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Impact of geopolitical risks on the innovation activity of multinational corporations

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Abstract

As the core driver of competitiveness for multinational corporations (MNCs), technology innovation has become a key battlefield for determining future geopolitical games between regions. On the other hand, given that MNCs' innovation activities are increasingly dependent on international cooperation, geopolitical risks will also affect their innovation activities. However, the impact of geopolitical risks on MNCs' innovation activities is still unclear. This article cross-references data from MNCs around the world from 2013 to 2019 to study the magnitude of firm-level geopolitical risk exposure of MNCs from each triad region, using some recent geopolitical events to discuss the geopolitical risks that MNCs R&D activities around the world are liable to encounter in the near future. Finally, based on the above discussion, we will make some recommendations for MNCs on IP protection.

Keywords: geopolitical risk, innovation, MNC

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Impact of geopolitical risks on the innovation activity of multinational corporations

Introduction

Since the Russian-Ukrainian War began, Western countries have imposed various financial sanctions on Russia. As a countermeasure, Russia has challenged the current intellectual property protection system. On March 7, the Russian government promulgated Decree 299, according to which, if the patent-holding company is from an "unfriendly" country and its patents registered in Russia are used without authorization, the user is not required to give any compensation for the unauthorized use of the patent. Recently, the Russian government suddenly lifted the blockade of RUTRACKER, the once largest pirated resource website, which includes audio-visual work, games, software, and other products. Multinational companies (MNCs), especially technology-driven MNCs, protected by the current intellectual property protection system, have become the main victims.

The more MNCs gain from the host market in peacetime, the more vulnerable they are to geopolitical risks in wartime. At present, Russia has put 59 companies from Western countries, including Volkswagen, Apple, IBM, Microsoft, etc., on the "nationalization list". In addition, many medical companies have registered a large number of patents in Russia and are vulnerable to uncompensated technology transfers from the Russian government, although the latter has not yet taken any action in this regard. The impact of geopolitical risks on the innovation activities of MNCs in particular come from two dimensions. First, foreign MNCs face a higher likelihood of intellectual property infringement. Second, foreign MNCs register a cliff-like decline in their revenues in the host region in times of trouble, reducing their capacity to invest in R&D. The aims of this paper are twofold: first, by exploring the industrial structure of each triad region and the level of dependence of the most innovative MNCs in each regional market, we analyse the potential geopolitical risks faced by MNCs globally, as well as the extent of risk exposure. Second, based on the results of data analysis and the complex international situation, we also put forward some ideas that can help prevent and protect MNCs against geopolitical risks by way of some practical cases. The dataset used in this article is based on the R&D investment ranking, annually released in the EU Industrial R&D Investment Scoreboard by Bureau Van Dijk since 2004 (Hernandez et al., 2017). The EU Industrial R&D Investment Scoreboard (hereafter the Scoreboard) compiles company-level data from the 2500 MNCs that make the largest investments in R&D in the world (European commission, 2022). These MNCs invested in approximately 90% of the world's business-funded R&D. To select and rank the top R&D spenders, the Scoreboard counts the R&D financed by a given MNC from its own funds, regardless of where the R&D activity takes place. It consolidates data at corporate group level, i.e., including all subsidiaries, while excluding R&D financed by third parties such as governments or other companies. It also excludes a given company's share of any associated company or joint venture R&D investment, which is listed separately. Economic activities are classified according to the ICB classification (Industry Classification Benchmark), based on the ICB 4-digit level (119 industries) or the ICB 3-digit level (82 industries). The Scoreboard data have previously been used in a series of academic publications on corporate R&D and innovation (e.g., Cincera & Ravet, 2010; Cincera & Veugelers, 2014; Coad, 2019; García-Manjóna & Romero-Merino, 2012; Montresor & Vezzani, 2015).

