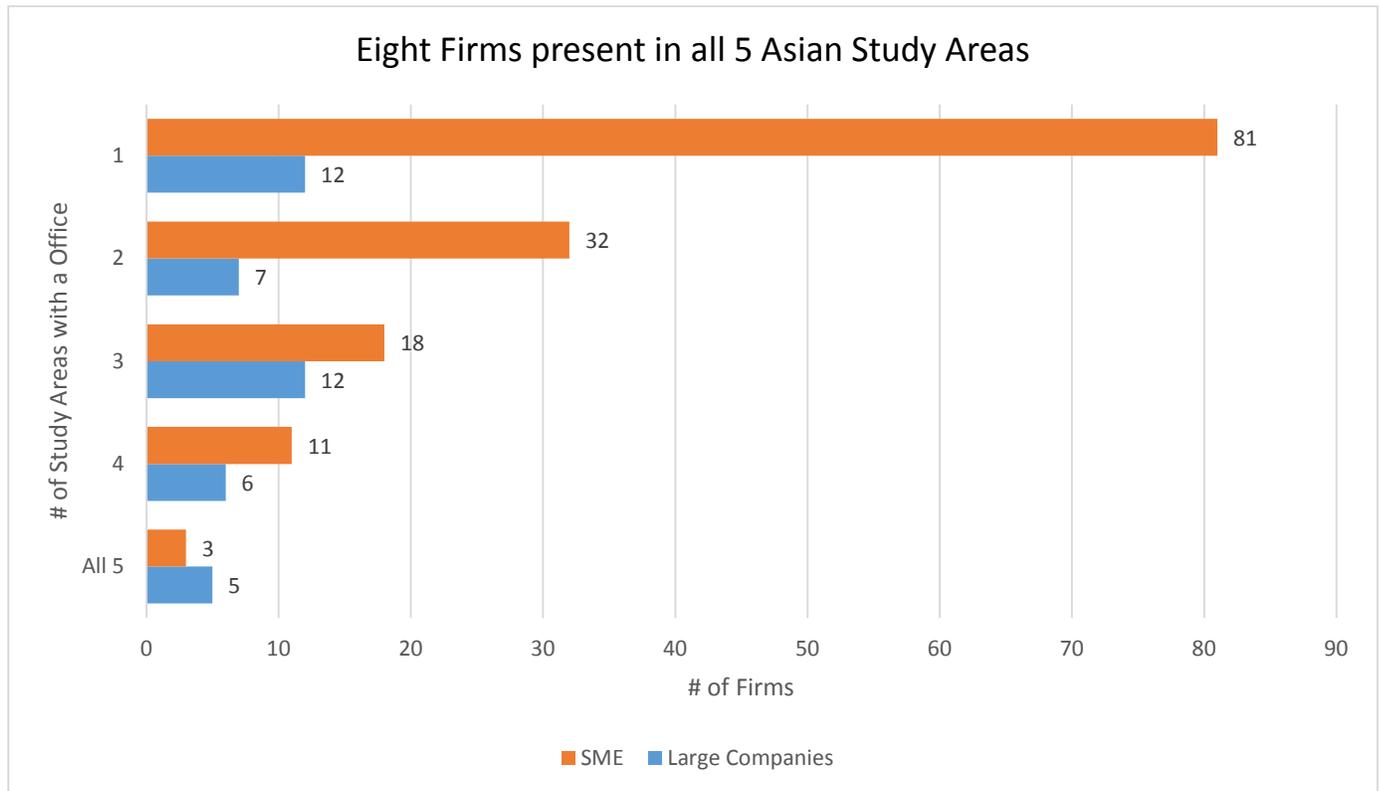
Average Year of Entry



Some quick take-aways from the data show that Japan has the earliest average entry year for both sizes of firms while South Korea has the latest average entry year. South Korea is also interesting since it is the only case where the SMEs in the sample are arriving before the large companies.

The data below show that over half of the firms in the CDO dataset are located in only one of the five study areas covered in this report. Only eight firms have a presence in all 5 Asian study areas. This could indicate that Canadian firms chose to move to Asia in order to access one specific market or to serve the rest of Asia from that market. However, it is also interesting that almost half of the firms have between 2 and 4 locations in these large markets.

