

The Impact of COVID-19 on Developed & Emerging Capital Markets: A Comparative Study

تأثير COVID-19 على أسواق رأس المال المتطورة والناشئة: دراسة مقارنة

by

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Abstract

Undoubtedly, the outbreak of COVID-19 pandemic has had extensive and severe effects among sectors, including financial markets. Therefore, the purpose of this study is to examine the impact of COVID-19 crisis on developed and emerging capital markets. More specifically, the study compares the impact of COVID-19 on developed and emerging capital markets and shows which markets are most impacted by coronavirus. Based on MSCI market classification framework, all developed and emerging markets are selected and examined from the date of announcing COVID-19 as a pandemic on March 11, 2020 until August 31, 2020 and analyses daily returns, markets turnover, trading volumes, P/E ratios, markets earning and markets volatility using EGARCH of the selected indices. The study employs various statistical techniques to carry out the analysis. In addition, the study examines the circumstances and the reasons behind markets performance and discusses whether the performance is fairly justified or not, by checking the performance of each market and comparing it with the markets' earnings. The findings show that developed and emerging markets have responded to COVID-19 in a similar way especially in terms of closing prices, where prices have declined at the beginning of the pandemic, then markets have recovered within a short period of time. Similarly, markets witnessed drop in trading turnover and volume, while their levels have not recovered up to the level prior to the pandemic, just few high hits in turnover and volume levels in few days during the pandemic.

Keywords: COVID-19, coronavirus, pandemic, capital markets, financial markets, P/E ratio, market earnings, EGARCH.

ملخص

مما لا شك فيه، أن تفشي وباء فايروس كورونا المستجد كان له آثار شديدة وواسعة النطاق بين القطاعات، بما في ذلك أسواق رأس المال. وبشكل أكثر تحديداً فإن الغرض من هذه الدراسة هو دراسة تأثير أزمة فايروس كورونا على أسواق رأس المال المتقدمة والناشئة استناداً إلى تصنيف MSCI.

تناقش الأطروحة مقارنة الأسواق المالية الأكثر تأثراً بأزمة فايروس كورونا في الفترة ما بين اعتبار الفايروس وباء في الحادي عشر من آذار لسنة ٢٠٢٠ إلى الواحد والثلاثين من أغسطس لسنة ٢٠٢٠. كما تحلل هذه الدراسة العوائد اليومية، ودوران رؤوس الأموال في الأسواق المالية، وأحجام التداول، ونسب السعر إلى العائد، وأرباح الأسواق، بالإضافة إلى تقلبات الأسواق للمؤشرات المختارة.

تستخدم الدراسة تقنيات إحصائية مختلفة لإجراء التحليل. بالإضافة إلى ذلك، تفحص الدراسة الظروف والأسباب الكامنة وراء أداء الأسواق وتناقش ما إذا كان الأداء مبرراً إلى حد ما أم لا، من خلال التحقق من أداء كل سوق ومقارنته مع أرباح الأسواق.

كما تم اختبار الإحصائيات لكل متغير، مثل المتوسط، والوسيط، والحد الأدنى، والحد الأقصى، والانحراف المعياري، والاختلافات بين اليوم السابق لإعلان الجائحة في العاشر من آذار لسنة ٢٠٢٠ والحد الأدنى للمتغيرات أثناء الجائحة، بالإضافة إلى الفرق بين الحد الأدنى والحد الأقصى للتعافي أثناء جائحة فايروس كورونا المستجد.