Panorama of R&D Investment across the Triad Regions

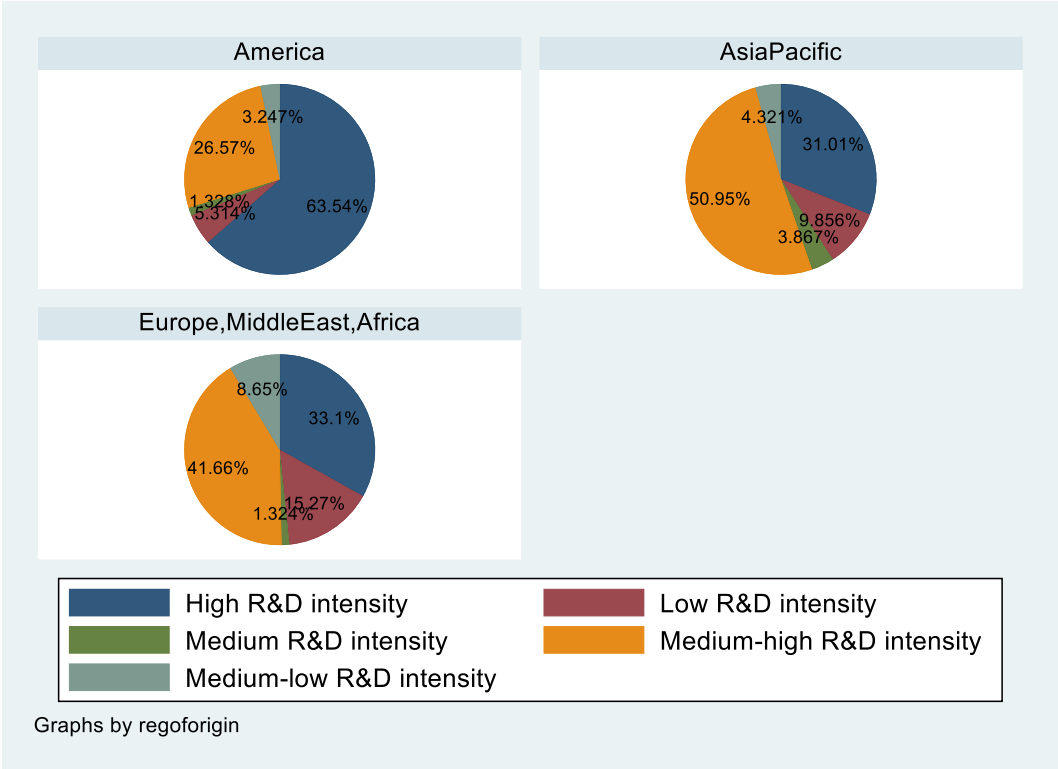
OECD has introduced a taxonomy that includes five industrial groups differentiated according to their level of R&D intensity- high, medium-high, medium, medium-low, and low R&D intensive categories (OECD, 2017). The OECD created a classification to summarize the presentation of a number of innovation-related industrial level statistics, including skilled labour force, patents, innovation expenditures, and knowledge-based capital.

As can be seen from Figure 1, most of the MNCs included in our sample are classified as active in high or medium-high R&D intensive industries. In comparison with MNCs in the Americas and Asia-Pacific regions, MNCs from Europe, the Middle East and Africa (EMEA) are proportionally more active in low R&D industries, and intensive and medium low R&D intensive sectors, including food & beverage, banks, general retailers, financial services, construction materials, oil producers, mining, chemicals, alternative energy, etc. The R&D intensity gap between companies in Europe and the US and Asia Pacific is mainly due to the dependence of their economic structure on traditional industries, differences in their company demographics (European companies are generally older, but smaller), and EU economy policy. Europe's economic structure and corporate demographics prevent the liberation of resources from old industries into new high-tech ones (van Ark et al., 2008; Cardona et al., 2013; Kumbhakar et al., 2012; Cettè et al., 2015). Moreover, the government's economic policies provide insufficient support for emerging industries (Voigt and Moncada Paternò-Castello, 2012).

In order to investigate the respective R&D investment levels of companies in the three regions, we calculated the average R&D intensity level of companies in each region. From Figure 2, we can see that companies in all three regions have increasingly invested in R&D since 2014. Before 2019, US companies' investment in R&D was much higher than that of Asia Pacific and EMEA companies. By 2020, however, the level of R&D investment of EMEA companies was as high as that of America, and much higher than that of Asia-Pacific companies. However, combined with Figure 1, since EMEA MNCs are more concentrated in low and medium-low R&D intensive industries, the transformation from R&D investment to innovation performance is weaker than that of American MNCs.