Avg Large Company Entry Year Avg SME Entry Year



*187/192 total firms accounted for due to absence of data

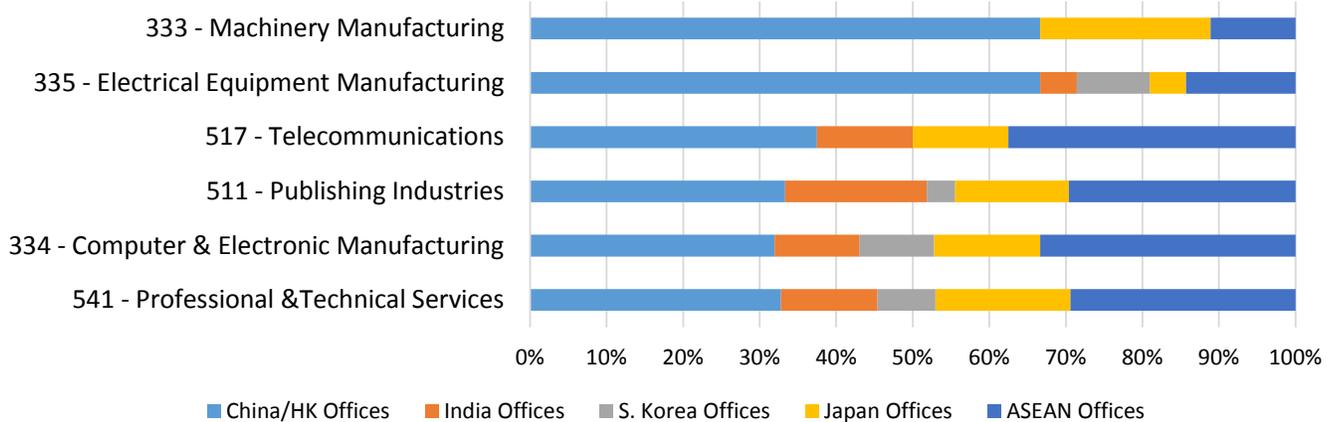
Table on the Distribution of Companies by Industry within Asia (Top 8 NAICS Categories)

	Industry Category (3 Digit NAICS Code)	Company Size	China/HK Offices	India Offices	S. Korea Offices	Japan Offices	ASEAN Offices
Services	541 - Professional & Technical Services	Large	10	3	1	6	8
		SME	39	15	9	21	35
	519 - Information Services	Large	6	8	0	2	6
		SME	4	1	0	1	4
	517 - Telecommunications	Large	2	7	0	0	9
		SME	6	2	0	2	6
511 - Publishing Industries	Large	3	4	1	2	1	
	SME	9	5	1	4	8	
Manufacturing	336 - Transportation Equipment Manufacturing	Large	20	10	2	4	9
		SME	1	1	1	1	1
	335 - Electrical Equipment Manufacturing	Large	3	1	0	0	1
		SME	14	1	2	1	3
	334 - Computer & Electronic Manufacturing	Large	23	8	4	4	16
		SME	23	8	7	10	24
333 - Machinery Manufacturing	Large	10	5	1	2	8	
	SME	6	0	0	2	1	

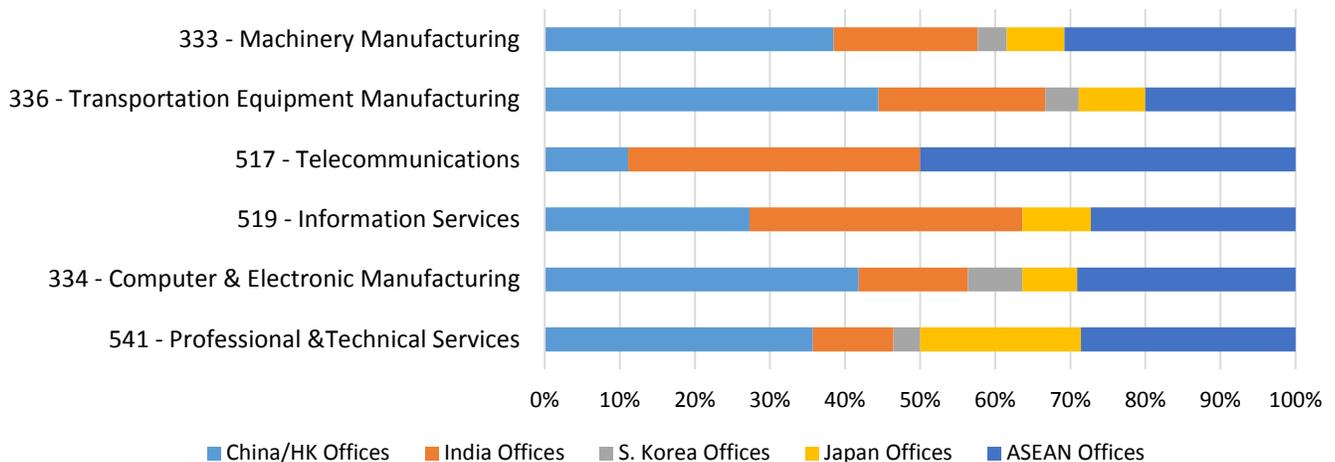
Clustered Industries within Asia (Data taken from Top 8 NAICS Categories Table)

The following two visuals show the concentration of firm location in different industries for SMEs and Large firms respectively. It can be seen that there are some notable clustering of similar firms within certain jurisdictions. The first, most notable clustering of similar firms can be seen in SMEs involved in NAICS 333 and 335 in China and Hong Kong. However, there is no similar clustering effect in NAICS 334 which is more evenly distributed across the five study areas. The second notable clustering of firms is in the ASEAN region which is home to a high concentration of telecommunications and computer/electronic manufacturing SMEs. Generally speaking the ASEAN region consistently ranks second in the proportion of company locations per industry for SMEs with Japan occupying third place on 5 of the 6 industries evaluated. Additionally, it is interesting to note that both Electrical Equipment Manufacturing (NAICS 335) and Publishing (NAICS 511) are industries that are predominately represented by SMEs showing such low representation by large firms that they had to be removed from the comparison.

