

# “Growth Followed by a Pandemic: Patterns in Fourteen Major Stock Exchanges, from 2012 to 2021”

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**Abstract.** This paper analyzes fourteen major global exchanges during the period 2012 to 2021 in order to evaluate the impact of COVID-19 on previous growth as well as to ascertain the nature of changes in proportion of regional and size-based categories. The primary audience for this analysis are investors in mutual funds or index funds. Drawing on publicly available information from Yahoo! Finance and research in financial news, a variety of conclusions were drawn regarding the above question. Although generally the fourteen chosen stock indexes grew during 2012 to 2020 and shrank in 2021, certain indexes appeared more resilient than others, namely the Nikkei and Nasdaq indices, in weathering the impacts of the COVID-19 recession. Other indexes, such as the Johannesburg and the Swiss, saw their relatively large pre-COVID gains more than wiped out during 2021. Finally, several formerly leading regional exchanges, such as the Hong Kong Hang Seng, lost their formerly dominant regional position. Although COVID-19 caused great havoc in the markets, it appears that some of the relative “winners” of the pandemic might have been the result of strong external factors only partially related to their country’s overall handling of the pandemic.

**Keywords:** Stock Exchange; Stock Index; COVID-19; Pandemic; Investor.

## 1. Introduction

Prior to the COVID-19 Pandemic, global stock exchanges were generally growing across the world. The 2008 financial crisis in the United States had ended, and the major world economies were continuing to boom. However, beginning in 2020, the COVID-19 Pandemic began to cause major economic impacts. Due to a combination of pandemic restrictions, illness, and quarantine, many companies found it difficult to grow, or even remain stable, due to decreased consumer demand, supply chain issues, or even dramatic changes to their operations; this led to COVID-19 “devast[ing] some industries like leisure and hospitality.” As 2020 ended and 2021 began, it was clear the pandemic was continuing, and in some ways becoming worse. New, highly infectious variants such as the Delta variant, combined with inadequate vaccination numbers, caused many nations, such as the United States, to continue to experience economic difficulties.

Beyond affecting individual companies, the pandemic would also impact stock exchanges: as companies failed to make projections, investors became nervous about future prospects, leading to sell-offs, lower prices, and more cautious behavior. As different stocks would be affected by different circumstances, this paper will instead focus on the aggregate impact of the pandemic on fourteen major stock exchanges through discussing five different data-based questions. The intended audience for this analysis are large investors such as mutual funds or index funds, which rely on making safe, diversified, and long-term bets based on the overall growth of large collections of stocks or the entire index. Given the changes present between 2012 and 2021, especially with COVID-19, it is valuable information to understand better the changes in the markets in this time.

The fourteen exchanges were chosen to provide a cross-section of major exchanges in North America, Europe, Africa, East Asia, and India (Figure 1). They also represent a variety of types of exchanges, from large national exchanges such as NSEI, to industry-specific ones like IXIC and Blue-chip indexes such as GDAXI. Information for their performance 2012 to 2021 was taken from Yahoo! Finance. All figures are placed in the appendix at the end of this essay.

## 2. Overall Trends

In the period 2012-2021, the fourteen chosen exchanges all generally displayed a consistent pattern of growth from 2012 to 2020, with a fall in 2021, due to COVID-19. This is shown in Figure 2, which tracks the rise and fall of the exchanges' closing values for each year.

However, even with the same overall pattern, there are some interesting differences between the individual stock exchanges. Some exchanges experienced rapid growth during 2012 to 2020, in particular, the Johannesburg Stock Exchange in South Africa (J203.JO). It rose from 8 million in 2012 to around 13 to 14 million in the eight years from 2012 to 2020. However, its fall was equally dramatic: it plunged to 6.7 million in 2021, ending lower than it started. A second trend is seen in stock exchanges like the Canadian Stock Exchange (GSPTSE). It experienced small but consistent growth from 2012 to 2020, rising from 3 million to a height of 4.1 million in 2019. Unfortunately, it appears to also have been negatively affected by the global recession in 2021, and fell by nearly half its value.

Although many stock exchanges had a similar story to these two, a few other ones still managed to keep some of their growth between 2012 and 2020. N225, the Nikkei, or Japanese Stock Exchange, is one of these. Starting at 2.2 million in 2012, it rose to its highest point in 2020 at 5.5 million. Even though it dropped to a little under 3 million in 2021, this is still higher than it was in 2012. Overall, it appears that although 2021 represented a major loss in stock exchanges, not all stock exchanges were impacted equally as some of the exchanges managed to keep some of the gains from the 2012 to 2020 period.