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Table of contents

Chapter 1: Introduction.....	1
1.1 Background.....	1
1.2 Significance of the study	2
1.3 Aim and objectives.....	3
1.4 Research questions:.....	4
1.5 Structure of the thesis:.....	4
Chapter 2: COVID-19: Background and Literature Review.....	5
2.1 Introduction	5
2.1.1 Key dates of COVID-19 outbreak.....	7
2.2 COVID-19 impact on social life	9
2.3 COVID-19 impact on economy	9
2.4 COVID-19 impact on inflation.....	12
2.5 COVID-19 impact on travel industry.....	13
2.6 COVID-19 impact on technology sector.....	15
2.7 COVID-19 impact on entertainment industry	16
2.8 COVID-19 impact on Gold	17
2.9 COVID-19 impact on Oil	18
2.10 Actions to enhance the economy	20
2.11 Exponential Generalized Autoregressive Conditional Heteroscedastic (EGARCH)	26
Chapter 3: Data and Methodology	29
3.1 Introduction	29
3.2 Markets Classification.....	30
3.2.1 Developed markets.....	32
3.2.2 Emerging markets:	32
3.3 Data.....	34
3.3.1 Definition of variables.....	34
Variable.....	34
Definition	34
Market indices	34
Turnover.....	34
Is the value of traded shares in million, and the value is in the country's currency, (Source: Bloomberg)	34
Volume.....	34

P/E ratio:	34
Earnings	34
3.3.2 Market Indices:	35
3.4 Empirical methodology	44
Chapter 4: Results and Discussion	47
4.1 Introduction	47
4.2 The impact of COVID-19 on developed and emerging markets.	48
4.2.1 Developed markets comparison between closing price on August 31, 2020 and the day prior to pandemic announcement on March 10, 2020.	48
4.2.2 Emerging markets comparison between closing price on August 31, 2020 and the day prior to pandemic announcement on March 10, 2020.	51
4.2.3 Actions taken by governments to enhance capital markets.	54
4.3 Markets closing prices summary statistics for the period March 11, 2020 - August 31, 2020.	54
4.3.1 Developed markets daily closing prices summary statistics	55
4.3.2 Emerging markets daily closing prices summary statistics	60
4.4 Markets turnover for the period March 11, 2020 - August 31, 2020	65
4.4.1 Developed markets turnover for the period March 11, 2020 - August 31, 2020	66
4.4.2 Emerging markets turnover for the period March 11, 2020 - August 31, 2020.	71
4.5 Trading volume for the period March 11, 2020 - August 31, 2020	75
4.5.1 Developed markets: Trading volume for the period March 11, 2020 - August 31, 2020.	76
4.5.2 Emerging markets: Trading volume for the period March 11, 2020 - August 31, 2020	80
4.6 P/E ratios & Earnings for the period March 11, 2020 - August 31, 2020	85
4.6.1 Developed markets: P/E ratio & Earnings for the period March 11, 2020 - August 31, 2020 ..	87
4.6.1.1 Developed markets P/E ratio for the period March 11, 2020 - August 31, 2020	87
4.6.1.2 Developed markets earnings for the period March 11, 2020 - August 31, 2020.	92
4.6.2 Emerging markets: P/E ratios & Earnings for the period March 11, 2020 - August 31, 2020 ..	95
4.6.2.1 Emerging markets P/E ratio for the period March 11, 2020 - August 31, 2020.	95
4.6.2.2 Emerging markets earning for the period March 11, 2020 - August 31, 2020.	100
4.7 EGARCH for the period March 11, 2020 - August 31, 2020	103
Chapter 5: Conclusion	105
5.1 Summary of the thesis	105
5.2 Summary of the findings.	106
5.3. Implications and recommendations	107
5.4. Limitations.	108
5.5 Future research.	108