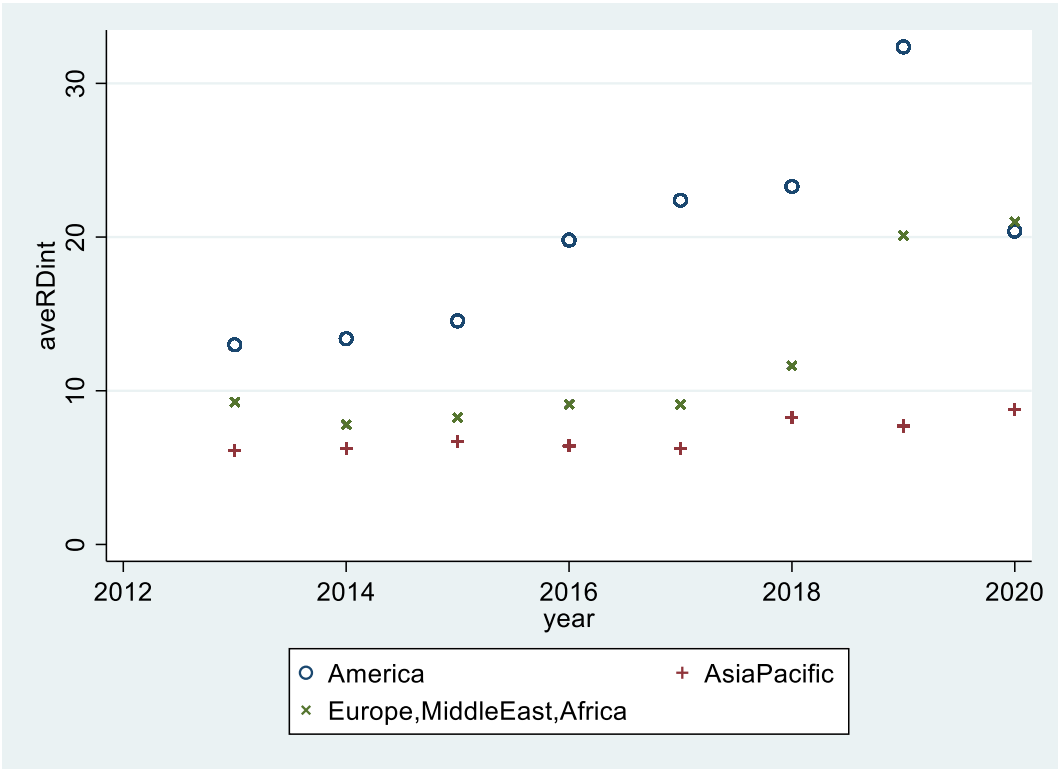
Since 2015, the R&D investment growth of American and EMEA companies has been substantial, especially for EMEA companies, while the growth of R&D investment of Asia-Pacific companies has been relatively flat. This also shows that innovation, as the core competitiveness factor in EMEA and American companies, plays an increasingly important role in industry competition. The focus of the current competitive strategy of Asian companies is still the integration of the global value chain, which is, however, mainly concentrated in the supply chain of the following industries, General industrials, Industrial engineering, Support services, Electronic & Electrical Equipment, Automobiles & Parts, Chemicals, Travel & Leisure, Health Care Equipment & Services, Household Goods & Home Construction, and Personal goods.

Figure 1. R&D intensity-based industry classification of MNCs in the triad regions



Note: The percentage in the figure is the ratio of the number of high R&D intensive, medium-high R&D intensive, medium R&D intensive, medium-low R&D intensive, and low R&D intensive MNCs in each triad region to the total number of MNCs in the region. This way of classifying industries was developed by the OECD.

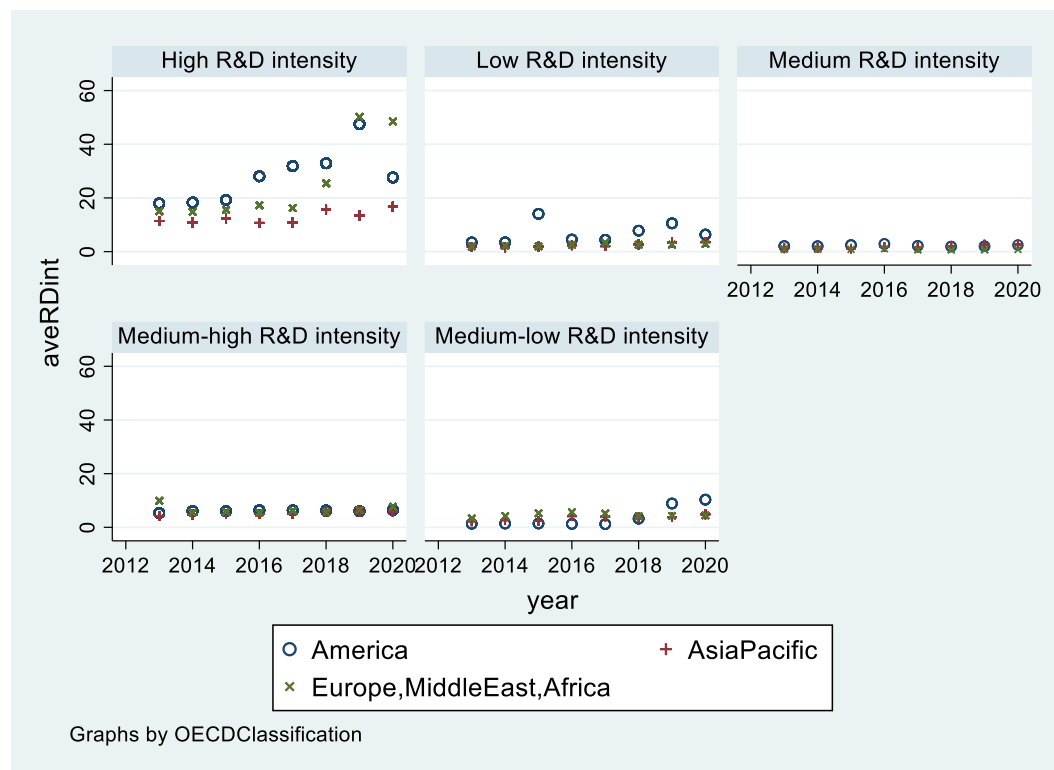
Figure 2. Average R&D intensity of MNCs in the triad regions