## 3. Relative Regional Performance

The second question I investigated was whether for each regional group of stock exchanges, what was the relative performance of their major stock exchanges during 2012-2020, and did any stock exchanges become more dominant in their region. I wanted to better understand how each exchange behaved in relation to others in its region, as those would be the economies most closely tied together—for example, in North America, with NAFTA, the North American Free Trade Association being in operation until 2020, and then replaced that year with the USMCA, or the United States Mexico Canada Agreement, their economies were especially close. I divided the fourteen stock exchanges into a total of 4 regions: East Asian, Developing countries, European, and North America. Developing countries refers not to a region but to the similar economic position of India and South Africa compared to more developed nations like the United States, Germany, and Japan.

In East Asia there are a total of 6 indexes, they are 000001.SS, 399001.SZ, HSI, KS11, N225, and TWII (Figure 3). During 2012 to 2020, the big takeaway is that the Hang Seng Hong Kong (HSI) Stock Exchange experienced a relative contraction in size compared to the other exchanges. Initially in 2012, it was 40.4% of the combined size of the six exchanges. However, by 2020, it had become just 33%. Potentially this could be the result of general political conflict in the city due to its relationship with China, or just the better performance of other indexes. In contrast, the Japanese Nikkei index, N225, increased its relative share, expanding from 18.28% to 28.89, nearly surpassing the Hang Seng index. During these years, Japan experienced an economic recovery from its long economic difficulties from the 1990s during the long tenure of Shinzo Abe's government and his financial market friendly policy of "Abenomics."

What is most interesting about the two developing countries indexes, J203.JO and NSEI, is what the graph doesn't show (Figure 4). Despite the massive raw growth of the Johannesburg exchange from 2012 to 2020, the proportional growth of the National Stock Exchange of India was ultimately a little greater. Finally, there are three indexes in Europe: GDAXI, N100 and SSMI (Figure 5). The European stock exchanges tell a fairly simple story. Although all the indexes grew in raw values during 2012 to 2020, the German blue-chip index, GDAXI, expanded its relative dominance; by 2020, it was over half of the entire value of the major European exchange. This may reflect the long period

of stable German politics and economy under Angela Merkel's "sound stewardship," a parallel to what happened in East Asia.

Finally, North America has three indexes: GSPTSE, IXIC, and NYA (Figure 6). As previously mentioned, the Canadian GSPTSE experienced slow but steady growth, which resulted in its relative size shrinking, although it still maintained its position as the largest of the three exchanges during 2012 to 2020. Notably, the NASDAQ, IXIC, 's growth allowed it to grow from 12% of the North American Exchanges in 2012 to 26% in 2020. Given the increasing dominance of technology in all parts of our lives, the massive growth of NASDAQ makes sense—such as with tech stocks like Amazon, Google, Apple, and even newer companies like Netflix.

Thus, although an investor would have gained from 2012 to 2020 if they had invested in a mutual fund or index fund, certain indexes were more volatile and could potentially offer greater gains, such as the Johannesburg index, many of the other indexes with more stable growth combined with stronger proportionality like NASDAQ or NSEI might have been better bets in the longer term.

#### 4. Impact of COVID-19 on Exchanges, 2020-2021

The next question was to then go further and directly compare what the impact of COVID-19 was on stock exchanges in each regional group from 2020 to 2021, in particular whether the balance of stock exchanges in each group changed, and, if so, which stock exchanges were the most or the least impacted?" Overall, COVID-19 affected each regional stock exchange in a similar manner, as many exchanges lost from one-third to over one-half of their value. However, each region has a different story, with some experiencing changes in their order of value or proportion to one another.

In East Asia, the Hong Kong Stock Exchange (HSI) lost its position as the largest stock exchange, and was closely replaced by the Japanese Nikkei Exchange (N225), which suffered a smaller loss relative to HSI (Figure 7). In the stock exchanges in the developing countries, the massive losses in the Johannesburg Exchange (J203.JO) changed the ratio between it and the National Stock Exchange of India (NSEI). Previously in 2020, the ratio was 5 to 1. However, due to the generally less negative (but still pretty negative) impact of COVID-19 on smaller exchanges in 2021, the ratio became a little smaller, closer to 4.5 to 1 (Figure 8). Some of this could be attributable to the decreased demand for many types of manufactured goods during the Pandemic, which would result in decreased commodity prices. However, due to the greater diversification of the Indian economy, as well as its stronger tech and outsourcing/remote work industry, would allow it to weather the storm and rebound better than the Johannesburg index.