References.....	109
Appendix	116

List of Figures

Figure 4.2.1: Developed Markets closing prices on August 31, 2020 comparing to closing prices on March 10, 2020.	50
Figure 4.2.2: Emerging Markets closing prices on August 31, 2020 comparing to closing prices on March 10, 2020.	53
Figure 4.3 : Example SP500 daily closing prices between March 11, 2020 and August 31, 2020	55
Figure 4.3.1A: Developed markets minimum closing price for the period March 11, 2020 - August 31, 2020	58
Figure 4.3.1B: Developed markets maximum recovery from minimum closing price for the period March 11, 2020 - August 31, 2020.....	59
Figure 4.3.2A: Emerging markets minimum closing price for the period March 11, 2020 - August 31, 2020.....	63
Figure 4.3.2B: Emerging markets maximum recovery from minimum closing price for the period March 11, 2020 - August 31, 2020.....	64
Figure 4.4: SP500 turnover for the period March 11, 2020 - August 31, 2020	65
Figure 4.4.1A: Developed markets minimum trading turnover for the period March 11, 2020 - August 31, 2020.....	69
Figure 4.4.1B: Developed markets maximum turnover percentage from minimum turnover for the period March 11, 2020 - August 31, 2020.....	70
Figure 4.4.2A: Emerging markets minimum trading turnover for the period March 11, 2020 - August 31, 2020.....	73
Figure 4.4.2B: Emerging markets maximum turnover percentage from minimum turnover between March 11, 2020 and August 31, 2020	74
Figure 4.5: SP500 volume for the period March 11, 2020 - August 31, 2020.....	75
Figure 4.5.1A: Developed markets minimum volume for the period March 11, 2020 - August 31, 2020.....	78
Figure 4.5.1B: Developed markets maximum volume percentage from minimum volume for the period March 11, 2020 - August 31, 2020.....	79
Figure 4.5.2A: Emerging markets minimum volume for the period March 11, 2020 - August 31, 2020. .	83
Figure 4.5.2B: Emerging markets maximum volume percentage from minimum volume for the period March 11, 2020 - August 31, 2020.....	84
Figure 4.6A: Example SP500 P/E ratio for the period March 11, 2020 - August 31, 2020.....	86
Figure 4.6B: Example SP500 earnings for the period March 11, 2020 - August 31, 2020	86
Figure 4.6.1.1A : Developed markets average P/E ratio for the period March 11, 2020 - August 31, 2020	90
Figure 4.6.1.1B: Developed markets maximum P/E ratio percentage to minimum P/E ratio for the period March 11, 2020 - August 31, 2020.....	91
Figure 4.6.1.2: Developed markets minimum earnings between March 11, 2020 and August 31, 2020 ...	94
Figure 4.6.2.1A : Emerging markets average P/E ratio for the period March 11, 2020 - August 31, 2020.....	98
Figure 4.6.2.1B: Emerging markets maximum P/E ratio to minimum P/E ratio for the period March 11, 2020 - August 31, 2020	99
Figure 4.6.2.2: Emerging markets minimum earnings for the period March 11, 2020 - August 31, 2020	102

List of Tables

Table 2.1.1 Key dates of COVID-19 outbreak.....	7
Table 3.1: Capital markets classification	30
Table 3.2: Capital markets classification by region	31
Table 4.2.1: COVID-19 impact on developed market as of August 31, 2020	49
Table 4.2.2: COVID-19 impact on emerging market as of August 31, 2020.	52
Table 4.3.1: Summary statistics: Developed markets closing prices for the period March 11, 2020 - August 31, 2020.	57
Table 4.3.2: Summary statistics: Emerging markets closing prices for the period March 11, 2020 - August 31, 2020.	61
Table 4.4.1: Summary statistics: Developed markets turnover for the period March 11, 2020 - August 31, 2020, 2020	68
Table 4.4.2: Summary statistics: Emerging markets turnover for the period March 11, 2020 - August 31, 2020.....	72
Table4.5.1: Summary statistics: Developed markets volume for the period March 11, 2020 - August 31, 2020.....	77
Table 4.5.2: Summary statistics: Emerging markets volume for the period March 11, 2020 - August 31, 2020.....	81
Table 4.6.1.1: Summary statistics: Developed markets P/E ratios for the period March 11, 2020 - August 31, 2020, 2020.....	89
Table 4.6.1.2: Summary statistics: Developed markets earning for the period March 11, 2020 - August 31, 2020, 2020.....	92
Table 4.6.2.1: Summary statistics: Emerging markets P/E ratio for the period March 11, 2020 - August 31, 2020	96
Table 4.6.2.2: Summary statistics: Emerging markets earning for the period March 11, 2020 - August 31, 2020.....	100
Table 4.7: Developed and Emerging markets EGARCH	104