Technological Breakthrough & Blowout of R&D Investment

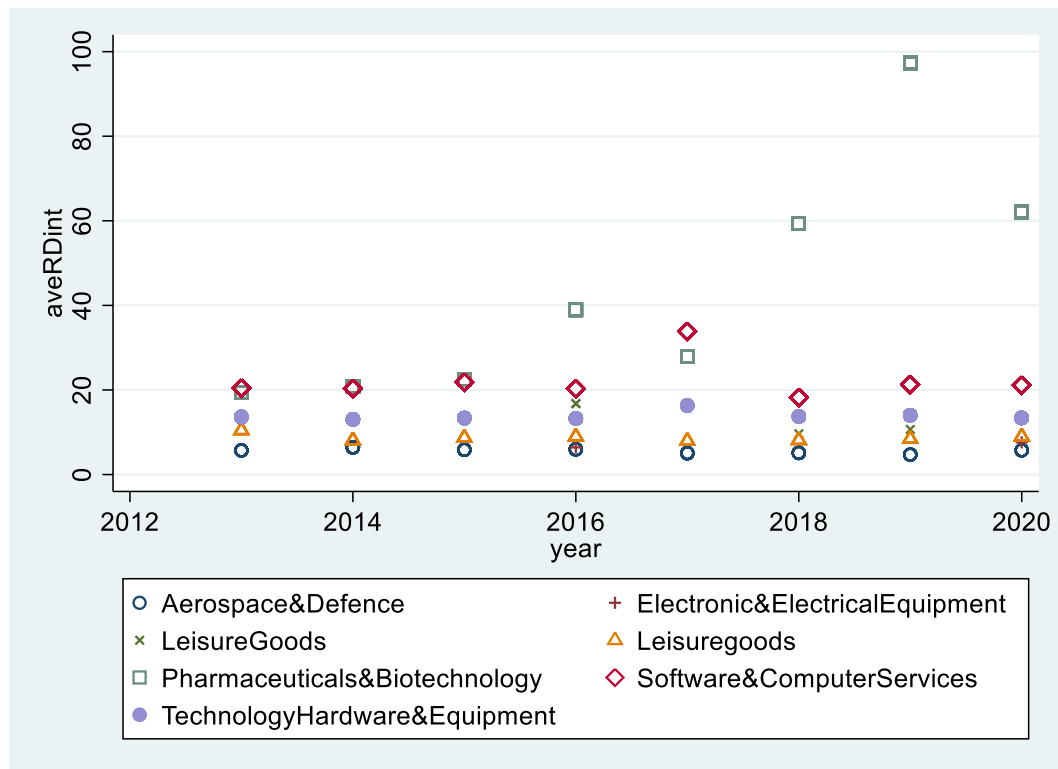
From Figure 3, we can see that, except for the high R&D intensity industries, the R&D investment levels of MNCs from the Asia-Pacific region, EMEA, and the Americas are already similar to other industries. In high R&D intensity sectors, the R&D investment gap between EMEA companies and Asia-Pacific companies has widened since 2018. Before 2018, the difference in R&D investment between Europe and the Asia-Pacific region was not large, but since 2019, the gap has become wider, while the R&D level of EMEA companies has been similar to that of American companies.

Figure 3. R&D intensities of different categories in the triad regions



As high R&D intensive sectors with the most intense competition in innovative activities, R&D investment in the pharmaceutical industry has grown far more in recent years than that of other high R&D intensive companies (Figure 4). 2019 was especially notable as pharmaceutical companies even invested all their revenue in R&D activities. This sector is followed by the software & computer services industry, whose R&D expenditure has always accounted for 20% to 40% of total revenues. This is related to recent technological breakthroughs, such as big data, block chain around 2017, and the CRISPR technology in 2020, which won the Nobel Prize, requiring firms in related industries to invest considerable sums to convert technological achievements into commercial products.