In Europe (Figure 9), the Swiss Stock Exchange (SSMI) was the hardest hit, falling 1.5 million, or 60% between 2020 and 2021. Although the German Blue Chips (GDAXI) were always the largest portion of the European exchanges, their relative portion increased, mostly due to the huge losses in the Swiss exchange (and the very small Pan-European blue Chips [N100]). Finally, in North America, the relative ranking of the three exchanges remained the same: GSPTSE, NYA, then IXIC (Figure 10). However, the difference between the three changed, as NASDAQ (IXIC) became a larger overall portion of the stock exchanges due to the large losses in the Canadian and New York Stock Exchanges. The new USMCA in 2020 might have also helped the IXIC, because of the previously mentioned intellectual property protections for tech companies in the new trade agreement for North America. Moreover, in the United States and other developed Western nations, the pandemic brought a massive increase in remote work and telecommunications, which would positively impact IXIC through "COVID-19 gave them an additional jolt."

Overall, COVID-19 affected each regional stock exchange in a similar manner, as many exchanges lost from one third to over one half of their value. However, each region has a different story, with some experiencing changes in their order of value. Ultimately, the size of an index did not seem to be good insurance against a major fall during the COVID-19. Individual features of the indexes likely played a more important factor in the extent of their damage from 2020 to 2021.

## 5. Largest and Smallest Exchanges

However, the largest of the exchanges might show unexpected resiliency, or perhaps reflect how a region maintained a stronger position in the global exchanges. Thus, my fourth question was to investigate whether for the largest stock exchanges from each of the four regional groups how did COVID-19 affected their overall share of the global stock exchange during 2020 to 2021.

In 2020, the Johannesburg Stock Exchange (J203.JO) was the largest stock exchange in the world, representing about one-third the total size of the 14 largest stock exchanges. However, in 2021, likely due to COVID-19 Pandemic restrictions, its value dropped to just 16% of the total—a dramatic cut in half. Although many of the stock exchanges around the world had similar drops, this one is especially noteworthy because of the raw amount of drop. It fell about 7 million, which is a larger amount than it ended up with in 2021 (Figure 11). For the other three indexes, the Hong Kong Exchange (HSI), the German blue Chips (GDAXI), and the Canadian Stock Exchange (GSPTSE) had a similarly difficult time with COVID-19. It seems regardless of the size of the exchange, the four largest all lost much of their overall dominance of the stock exchange total size.

Finally, for my last data question, I looked at the smallest exchanges. These exchanges, because of their smaller size or more niche focus, might have experienced the smallest overall impact, and thus could be a safer bet for an investor. During the 2020-2021 COVID-19 period, the order of value for the four smallest exchanges (NSEI, IXIC, KS11, and N100) remained the same. However, comparing the proportions of the exchanges tells a slightly different story. Between the two largest of these exchanges, IXIC and NSEI, the ratio changed from .92 to .94, as IXIC maintained a relatively larger percentage of its region than NSEI (Figure 12).

However, just as the largest exchange of the fourteen, the Johannesburg Exchange, had the greatest fall, interestingly here the smallest of all of the exchanges, the 100 pan-European blue chips, also shrunk significantly. The ratio between them and the NSEI used to be .09, but it became .08 in 2021. It seems that in many cases, the smaller of the exchanges managed to hold onto more value proportionally than those of their larger counterparts.