Abbreviations

BoJ: the Bank of Japan

BVC: Bolsa de Valores de Colombia

CAPM: Capital Asset Pricing Model

CoVs: Coronaviruses

CPI: Consumer Price Index

ECB: European Central Bank

EGARCH: Exponential Generalized Autoregressive Conditional Heteroscedastic

EME: Emerging Market Economy

ETFs: Exchange -Traded Funds

FED: Federal Reserve

GDP: Gross Domestic Product

IATA: International Air Transport Association

IEA: The International Energy Agency

IFC: International Finance Corporation

ILO: International Labour Organization

IMF: International Monetary Fund

KFW: Kreditanstalt für Wiederaufbau

MERS-CoV: Middle East respiratory syndrome

MSCI: Morgan Stanley Capital International

OAG: Official Airline Guide

OECD: Economic Co-operation and Development

OPEC: Organization of the Petroleum Exporting Countries

p.a: per annum

P/E: Price to Earnings

PBoC: People's Bank of China

PHEIC: Public Health Emergency of International Concern

PPI: Producer Price Index

QE: Quantitative Easing

SARS-CoV: Severe acute respiratory syndrome

SMEs: Small and Medium sized Enterprises

UNCTAD: United Nations Conference on Trade and Development

UNESCO: United Nations Educational, Scientific and Cultural Organization

UNWTO: World Tourism Organization

WB: World Bank

WHO: World Health Organization

WTI: West Texas Intermediate

WTTC: World Travel & Tourism Council

Chapter 1: Introduction

1.1 Background

COVID-19, **CO** stands for the first two letters of **CO**rona, **VI** the first two letters of **VI**rus and the **D** stands for **D**isease, the number 19 represents the year 2019 when the virus was found. Also, the disease was referred initially as “2019-nCoV” or “2019 novel coronavirus” (Unicef, WHO & IFRC 2020).

On December 31, 2020 , 27 cases of unknown decease were reported in Wuhan, the most populated city in central China with over 11 million population , the symptoms of the new virus were cough, fever , dyspnea, and on imaging a bilateral lung infiltrates appear, and in some cases vomiting and diarrhea, the symptoms my cause kidney injury and other critical symptoms. In the absence of effective antiviral treatment and vaccine, treatments were randomized. However, treatments focus on controlling fever using paracetamol and expectorants to control cough (Sohrabi et al. 2020).

Medical status keeps changing on hourly basis during COVID-19, and those changes have a direct impact on all sectors. The widespread of corona virus has forced the governments to take firm actions by constraining people to isolate and stay home, in addition to travel bans and grouping restrictions, those measurements have impacted the economy negatively. Wyplosz (2020) discussed the top ten hardest economical hits as of March 5, 2020, the hits’ strength was almost the same on the largest ten economies. Mainly, The US, Japan, UK, Germany, Italy, France, and China had the hardest hits. Those countries are the world’s 60% supply and demand Gross Domestic Product (GDP), 65% manufacturing, and 41% manufacturing exports, if those

main economies sneeze, the rest of the world will get sick. The economic shock as well as medical shock has impacted all sectors and affected countries' GDP. Simply, workers who were sickbed were not producing, and were not contributing to the economy. Nevertheless, they paused utilizing goods and services. In addition, quarantines, lockdowns, and travel restrictions have impacted negatively the whole economic cycle.

