A special feature brought to you by Singapore Management University

TACKLING SOCIETAL CHALLENGES

This is a monthly series on SMU research which aims to create significant impact by addressing these five societal challenges: Economies & Financial Markets, Social Fabric & Quality of Life, Boundaries & Borders, Sustainability, Innovation & Technology.

In this issue, SMU researchers offer insights on tackling the societal challenge of interpreting economies & financial markets.

Singapore in the global value chains

The republic's high level of participation in value chains could see its trade impacted by the ongoing disruption to production networks


Associate Professor Chang Pao-Li

The disruption of global supply chains has been in the spotlight in the past year as a result of the US-China trade dispute and, more recently, the outbreak of the highly contagious Covid-19. These disruptions have been exacerbated by the increasing fragmentation of manufacturing in the last three decades, with the various stages of the production process being located in a growing number of countries; resulting in the creation of what is known as global value chains (GVCs)

The iPhone's GVC, for instance, starts with its conception and design in California, with high-tech components being made in Japan, Korea and Germany, among other countries. Apple's smart phones are then assembled in China by Taiwanese companies before being exported around the world. For a country such as Singapore, which is limited in natural resources and size, having a high level of GVC trade allows it to focus on niche production processes or tasks that it has the strongest comparative advantage in.

A Singapore Management University (SMU) study showed that although Singapore has had a very high level of GVC trade since 1995, its unique status has become gradually diluted over the years. In particular, East Asian economies such as Taiwan and Korea have made great strides in this direction, the research by Associate Professor Chang Pao-Li from SMU's School of Economics and Phuong T. B. Nguyen, Postdoctoral Research Fellow from SMU's Lee Kong Chian School of Business found. In total, GVC trade typically accounted for 55-60 per cent of Singapore's gross exports from 1995-2015.

Impact of US-China trade war

The discussion of GVCs comes at a critical time for Singapore as the ongoing US-China tariff war has raised concerns about its impact on the world's trading system. The trade dispute could potentially destabilise the global production network and trigger a re-configuration of the value chains.

In 2015, imports originating from the NAFTA (North American Free Trade Agreement) region received by Singapore were quite diversely intermediated by several countries, and not heavily concentrated in China. As such, Singapore's "backward linkages" are less likely to be disrupted by the Chinese tariffs against the US, explained Associate Prof Chang. However, about 20 per cent of Singapore's domestic contents destined for NAFTA countries – or its forward linkages – were intermediated by China. Thus, a "non-negligible" share of Singapore exports is likely to be hit by the US tariffs against China. Nonetheless, this is still much less than the potential impact on the forward linkages of Japan (27 per cent), Korea (50 per cent), and Taiwan (60 per cent), for whom China is a key downstream intermediary of their domestic contents destined for the NAFTA market.

Said Associate Prof Chang: "Singapore's forward linkages are likely to face more challenges from the trade war than its backward linkages. Meanwhile, the fallout from its neighbouring Asian exporters through the GVC connections is likely to cause significant threats."

Singapore's position in the value chain

The SMU study also determined that Singapore was located at the lower end, or at the more downstream portion, of the GVC, compared to the US and Japan; and had a similar level of "donwstreamness" as China.

"We may regard the ratio of foreign contents in a country's GVC trade as its relative downstreamness in the GVC. In other words, a country is considered relatively downstream if its GVC-related gross exports consist relatively more of backward linkages than forward linkages," explained Associate Prof Chang.

She noted that a dominant proportion of Singapore's exports involved in GVC trade comprises foreign contents. This partly reflects Singapore's limited natural resources. To produce goods for exports, the city-state needs to import a high proportion of foreign inputs and raw materials. At the same time, Singapore has a strong comparative advantage in service sectors such as wholesale and retail, transportation and storage, and other business services, which tend to be provided at the end of product value chains.

Associate Prof Chang said that there is no "definitive winning position" in the GVC, although it might appear to be preferable to be located upstream. Countries located upstream can be those endowed with abundant natural resources and primary commodities, such as Brunei and Brazil, or very differently those with leading technology capacities in product design, R&D, and key intermediate inputs, such as Japan and the US.