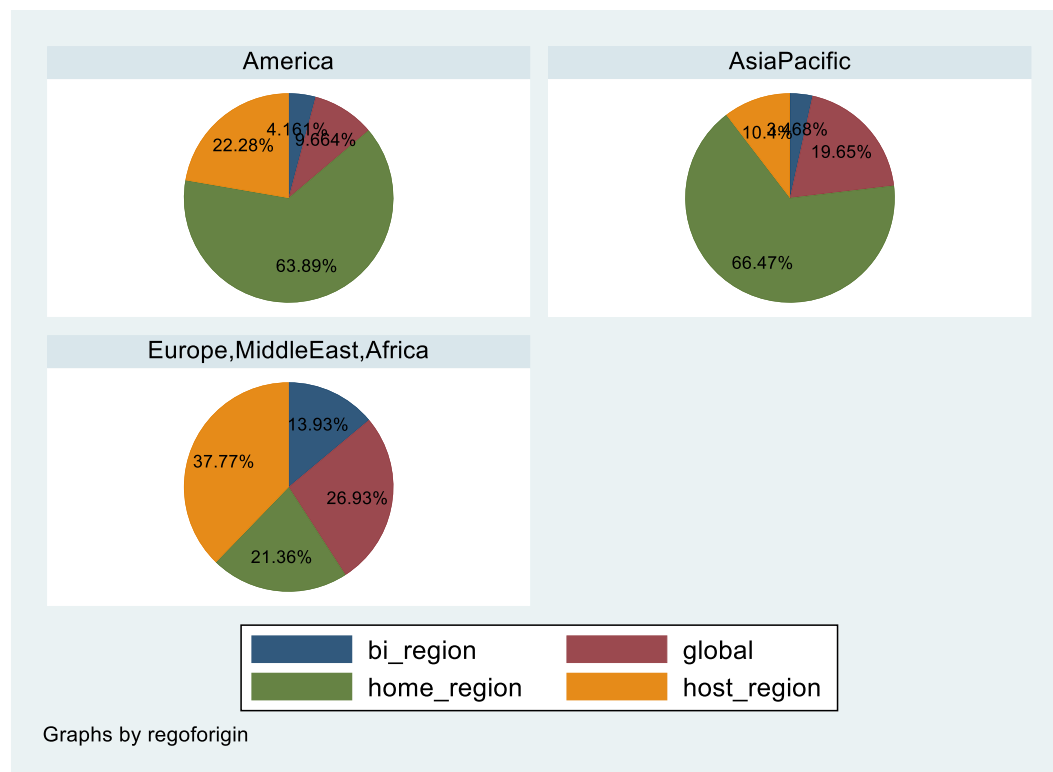
Figure 4. R&D investment in high R&D intensity industries over time



In general, except for a few high technology reliant industries, EMEA companies account for a smaller proportion of high R&D intensive industries compared to American and APAC MNCs. However, EMEA companies still have a large share of high R&D intensive industries and R&D investment. The R&D spending of companies in EMEA is much higher than that of companies from Asia Pacific. These companies have large numbers of patents and other intellectual properties around the world. When MNCs encounter geopolitical events, these IPs are at risk of being frozen or transferred. During the Russian-Ukrainian war, many pharmaceutical and software companies from the United States, Europe, and Japan face the risk of their Russia-registered patents being frozen.

Geopolitical Risks & IP in host regions

Figure 5. Globalization status of MNCs in high intensive industries



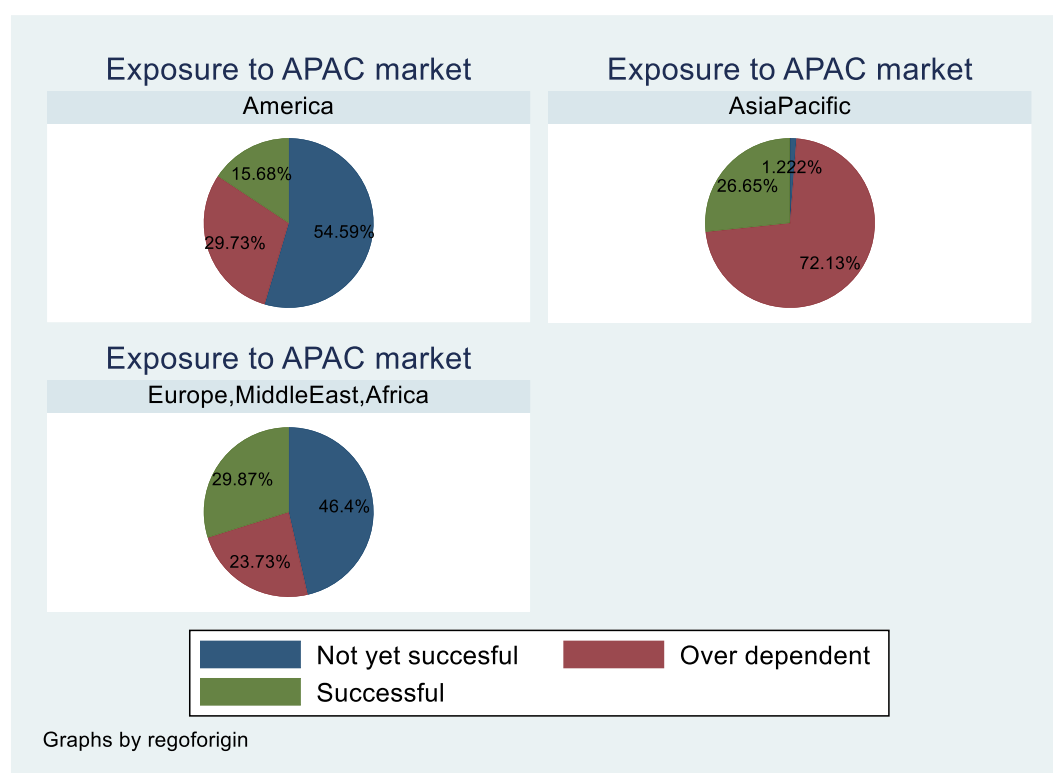
Previous empirical studies have shown that the higher the exposure of MNCs to host regional markets, the higher the geopolitical risks the company faces (Astvansh, Deng & Habib, 2022). To explore geopolitical risks, we can measure the proportion of MNC revenue in the host regional market to total revenue as a firm-level proximation of the geopolitical risk faced by MNCs. We began with the triad classification methodology proposed by Rugman and Verbeke (2004) and Arregle et al. (2009). The Triad perspective has been widely used when exploring globalization issues, as each triad represents a different cultural and institutional context. In Rugman and Verbeke (2004), the triad is defined around trade agreements: NAFTA, the EU, and ASEAN, as the vast majority of trade is done in these areas. In line with Rugman and Verbeke (2004), we divide corporate globalization strategies into four categories based on their geographic revenue distribution: home-regional, host-regional, bi-regional, and global.