Distribution of SME Offices by Industry (All Offices)



Distribution of Large Firm's Offices by Industry (All Offices)



There are also locational preferences for large firms in the database. The first big distinction is the inclusion of Transportation Equipment Manufacturing (NAICS 336) and Information Services (NAICS 519) on the second graph. This indicates that these two industries are predominately occupied by large companies with very few SMEs.

Another noticeable difference when comparing the two graphs is the greater proportion of locations in India when you look at large companies. This indicates that SMEs are generally less inclined to establish an office in India, meaning that the majority of locations will be subsidiaries of large MNCs. This trend is true across all sectors but most noticeable in the Telecommunications (NAICS 517) and Information Services sectors (NAICS 519).

The ASEAN region and India seem to be the preferred destination for the telecommunications (NAICS 517) industry, while the other service industries seems to be concentrated in China/Hong Kong and the ASEAN region. Not surprisingly, manufacturing of all types, but specifically transportation and computer/electronic manufacturing, has a high concentration in China (although we have grouped China and Hong Kong together for this research, we know from our location data that virtually all locations in Hong Kong are services-related). The assumption here is that these locations in China deal mostly with the assembly of final products for these large MNCs or are rep offices. The only notable clustering of similar firms in the same industry in Japan is around the

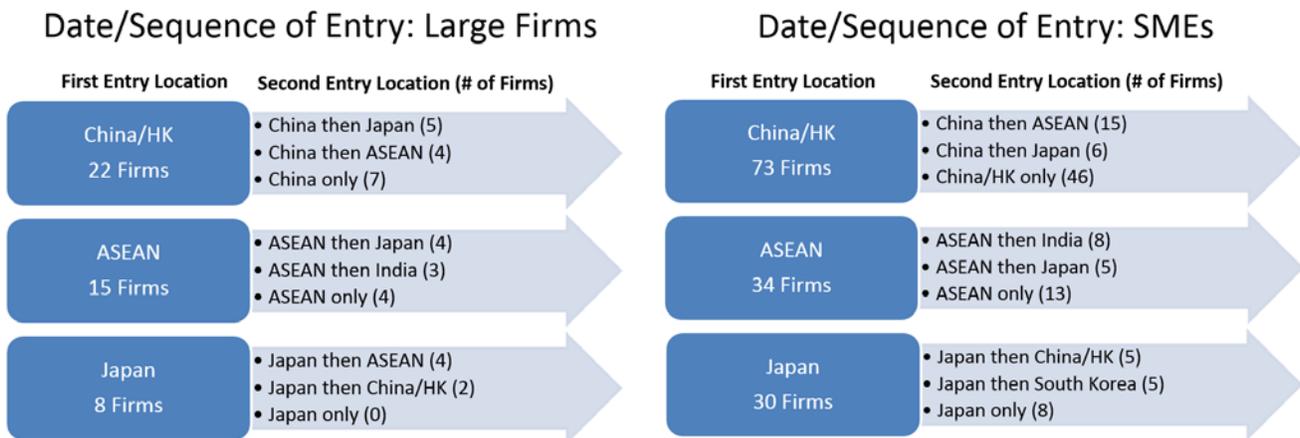
professional and technical services sector (NAICS 541) which is significant considering the small sample size of location in Japan compared to that of China, Hong Kong and the ASEAN countries.

Analyzing the Movement of CDO Firms within Asia

It is not surprising that China and Hong Kong are the preferred point of entry for both SMEs and large companies, however when we explore further the story becomes more interesting. Approximately 60% (46/73) of all SMEs with a location in China/HK do not have a presence in any of the other jurisdictions covered in the dataset, indicating that the expansion to Asia was a direct response to business opportunities in either China or Hong Kong with limited to no interest in expanding to the broader Asia Pacific region, or that other markets in Asia are serviced from those offices. The data show that there is a slight preference for non-manufacturing companies to stay within China/HK. Out of these 46 companies, 21 are in the high tech service sector (NAICS 500s), 17 are manufacturing firms (NAICS 300s) and 8 are classified as other industries (NAICS 200&400).

This same trend of only establishing an office in one country in Asia is also apparent, to a weaker extent, with SMEs that have decided to establish a presence in the ASEAN region first. Approximately 40% of SMEs stay within the ASEAN region and do not set up another location in a different country. The data shows that the majority of companies that stay within the ASEAN region are service sector firms. Out of these 13 companies that stay within the ASEAN region, 8 are in the high tech service sector (NAICS 500s), 4 are manufacturing firms (NAICS 300s) and 1 is classified as other. This number is quite accurate since there is only a couple of outliers in the dataset showing a SME establishing more than one location within the ASEAN region.