Several diseases before COVID-19 have attacked the humanity in the 20th and 21st centuries, those diseases are Spanish Influenza in 1918, Asian flu/ H2N2 in 1957, and Hong Kong flu in 1968. On the 21st century, the diseases infected the civilization were SARS in 2002, N1H1/bird flu in 2009, MERS in 2012, and Ebola in 2013-2014, those diseases have had a lot of lives, and they have impacted the economies and financial markets.

This study examines the impact of COVID-19 on developed and emerging markets. In particular, the study examines the impact on trading activity, trading turnover, trading volume, and trading volatility among the markets. In addition, this paper focuses on markets P/E (Price to Earnings) ratios and markets earning.

1.2 Significance of the study

This study goes deeply behind markets closing prices and trading activities as well as overall markets' performance during the period from March 11, 2020 when COVID-19 was announced as a pandemic until August 31, 2020.

Capital markets were impacted directly by COVID-19 pandemic and responded to all news. In the beginning of the pandemic, markets have responded negatively and plunged to low levels, then governments announced supporting programs to the economy and financial markets. This study analyses all developed and emerging markets movement and trading activities, as well as

markets volatility. In addition, this paper analyses markets behavior and suggests P/E ratio to be an indicator during financial crisis to assess if markets are reflecting the real situation or not, because negative markets performance during such pandemic is an expected reaction, while this normal reaction did not stay for long, and markets recovered afterwards with positive returns in a truly short period of time.

1.3 Aim and objectives

The overall positive returns in most of capital markets does not make sense in such circumstances, such as lockdowns, quarantines, and travel bans., The new restrictions cannot result positive capital markets performance. The positive performance can be explained for few sectors, such as technology sector who facilitate working continuity from distance and online shopping for example and therefore logistic providers.

The aim of this paper is to find if the positive performance of capital markets is an actual performance or just artificial and virtual performance, and the study aims to explore the markets movement during the pandemic.

Moreover, the study attempts to accomplish two objectives. The first objective is to examine the summery statistics of daily trading indicators, such as markets daily closing price, markets turnover, and markets volume. In addition to spotting the low points of those factors and the highest recovery levels. The second objective is to highlight the components of markets P/E ratio, and analyze markets earning along with markets closing price, and investigate if rises in markets price is the only factor influenced the P/E ratios to increase during the pandemic.

1.4 Research questions:

The study contributes to the existing studies the circumstances of COVID-19 positive impact on most developed and emerging markets, and answers the question of why the un-logical positive response happened during the pandemic, and if this response is a result of economy pick up, or just pumping money in financial markets to shows positive markets return. In addition, this study answers the question, do markets recover at crises time or they keep making negative returns.

1.5 Structure of the thesis:

Chapter 1 discusses the background of the research and highlights the research aim and objectives, it moreover highlights the research questions. Chapter 2 is the literature review and discusses previous studies related to the same topic. Chapter 3 talks about the methodology utilized. Chapter 4 discusses the results of the study in multiple sub sections. Chapter 5 is the last chapter and summarizes thesis and findings, in addition to study recommendations and limitations, along with suggested future studies.

Chapter 2: COVID-19: Background and Literature Review

2.1 Introduction

This chapter is divided into two parts. The first part will provide a background on the COVID-19 and the second part will review the relevant literature on the impact of COVID-19 pandemic on social and economic activities.

Coronaviruses (CoVs) are a collection of viruses that can infect humans as well as animals. Viruses infection symptoms on animals do not differ from humans, it can be respiratory, digestive, cold fever and liver systems (Sharma & Kaur 2020).

CoVs is categorized by scientists as one of the viruses family causes range of symptoms on humans such as normal cold for some people as well as serious diseases similar to Middle East respiratory syndrome (MERS-CoV) and Severe acute respiratory syndrome (SARS-CoV) symptoms, the new strain of viruses started in China in 2019, they could not identify the new virus in the beginning and how to treat it. The word pandemic is derived from “Pandemos”, it is a Greek word means global epidemic. An epidemic refers to a disease affects smaller area. Hence pandemic is the highest level of emergency from a disease threatens humans’ health in multiple regions across the world. Declaring a pandemic is followed by multiple consequences affecting several sectors and humans behavior around the world such as social dimensions, political and economic effects (Açıkgöz & Günay 2020).