As shown in Figure 5, in the high R&D intensity industry, only 21.36% of the EMEA company MNCs are home regional firms. In particular, the proportion of host regional and global firms is very high compared to that of MNCs from Asia-Pacific and the Americas. Generally speaking, MNCs are least exposed to geopolitical shocks in their home region. Host-regional and bi-regional MNCs are highly affected by other forms of institutional uncertainty due to their dependence on the host regional market. Consequently, EMEA companies face higher host region or cross-regional political risks than US and Asia-Pacific companies.

If we look at the way MNCs in each region are connected to the Asia-Pacific region, and also consider the institutional voids concerning intellectual property protection in this region and the urgent need of Asia-Pacific companies for advanced technologies, the risk of R&D misappropriation in Asia-Pacific is considered by many scholars as the highest among the three regions.

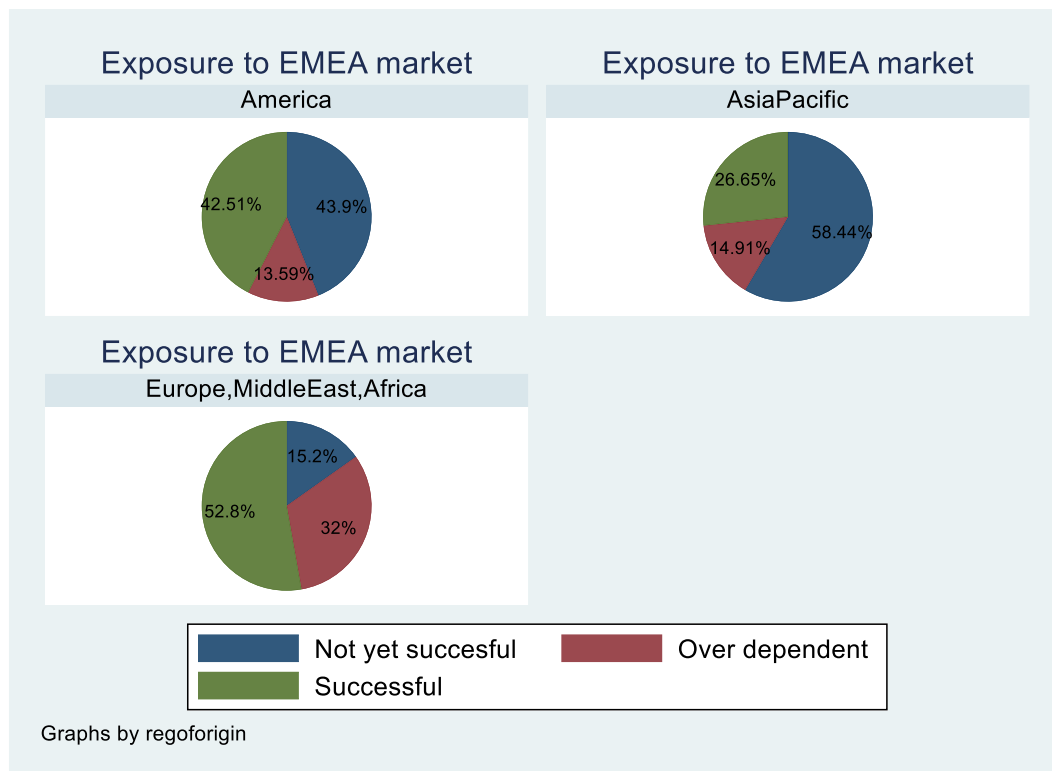
As shown in Figure 6, we see that 29.73% and 23.73% of MNCs in the Americas and Europe are over-dependent on the Asia-Pacific market (over 50% of their revenues are generated in APAC). In contrast, 29.87% of EMEA companies have achieved commercial success in the Asia-Pacific region (at least 20% of their sales are generated in this region). Geopolitical risks could put companies at risk of losing their industry status or even going bankrupt after being kicked out of the region. When a company succeeds in the region, it faces the risk of technology transfer in exchange for staying in the regional market. Generally speaking, EMEA companies face the highest risk of R&D misappropriation, while also facing high degree of geopolitical risk. On the other hand, from past experience, when EMEA and American high-tech companies enter the emerging market in the APAC region, the local government often takes a series of administrative measures to promote the transfer of technology from multinational companies to local companies, thereby promoting the competitiveness of domestic technology development (Cannice, Roger & Daniels, 2004).