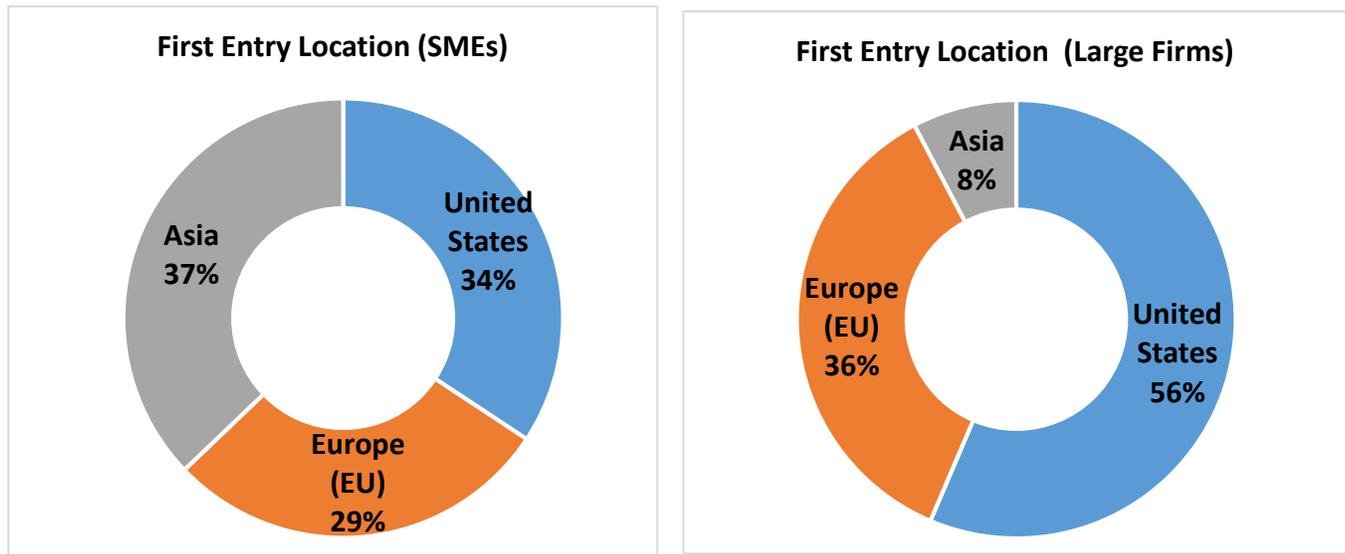
This is contrary to the pattern observed when analysing firms that establish locations in Japan which are significantly more likely to expand across the AP region. Every large company that has a presence in Japan has presence in at least one other Asian country, and the same is true for about three quarters of SMEs. SMEs that expand to Japan were also much more likely to expand to one other country within the same year which accounts for the discrepancies seen in visuals below.



* All values represent number of firms

Examining Companies with Operations in Asia, EU and USA

The next step in this CDO research was to identify those Canadian firms who participate in other developed markets, namely the USA and EU—these companies are likely to be servicing global clients, or participating in the Global Value Chains of the digital economy. Of the 192 firms in the CDO dataset, there are 129 companies that have an operation in Asia and in one of or both the European Union and the United States – with 84 companies having operations in all 3 locations. Of these 129 companies, 90 are SMEs and 39 are large companies. The following section will analyse these 129 companies that meet the stated conditions (Asia A-16 plus either USA, EU or both) and will divide them into subgroups sorted by their NAICS codes in order to draw distinctions between industries within this study.

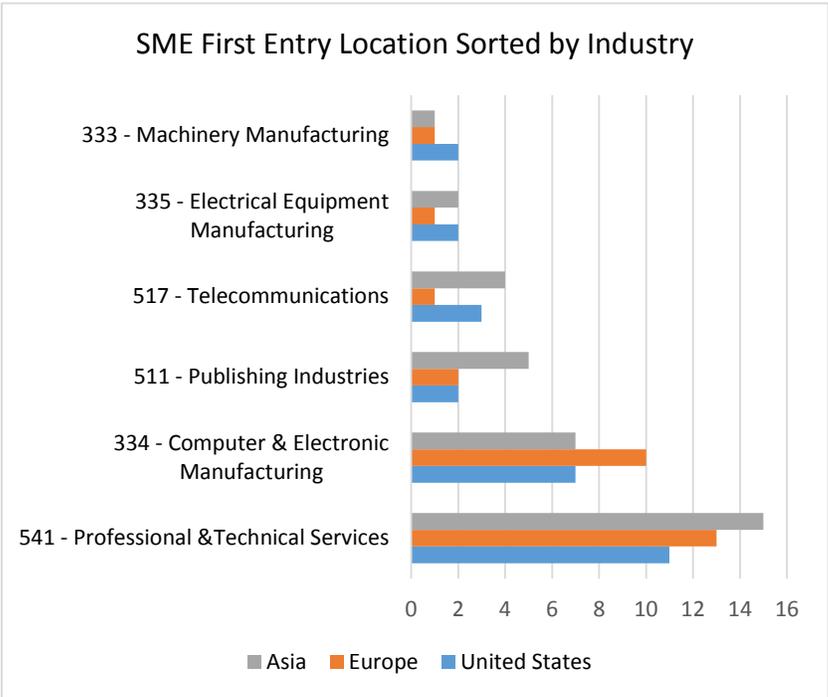


There is a notable difference in the movement patterns of the CDO firms across the US, EU and Asia. SMEs have a more even probability of first entry however a majority of the Canadian SMEs in this dataset (i.e. have a location in Asia) choose Asia as their first location for a foreign office/subsidiary/partnership. The preference for these SMEs as having selected Asia as a location for their first foreign office is overwhelming.