Pandemic declaration has been announced previously for other diseases. In the last two centuries, the world has challenged four pandemics, Spanish Flu A(H1N1), Asian Flu A(H2N2), Hong

Kong Flu A(H3N2) and swine flu, those pandemics happened on 1918, 1957, 1968 and 2009 respectively (Açikgöz & Günay 2020).

On March 11, 2020, World Health Organization (WHO) officially declared COVID-19 as a pandemic due to the widespread all over the world and the severity of the virus, the announcement was following the first alert on January 30, 2020 (He et al. 2020).

When WHO declared Public Health Emergency of International Concern (PHEIC) status in China. The virus ravages several countries, and the largest number of cases were in the United States of America, Republic of China, South Korea, Italy, Spain, France, Japan, and Germany. On March 27, 2020 the confirmed cases have exceeded 500,000 and continued to rise in more than 170 countries with majority of the cases in the US (Zhang, Hu & Ji 2020). By April 11, 2020, more than 1.7 million got infected in 210 countries and death cases were over 102,000 (Venkatachary et al. 2020).

On December 31, 2019, several viral pneumonia cases were reported in Wuhan the capital of Hubei province Al-Awadhi et al. (2020) in the center of China with population in excess to 11 million, and all cases were linked to seafood wholesale market, this market trades fish in addition to other animals like bats, snakes and marmots, the reported cases were suffering from dry cough, fever, dyspnea and bilateral lung infiltrates (Sohrabi et al. 2020). In the meantime, Chinese were preparing for the new year, and they used to travel across the cities passing by Wuhan due to its geographical location which makes the city one of the main transportation hubs in China He et al. (2020), the disease started spreading silently across the country, three cases were reported outside Wuhan on January 19, 2020, two of them in Beijing and one case in Guangdong. In conjunction with the first death on January 11, 2020, the Chinese authorities

imposed full quarantine by closing borders and large cities, in addition to restricting people from leaving their home. On January 23, 2020 ferry, metro, buses and all long distance transportation in Wuhan were suspended (He et al. 2020). This is to limit the spread of the virus, and those containment measures have reduced the number of new infections and flattened the infection curve (Kraus et al. 2020) . Hence, most of the temporary hospitals built to host infected Chinese people were shut by March 2020 (Al-Awadhi et al. 2020).

2.1.1 Key dates of COVID-19 outbreak

The pandemic went through key dates since the outbreak, main dates were as follows:

Table 2.1.1 Key dates of COVID-19 outbreak

Date	Event	Source
December 1, 2019	The first case of coronavirus symptoms reported in Wuhan.	(Mhalla 2020)
Between December 8 and 18, 2019	Seven more cases were diagnosed, two of those cases were linked to the seafood wholesale market person of Wuhan.	(Mhalla 2020)
December 30, 2019	An ophthalmologist called Li Wenliang communicated to eight of his colleagues at Wuhan Central Hospital, by message that he found a mysterious disease, he suspected that this is the reappearance of SARS which killed 349 people in China between 2002 and 2003.	(Mhalla 2020)
December 31, 2019	Several cases of viral pneumonia were reported to WHO in Wuhan the capital of Hubei province in China, the cases reported were between December 12, 2019 and December 29, 2019. The virus was unknown at this stage.	(Corbet, Larkin & Lucey 2020)
January 1, 2020	Chinese authorities had closed seafood wholesale market because they suspected that the infection was spread from animals sold there.	(Corbet, Larkin & Lucey 2020)
January 5, 2020	China announced that this virus is not SARS or MERS.	(Corbet, Larkin & Lucey 2020)
January 7, 2020	The virus was identified by Chinese authorities as novel coronavirus and named initially by WHO as 2019-nCoV (Corbet, Larkin & Lucey 2020) & (Mhalla 2020) or SARS-CoV-2 (Sohrabi et al. 2020). On the same day, the first European case was reported in France.	(Venkatachary et al. 2020)
January 11, 2020	The first death of coronavirus was announced by the Wuhan Municipal Health Commission after 2 days of actual death of 61 years old man following respiratory failure.	(Corbet, Larkin & Lucey 2020)
January 13, 2020	Thailand authorities reported the first case of coronavirus by a Chinese arrived from Wuhan.	(Corbet, Larkin & Lucey 2020)
January 20, 2020	Virus started to spread in other countries, US confirmed the first case. In addition to other countries such as South Korea, Thailand and Japan. On this day, 300 cases were reported in Chania and 5 cases in other	(Mhalla 2020)