Figure 6. Exposure of high R&D intensive MNCs to the APAC region



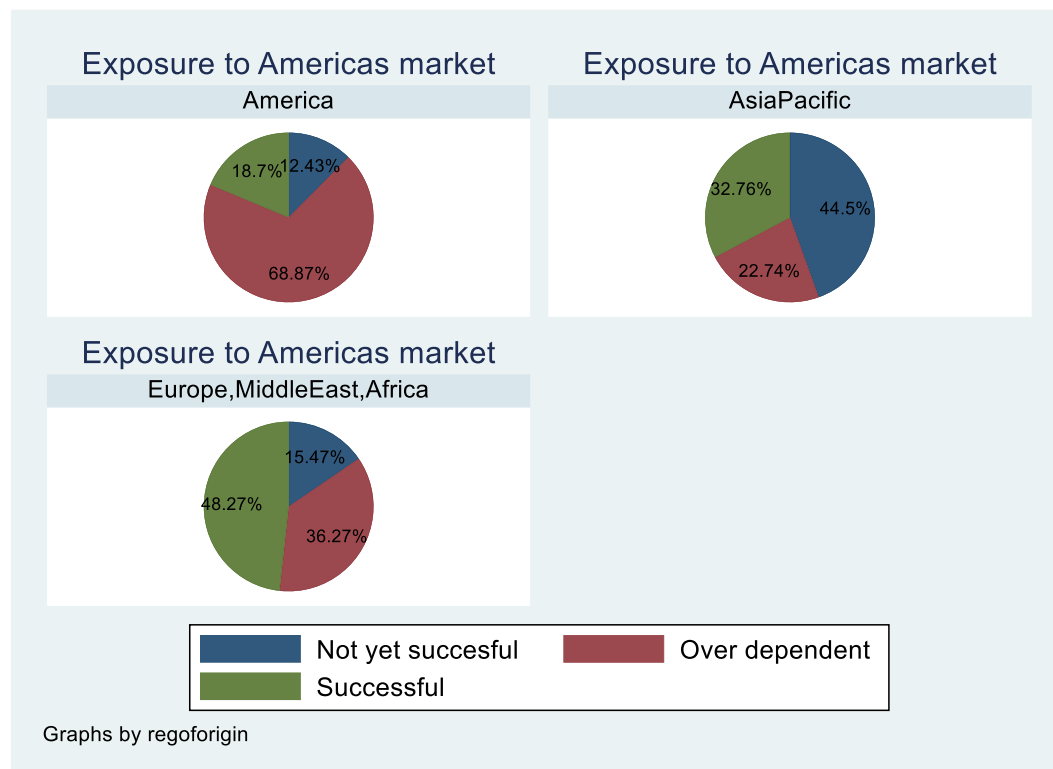
As can be seen from Figure 7, only 32% of EMEA companies mainly rely on the home regional market. At the same time, the dependence of US and Asian companies on the EMEA market is relatively low compared to the other two regional markets.

Figure 7. Exposure of high R&D intensive MNCs to the EMEA region



In Figure 8, we can see that both Europe and Asia are highly dependent on the US market. 22.74% of Asian companies and 36.27% of EMEA companies are overly dependent on the US market (50% of the total revenue comes from the US). 68.87% of American domestic companies are overly dependent on the home regional market. The attractiveness of the US market for MNCs is multifaceted, including scale of consumption and accessibility to advanced technologies.

Figure 8. Exposure of high R&D intensive MNCs to the Americas region



In addition to the aforementioned technology transfer issues in emerging markets, MNCs also face the threat of geopolitical risks in developed markets such as Europe and the United States. Since the outbreak of the US-China trade war, global trade has been severely impacted, and the global supply chain has also faced significant restructuring pressure. Self-reliance is now likely to be a mainstream trend for both China and the United States in the foreseeable future. In this political current, the US government is increasingly moving toward local protectionism. Another outcome of the trade war is the shift in the world's personal value orientation brought about by the change in political winds. EMEA and American consumers are increasingly inclined to take personal values into consideration when choosing brands and products. For example, in the Xinjiang cotton incident in 2020, the Swedish fashion company H&M was accused by the NGO BCI of including cotton produced in Xinjiang, China, in its supply chain, despite the forced labour issue there. Subsequently, the United States passed the *Uyghur Forced Labor Prevention Act*, which prohibited the export of Xinjiang cotton products to the United States. Then, after H&M announced that it would quit using Xinjiang cotton, the brand faced a massive boycott in China. In recent years, with Western consumers' growing awareness of consumer values and corporate responsibility, more and more consumers choose brands and products according to the values represented by the company. And increasingly prominent values and political conflicts between regions are making MNCs walk an increasingly fine line.