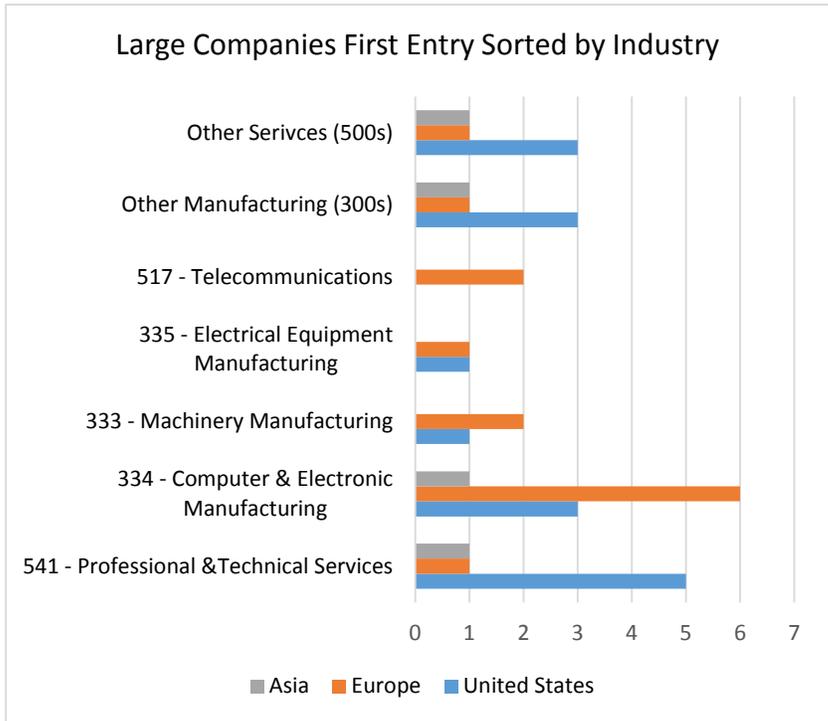
Breaking Down First Entries into US, EU and Asia by Industry

The data was then sorted by industry using the top six common categories between all three study regions (US, EU and Asia). This visual shows that SMEs in certain industries favour certain locations for a foreign office over others. Professional and Technical Services (NAICS 541), which includes software, tends to favour an entry into Asia over the EU or US, while the EU leads in the first location of Computer and Electronic Manufacturing (NAICS 334). There also seems to be a higher concentration of SMEs in Asia involved in the Publishing Industry (NAICS 511). The telecom industry (NAICS 517) also seems to favor the US and Asia over Europe as a first location for a foreign office. Generally speaking, the manufacturing industries (NAICS 333, 334, 335) seems to favor the US & Asia over the EU, but show no real significant preference for either the US or Asian market.

Conclusions drawn after examining large companies paint a much different picture. The few companies that chose to expand to Asia first are not concentrated into one specific industry. Europe dominates as a first choice for large firms in Computer and Electronics Manufacturing (NAICS 334) and Machinery Manufacturing (NAICS 333), while the US is the favorite for Professional and Technical Services (NAICS 541). Interestingly, the 2 large companies that make up the telecom industry (NAICS 517) have chosen to go to Europe over the US and Asia, a trend very different than that observed by SMEs. All 4 companies that are shown to have gone to Asia first only have an office in Asia with no presence in either the US or the EU.



By looking at the visual it seems that service sector SMEs make up the bulk of the companies that have made the decision to expand first into Asia. Manufacturing SMEs seem to favor either Europe and/or the US as the location of their first office, however it seems that SMEs in the manufacturing sector favor Europe over the US for the location of the first foreign office.

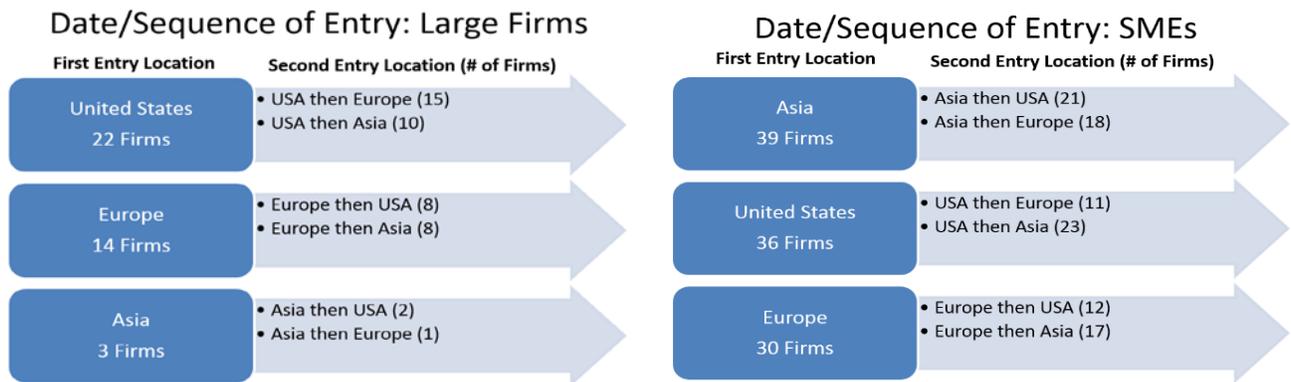


Examining the Patterns of Movement between the US, EU and Asia

When comparing the timing of the movement patterns of large firms to SMEs, it can be seen that there is a distinct difference between the movement patterns of each category. Large firms overwhelmingly favour the US as the first location for a foreign office with an average year of entry of 1989. Asia as a first location makes up a

much smaller proportion of the group of large firms in the dataset and all entered the Asian market after 2007. Large companies model a more traditional belief of how Canadian firms begin their international journey. These large firms tend to move to the US first, and then make the move into Europe before finally establishing an office in Asia.