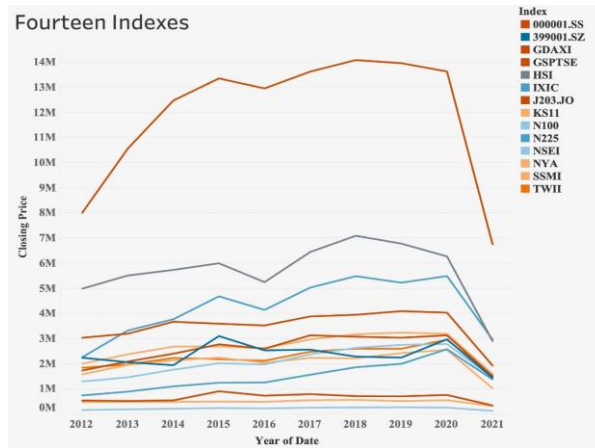
## 6. Conclusion

Ultimately, the data shown here tells a story of a strong global economy reflected in the growth in the major stock exchanges during the period 2012 to 2020. Unfortunately, with the onset of COVID-19 and the major economic contraction that came from the pandemic restrictions and logistics nightmares, all of the exchanges fell. However, they did not fall in the same way, as several exchanges, such as the Nikkei N225, NASDAQ, and the National Stock Exchange of India all kept some of their growth from the 2012 to 2020 period and either maintained or improved their relative positions within their regions. This shows how even within generally bullish or bearish markets, some markets may be more resilient during difficult economic times. This can be helpful to an investor for mutual or index funds, as even during COVID-19 in 2021, it could be possible for an investor in a stock exchange like the Nikkei N225 to end in a more positive situation than they started in 2012—not all economic downturns cause every investor to lose.

## 7. Appendix

**Table 1.** Description of the Fourteen Stock Exchanges

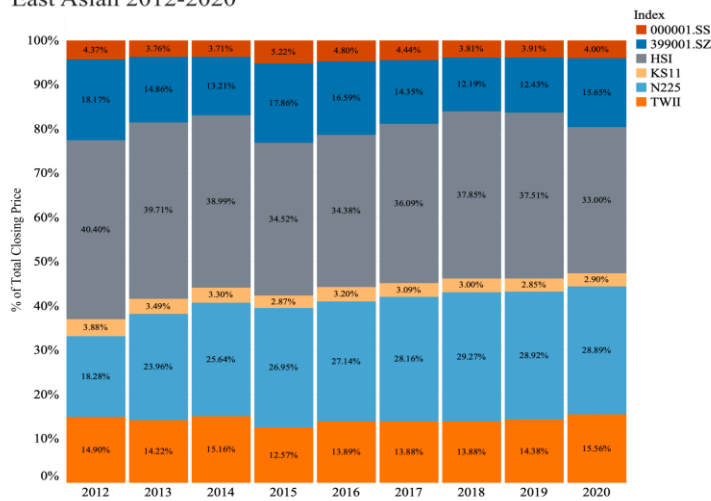
Name of Exchange	Ticker Symbol	Location	Description
Shanghai Stock Exchange	000001.SS	Shanghai, China	This is one of the two major stock exchanges for mainland China. Shanghai, like New York for the United States, is the financial capital of China.
Shenzhen Index	399001.SZ	Shenzhen, China	399001.SZ is an index of 500 stocks that are traded at the Shenzhen Stock Exchange, also in China. The Shenzhen stock exchange has many companies that are closely connected to the Chinese government.
DAX Performance Index	GDAXI	Frankfurt, Germany	GDAXI is an index of 40 blue chip German firms from the Frankfurt Stock Exchange, in Germany. Germany is a major economic power in the European Union and is both technologically and industrially developed
S&P/TSX Composite Index	GSPTSE	Toronto, Canada	The Canadian economy is similar to the United States economy but has many more raw resources like oil and lumber.
Hang Seng Index	HSI	Hong Kong, China	Although Hong Kong was a British colony and then became part of China, its economy is still in many ways separate from that of China.
NASDAQ Composite Index	IXIC	New York, USA	NASDAQ is composed of technology companies from Silicon Valley and elsewhere, like Apple, Microsoft, Google, and Amazon.
Johannesburg Stock Exchange	J203.JO	Johannesburg, South Africa	South Africa is a major economy in Africa due to its resources, relative political stability, and large population. Many other companies around Africa list on this exchange.
KOSPI Index	KS11	Seoul, South Korea	The Korean economy has grown greatly in the last decades as its largest companies like Samsung and Hyundai gain more power in their markets. Recently Korean culture has become very popular as an export, like KPOP.
Euronext 100 Index	N100	Amsterdam, EU [The Netherlands]	Although the Euronext is a larger index, the N100 is, like the S&P 500, a highly regarded index of the strongest stocks in the exchange.
Nikkei 225	N225	Tokyo, Japan	The Japanese economy is one of the largest in the world, despite the country's small size. This is because of its powerful cultural and technological industries and influence.
National Stock Exchange of India	NSEI	Mumbai, India	India has one of the largest populations on earth and also a very large technology and engineering sector. However, it also has a huge gap in class, and many parts of the country are less developed than the larger cities.
New York Stock Exchange	NYA	New York, USA	This is perhaps one of the most famous stock exchanges, and is the oldest in the United States. It is sometimes referred to as the "Dow Jones."
Swiss Market Index	SSMI	[Zurich], Switzerland	Switzerland has long been famous for its financial markets and banks as well as political and economic stability.
Taiwan Weighted Index	TWII	Taipei, Taiwan	Taiwan, an island off the coast of mainland China, has long been in a difficult political situation. Taiwan in recent years has gained a growing technology industry especially in microchips.



Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 1.** Yingzhi Ma; Source *Yahoo!* Finance (2021)

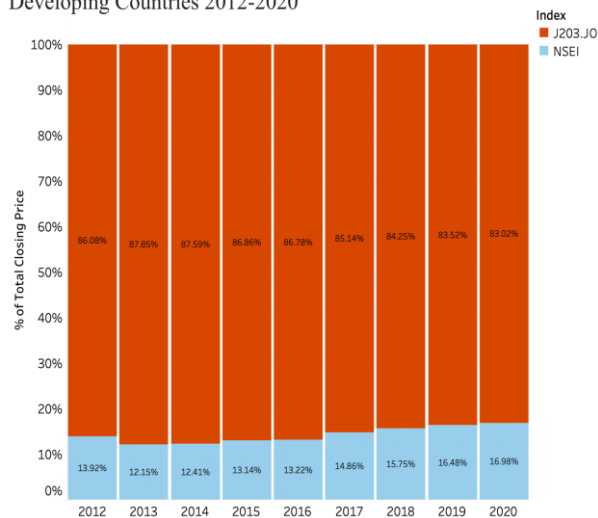
East Asian 2012-2020



Yingzhi Ma: Source: Yahoo Finance (2021)

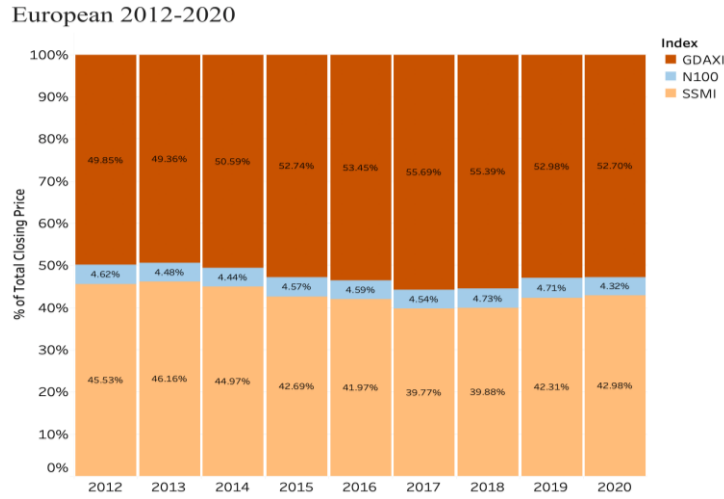
**Figure 2.** Yingzhi Ma; Source *Yahoo!* Finance (2021)

Developing Countries 2012-2020



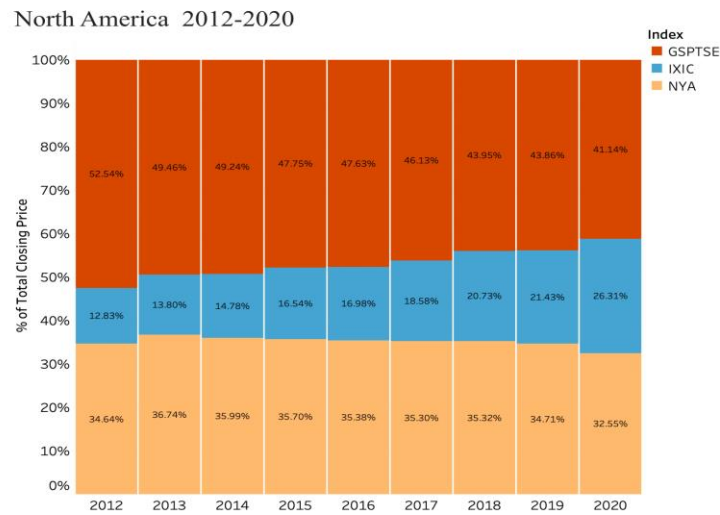
Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 3.** Developing Countries 2012-2020