H&M, which was boycotted by Chinese consumers amid the labour right controversy in Xinjiang, suffered a huge decline in sales. Since the Russian-Ukrainian war, more than 400 MNCs, including McDonald, have abandoned the Russian market. And Russia is apparently not willing to dispose of the assets left behind by these companies in accordance with international law. Putin has already ordered the seizure of assets of companies that left Russia in March and has allowed Russian companies to claim their intellectual property with zero compensation for companies from "unfriendly countries". The impact of geopolitical risks on the innovation capabilities of multinational companies mainly stem from their repercussions on an organization's financial constraints. When a multinational company's business activities in a country or region are suddenly interrupted, or its assets are seized,

the company will face considerable financial constraints, thereby reducing its potential to invest in R&D.

Reflections on geopolitics and technological transfer risk for MNCs

Regarding ways to deal with the technology transfer risks that MNCs are exposed to in host regional institutions, we can learn some lessons from the experience of industries we mentioned earlier that are most likely to experience globalization (Coeurderoy, Duplat & Yang, 2021). For example, a wave of technological innovations centred on data processing and wireless communications has disrupted the automotive industry in recent years. In a bid to solve the environmental issues linked to carbon fuels, the development of electric vehicles has also become a major trend. Automobile companies including Volkswagen, Mercedes-Benz and BMW are investing heavily in research and development for electric vehicles, driving systems, and digital connectivity. However, the core technology research and development of these companies is concentrated in the home country. The R&D centres located in host countries or host regions are only responsible for research and development in certain peripheral areas or tacit know-how. For example, the BMW R&D centre in China is responsible for studying local traffic laws and digital connections to mobile apps in China. Application of these peripheral technologies is dependent on headquarter-controlled technologies, so the value of technology transfers to potential usurpers, and the incentive to misappropriate is considerably reduced. In 2021, for example, most of Volkswagen's patents were registered in Germany. BMW has a global footprint of R&D centres in all three regions, but the R&D centres in China and the United States mainly study traffic-related laws. Research and development for core technologies remains in Germany. Mercedes-Benz has production facilities in Europe, North and South America, Asia, and Africa, but the company's core R&D strategy, the development and production of electric vehicles, remains in Germany.

The COVID-19 outbreak exposed some long-standing issues in the medical industry, including unequal distribution of medical resources and insufficient R&D investment. The ensuing digital transformation that swept the entire industry not only addresses existing problems, but has also led to new globalization trends. On the one hand, MNCs continue to seek resource integration and consolidation of their market position on a global scale. On the other hand, the COVID-19 crisis ignited nationalist and protective tendencies due to supply chain issues in China that have continued since the beginning of the pandemic. Thus, MNCs are more inclined to keep their main competitive assets in the safer domestic market, while looking for a loose coupling between core competitive advantages and overseas assets (Nambisan & Luo, 2022).

Philips Healthcare provides an example of how this novel model can work (Nambisan & Luo, 2022). The company has set up partnerships with many organizations in international markets, but it adopted different forms of partnership in the developed markets and the emerging markets. After creating a digital platform called HealthSuite, the company used the platform to enter long-term innovation partnerships with healthcare providers and technology companies that need to share platform-specific assets. For example, it entered a partnership with Validic to provide consumer-generated data from wearables and health apps, which is integrated and analysed with electronic medical records and other clinical data sources in HealthSuite. In South Korea, Philips partnered with Samsung to integrate the latter's Artik Smart IoT Platform with HealthSuite and to create interoperable, connected health solutions, such as advanced health analytics.

In contrast, Philips adopted a narrower scope of innovation collaboration with local players in China due to the high technology transfer risks. The company opened an R&D centre in Shanghai as a digital innovation hub, but its collaboration with local Chinese companies

mainly involves sharing digital infrastructure rather than developing new products (Nambisan & Luo, 2022). Philips Healthcare has entered a partnership with Huawei, for instance, to deploy products that use the Huawei Cloud AI platform. It has also partnered with Baidu, Alibaba, Tuya, and Tencent to use their digital infrastructure to expand Philips' product offerings in China. The products Philips sells in China rely on its R&D centres in other countries, but the R&D centres in China have no access to the company's patents or other IP assets.

Conclusion

In a peaceful world, all countries have an interest in multinationals being vectors of innovation diffusion, which can potentially even out the economic development of different regions. In this sense, technology transfers are powerful levers of harmony across the globe. However, the rise of geopolitical risks reminds us that technology can also be used as a significant lever of power between different states and regions. The presence of multinationals from another country in a given region can thus potentially induce a more or less conflictual battle for power between States. With the electroshock of the Russo-Ukrainian war, we find ourselves today and in the future at a crossroads. Should we move towards regional quotas on technological development and limit transfers in order to reduce exposure and the risks involved? But this would also mean accepting potential technological deficits (i.e., renouncing the benefits that other regions could bring). Should we instead let transfers seek out mutual benefits, even though this also means potentially being excessively exposed to abuses of power by certain countries outside the region. In this case, we are not far from a Catch22 situation.

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