When looking at SMEs between the three regions the story becomes more interesting. The location of first entry is much more evenly distributed between the three regions. However, Asia is now the most popular first destination for the CDO firms. The data shows that SMEs that choose Asia first have a much later date of entry, an average of 2005.4, when compared to the US and EU which have average dates of entry of 2001 and 2003.3 respectively. This shows that the majority of SMEs have chosen to move into Asia much more recently and in greater numbers compared to the US and EU. About two thirds of the SMEs that move to the US also decide to make a direct move to Asia rather than establishing an office in Europe before making the move to the A-16. The high growth, tech-friendly markets in the A-16 are no doubt a magnet for companies in the digital economy sphere.



* All values represent number of firms

** Countries had to meet the requirements of having a location in Asia and at least one of the US and/or EU

*** Discrepancies in the data (numbers greater than previous total) indicate entry into two regions within the same year

Industry Sub-Sector Case Studies: Manufacturing vs. Services Sector Comparison

There are some notable differences between service sector firms and manufacturing sector firms within the CDO dataset. The following section will delve more deeply into the trends occurring within the two largest subsectors of the manufacturing and service industries. The services sector will be represented by Professional and Technical Service companies (NAICS 541) and the manufacturing sector will be represented by companies in the Computer and Electronics Manufacturing subsector (NAICS 334). Trends that can easily be observed include the average date of entry into each Asian study country, average number of employees and ratio between total number of large company (< 500 total employees) offices and total number of SME (> or equal to 500 total employees) offices. Additionally, there are also some notable differences in how firms move between the 5 study regions in Asia (China/Hong Kong, Japan, South Korea, ASEAN, and India) covered in this comparison.

Services Sector Case Study: Movement Patterns of Professional and Technical Service Companies (NAICS 541)

Professional and Technical Services is by far the largest services sector industry group and is also the largest industry group within the CDO dataset. This subsector includes companies involved in business analytics, engineering, design, technical consulting, and research and development. Firms within this industry group are highly mobile as materials and equipment are not as important to revenue generation and also since human capital is the major input to production. These companies sell the knowledge and skills of their employees, while offering particular expertise and training to their clients.¹

Examples of Canadian companies within this sector that are included in the CDO dataset include:

Large Companies	Small and Medium Enterprises (SMEs)
 <p>D2L™ DESCARTES™ COREL™ REDKNEE Looking Beyond</p>	 <p>perle Aversan® Mxi Technologies ACCULOGIC ACCEDIAN NETWORKS BLUECAT</p>

Number of Firms in the dataset – 64 Companies (11 Large Companies, 53 SMEs)

Average Number of Employees – 366 Employees (1653 Employees per Large Company, 92 Employees per SME)