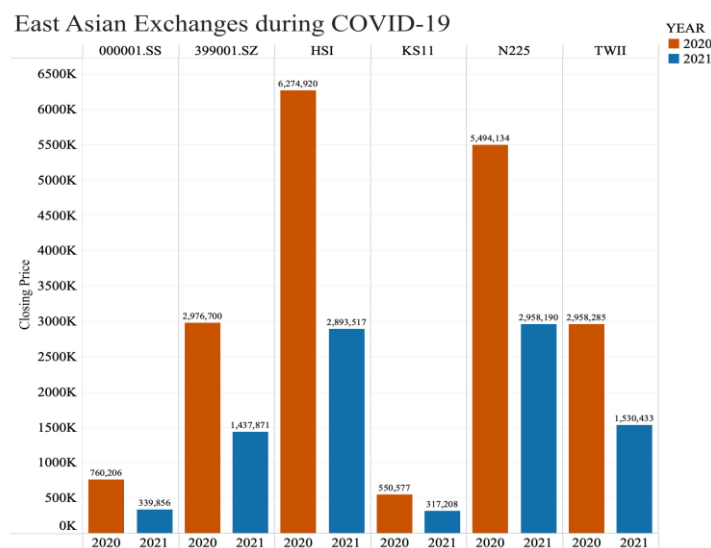
Yingzhi Ma: Source: Yahoo Finance (2021)

Figure 4. European 2012-2020



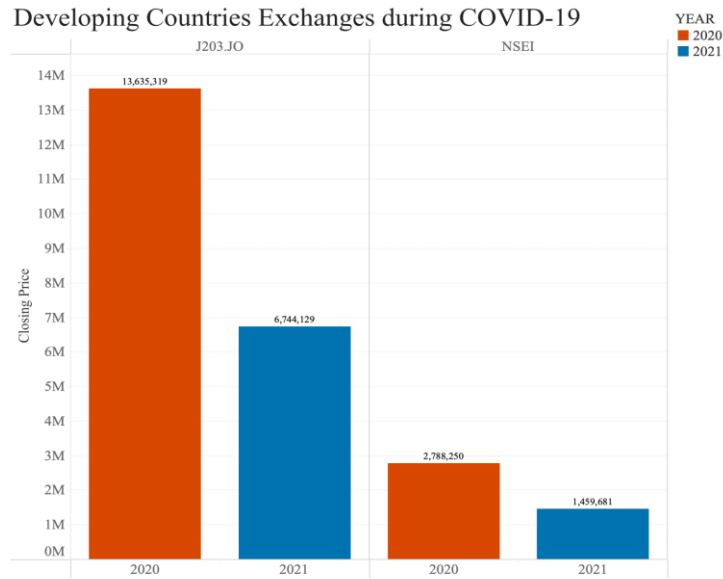
Yingzhi Ma: Source: Yahoo Finance (2021)

Figure 5. North America 2012-2020



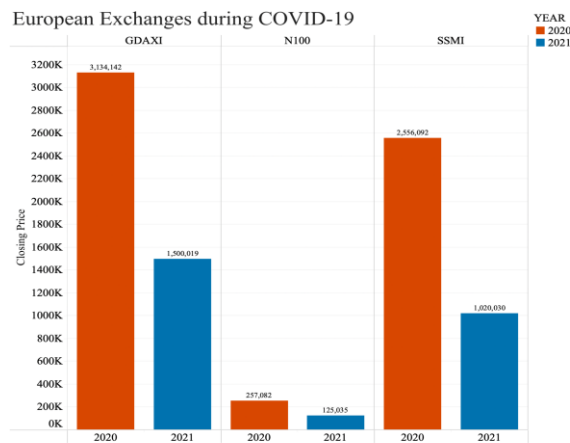
Yingzhi Ma: Source: Yahoo Finance (2021)

Figure 6. East Asian Exchanges during COVID-19



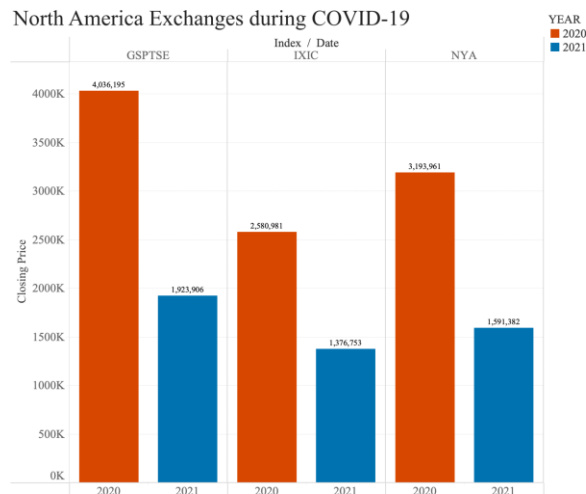
Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 7.** Developing Countries Exchanges during COVID-19