"As the economy matures, Singapore is likely to gradually move towards both pre-production and post-production value-added activities, which may not translate into a definitive upward move of its position in the GVC on aggregate." At the industry-level, however, the SMU study did observe significant upstream movements in some Singapore sectors, for example, in computer, electronic and optical equipment, as well as in motor vehicles, and rubber and plastic products.

Scan the QR Code to listen to the podcast on this topic

Uncovering financial misinformation

A new study finds that quantitative financial disclosures are not sufficient for detecting misreporting by companies


Assistant Professor Richard Crowley

While most investors focus on the hard numbers when reading a company's annual report, new research shows that what is discussed in the text of such documents is a better indicator of whether any intentional misreporting has occurred.

The study found that while quantitative financial information is useful for uncovering such misreporting, examining information about what companies discuss in the text in their disclosures can improve such detection by up to 59 per cent.

"Our results suggest that the topics discussed in annual report filings and the attention devoted to each topic are useful signals in detecting financial misreporting," said Singapore Management University (SMU) Assistant Professor of Accounting Richard Crowley, who conducted the study with Nerissa C. Brown, Associate Professor at University of Illinois, and W. Brooke Elliott, Ernst & Young Distinguished Professor, also from the University of Illinois.

The researchers used a machine learning technique to develop an algorithm that could assess whether the thematic content of financial statement disclosures is incrementally informative in predicting intentional misreporting.

"I think the relative efficacy of using textual information versus financial information for detecting financial misreporting is a big surprise. Financial misreporting is, by definition, reflected in the financial information of a company. However, it appears that many companies that have been involved in misreporting were very good at crafting believable financial statements," said Dr Crowley.

"As such, even though the financial information is incorrect, it can be very difficult to tell just by looking at the financials. Instead, our results suggest that a more holistic approach, incorporating both textual components and financial components, is best for detecting more serious instances of financial misreporting."

Raising red flags

The study cited two well-known examples of corporate malfeasance in the US to demonstrate the ability of the financial disclosure text to reveal efforts to mislead investors. One involved energy company Enron, which was embroiled in an accounting scandal that eventually led to its bankruptcy in 2001, the largest in US history at the time.

The researchers observed that in 1999, Enron management discussed year-on-year increases in income far more than most companies; enough to place it in the 98th percentile for the year.

"This is one of the biggest red flags that year for the firm, in what would eventually lead to one of the largest cases of misreporting in US history. Interestingly, as the misreporting began to unravel in 2000, Enron switched its disclosure behaviour to focus away from discussing increasing income, dropping to just the 2nd percentile. One explanation for this may be a deliberate effort by Enron executives to distract from their manipulated earnings," explained Dr Crowley.

In another case, American jewellery retailer Zales had improperly classified its television advertising costs from 2004 to 2009. The misreporting algorithm was able to classify Zales as one of the most likely firms to have been involved in misreporting at that time, placing it at the 97th percentile across all firms examined in each year from 2005 onwards.

The primary measures that contributed to this were related to Zales' disclosures on "media and entertainment" and "digital technology and services", which were discussed far more than would be expected for a firm in their industry. When the researchers conducted a manual review of the textual disclosures picked up by their model, they found that these discussions were largely focused on marketing and advertising expenses.

Benefits for regulators and investors

According to Dr Crowley, regulators will be able to use the research findings to offer a better way to analyse companies' annual reports when looking for misreporting or compliance with accounting rules and regulations. "Like any algorithm in a complex setting, it will not tell them exactly which firms are misreporting, but it helps to better direct resources to investigate companies that are a higher risk," he said.

Investors, meanwhile, can use the algorithm to try to avoid companies that may be reporting misleading information. This is important as companies involved in more severe cases of misreporting are likely to experience a significant decline in their stock price.

Hard to game the system

One interesting feature of the algorithm is its ability to adapt as companies change what they discuss over time. As such, the types of discussion that are deemed by the algorithm to be relatively safe one year, may be deemed as reflecting an increased risk of misreporting in the next year, simply because companies have changed how they discuss various issues over the years.

Said Dr Crowley: The lack of stationarity means that a financial misreporting algorithm based on textual content will be much harder to game or circumvent than an algorithm based only on financial information."

Scan the QR Code to listen to the podcast on this topic

For more information on SMU research, visit *https://www.smu.edu.sg/research*