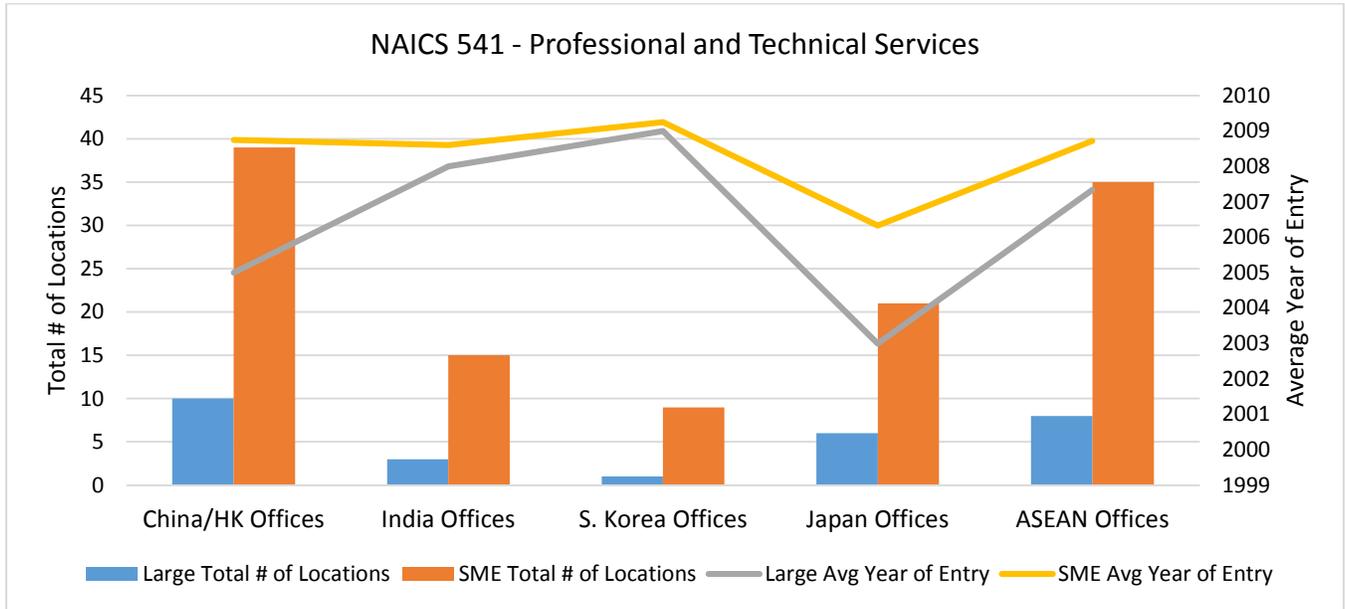
Industry Trends

After looking at the graph below it becomes clear that the total amount of SME locations vastly outnumber the total number of locations held by large firms. This fits with the general trend of numerous small firms selling solutions to a variety of clients within each jurisdiction which is characteristic of larger trends being observed in the services sector. It can also explain why the average number of employees per firm is much lower than that observed across the manufacturing sector.

Another interesting observation is that there is a relatively small gap between the average entry years of large firms compared to that of smaller firms. It seems that across all study areas there is a trend of SMEs following large companies. However it seems that SMEs closely follow large companies into these new markets due to how small these differences are in the average years of entry between the two groups. The only two

¹ Statistics Canada. Professional, Scientific and Technical Services. Accessed March 16 2016. <http://stds.statcan.gc.ca/naics-scian/2007/cs-rc-eng.asp?criteria=541>

notable exceptions are China/HK and Japan which have gaps greater than 3 years between the average entry of large companies and SMEs.



Sequence of Entry for Professional and Technical Service Subsector into Asia-Pacific Region (Large and SMEs)

As expected, China and Hong Kong are the most popular first destinations for Canadian firms operating in this subsector. However, it seems that the trend of staying within China/Hong Kong which was observed above is also true within the professional and technical services industry. According to the data, less than 50% of the firms who went to China decided to open another Asian office, although again, companies often serve other Asian markets from Hong Kong especially. This pattern is also repeated for first entry into the ASEAN region, although Japan appears to be the preferred choice for second locations.

Date/Sequence of Entry: NAICS 541



1. All values represent number of firms
 2. Discrepancies in the data (numbers greater/less than previous total) indicate entry into two regions within the same year

Manufacturing Sector Case Study: Movement Patterns of Computer and Electronic Manufacturers (NAICS 334)

Computer and electronic manufacturers is by far the largest individual industry group engaged in the manufacturing sector in the CDO database. This subsector contains companies which manufactures original products and components for computers, computer peripherals, communications equipment, and similar electronic products. The industry uses production processes that are characterized by the design and use of integrated circuits, and the application of highly specialized technologies.²

Examples of Canadian companies within this sector that are included in the CDO dataset include:

Large Companies	Small and Medium Enterprises (SMEs)
 <p>smtc manufacturing partner to innovators</p> <p>creation TECHNOLOGIES Working together to build the future</p> <p>BlackBerry</p> <p>Celestica™</p>	 <p>MITEL</p> <p>ROSS Production Technology Experts</p> <p>Avera</p> <p>DragonWave</p> <p>Norsat International Inc.</p>

Number of Firms in the dataset – 33 (10 Large Companies, 23 SMEs)

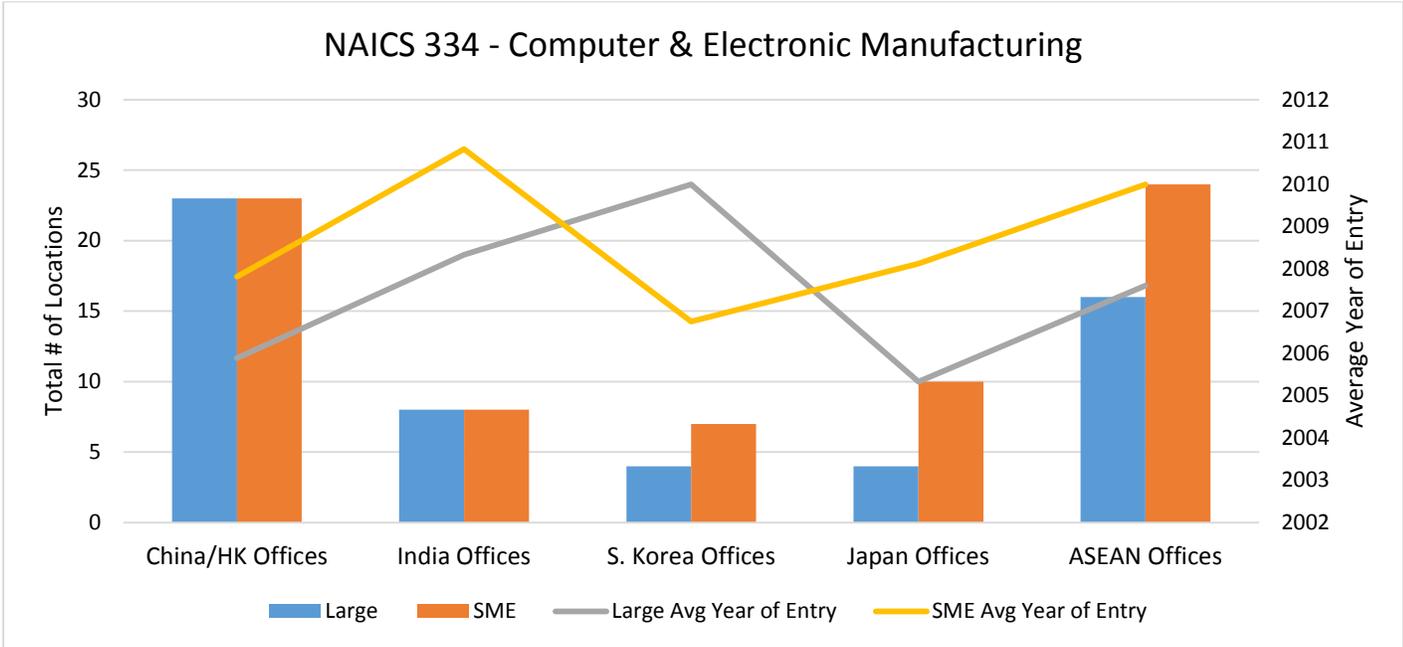
Average Number of Employees – 1354 Employees (4059 Employees per Large Company, 178 Employees per SME)