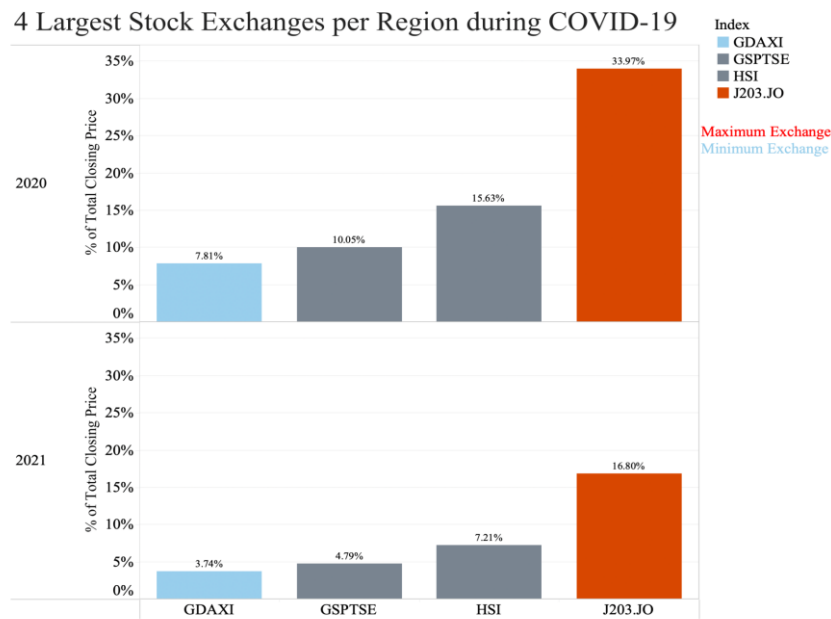
Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 8.** European Exchanges during COVID-19



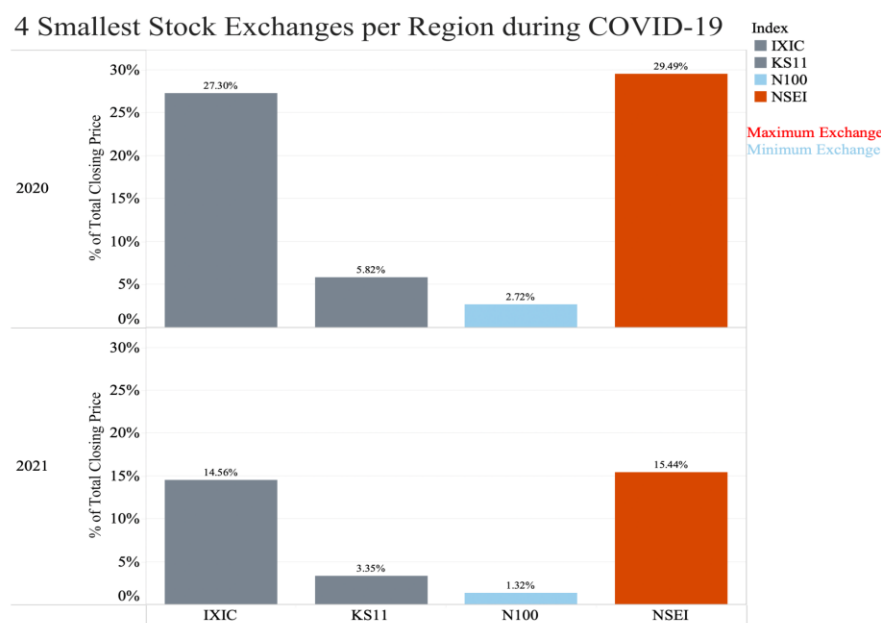
Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 9.** North America Exchanges during COVID-19



Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 10.** 4 Largest Stock Exchanges per Region during COVID-19



Yingzhi Ma: Source: Yahoo Finance (2021)

**Figure 11.** 4 Smallest Stock Exchanges per Region during COVID-19

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