Industry Trends

When looking across the Computer and Electronic Manufacturing subsector it becomes clear that there is a more even distribution of locations between large companies and SMEs with each location hosting a sizable amount from both size categories. The only real outlier to this trend is Japan which shows a much larger preference for SMEs within this industry. However, it should be noted that this is characteristic of the broader SME preference for Japan observed earlier in this report.

Additionally, within the manufacturing sector you see a much wider difference between the average year of entry for large companies and SMEs. SMEs are arriving much later than their larger counterparts within the same industries, perhaps showing a relationship where SMEs are following the bigger players into new markets supplying some of the components to larger supply chains and manufacturing processes. The only outlier to this trend are companies that went to South Korea, showing another factor potentially influencing Canadian SMEs to locate here before larger companies establish a presence.

² Statistics Canada. Computer and electronic product manufacturing. Accessed March 16 2016.
<http://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=163683&CVD=163686&CPV=334&CST=01012012&CLV=3&MLV=6>



Sequence of Entry for Computer and Electronic Manufacturers into Asia-Pacific Region (Large and SMEs)

As expected and continuing the trend above, China and Hong Kong are by far the most popular first destinations for Canadian SMEs operating in this subsector. This trend is a bit more pronounced in the manufacturing sector with the second most popular first destination, Japan, having less than half the amount of entries compared to China/HK. However, it seems that the trend of staying within China/Hong Kong which was observed above is also true within this industry. Only 50% of the firms who went to China decided to open another Asian office which is in line with the broader trends observed when comparing all firms in the CDO dataset. Computer manufacturing firms who went first to Japan and the ASEAN region were also more likely to (< 80%) establish another office in another one of the Asian study regions.

Date/Sequence of Entry: NAICS 334



1. All values represent number of firms

Conclusion

Although Canada may not be considered to be among the world's largest contributors to the global digital economy, our research has shown that there is a critical mass of Canadian firms large and small that participate in this newly established and ever changing global market. By following these firms with Asian locations (where much of the high tech manufacturing occurs and where there are large and sophisticated consumer markets), we have identified a number of trends that warrant additional research.

Preference for international expansion (Asia, US, EU)

- Large companies were much more likely to move to the US or EU before considering establishing an office in Asia. This is attributed to their longer operational history and important position that the US and EU markets previously presented for Canadian multinationals. SMEs (mostly in the services sector), which are generally less mature than large companies, show a more even preference for the US, EU and Asia – with Asia taking the top spot for first foreign location for the firms included in the dataset.
- Generally speaking large companies have an average entry year in Asia which is much earlier than SMEs, which started arriving more frequently post 2008. This can perhaps indicate that the most significant expansion of Canadian firms into Asia was in response to the 2008 financial crisis and growth in those markets. However this trend does deviate a bit when looking a different countries/industries, specifically the case study on NACIS 334.

Country of preference for entry into an Asian market

- China/HK is by far the most popular preference for a first location for an office in Asia according to the movement history of the firms included in this dataset.
- Companies that move to China and Hong Kong are much less likely to establish a presence in another Asian jurisdiction. This is true even when compared against companies within the same industry that have established their first Asian office in India, Japan, ASEAN and South Korea. This is also true even when comparing SMEs against large companies and across sectors.

Industry stratification, trends across industries

- There are also observed instances of industries clustered in multiple jurisdictions. Notable examples include the electrical equipment (NAICS 335) and machinery manufacturing (NAICS 333) in China/HK, and the professional and technical services (NAICS 541) in Japan.

Options for Future Study

- The 75% of the companies in the CDO dataset that are SMEs tend overwhelmingly to be in the services sector. It would be useful to determine the factors that determine the decision to locate in Asia, including through global value chain mapping
- More detailed research on the nature of clients being served: by sector, nationality
- Expanding research to include US and EU locations for companies in the CDO sectors
- More detailed industry analysis in order to understand what types of companies are consolidating within specific regions and linking this to any existing research on firm clustering that may exist within that region.