	countries, WHO found that the virus is transmissible between humans.	
January 23, 2020	Wuhan's twelve million inhabitants become under quarantine.	(Mhalla 2020)
January 30, 2020	2019-nCoV was declared as PHEIC by WHO (Corbet, Larkin & Lucey 2020) when infected cases exceeded 10,000 and 213 death case were reported.	(Mhalla 2020)
January 31, 2020	Italy reported two positive cases of Chinese tourists.	(Mhalla 2020)
February 2, 2020	the first death outside China was reported in Philippines.	(Mhalla 2020)
February 7, 2020	Doctor in China and informant Li Wenliang have died.	(Venkatachary et al. 2020)
February 11, 2020	WHO changed the name of the virus to COVID-19.	(Corbet, Larkin & Lucey 2020)
February 12, 2020	Japanese health ministry announced that 175 people got infected on Diamond Princess cruise.	(Mhalla 2020)
February 13, 2020	The second death outside China was reported in Japan.	(Mhalla 2020)
February 14, 2020	The first African case was reported in Egypt.	(Venkatachary et al. 2020)
February 15, 2020	The first death in France and Europe.	(Mhalla 2020)
February 16, 2020	The first death in Taiwan (Mhalla 2020).	February 16, 2020
February 18, 2020	The reported cases in China falls below 2000 since January 2020.	(Mhalla 2020)
February 22, 2020	Italy reported the first death.	(Mhalla 2020)
February 29, 2020	Twenty-two countries reported their first corona virus cases. South Korea had the highest number of confirmed cases and eleven municipalities in North Italy were placed under quarantine.	(Mhalla 2020)
March 2, 2020	All countries were infected and the total confirmed cases outside China exceeded 10,000.	(Mhalla 2020)
March 11, 2020	WHO announced that COVID-19 is a pandemic.	(Corbet, Larkin & Lucey 2020)

2.2 COVID-19 impact on social life

Following WHO announcement a pandemic of coronavirus disease, the governments around the world have instructed a strict measure to relieve its spread by ranging contact limitations up to full lockdown such as concerts, public events, marriages, public facilities, universities, and schools as well as closure of entertainment activities such as museums, cinemas, theatres and sport facilities. The limitations mandated health protection, by maintaining social distancing and wearing masks in essential businesses while non-essential businesses had to shut down completely implicating demand and supply issues, restaurants were allowed for food delivery or pickup without hosting customers in their premises (Kraus et al. 2020).

2.3 COVID-19 impact on economy

During COVID-19 pandemic, several non-pharmaceutical interventions impose have affected the economy negatively as a result of demand and supply shock as same as previous pandemics consequences, this is because consumers reduce non-essential spending on travel and entertainment as an example, this direction causes layoffs in those sectors as a result of society's reducing overall spending. Hence, supply of goods will remain on shelves and manufacturing sectors are forced to shut down. On the other hand, healthcare industry has benefitted from the crisis due to increase in demand (Kraus et al. 2020).

China, the highest population country in the world with 1.4 billion residents and the second biggest economy in the world with USD 13.6 trillion GDP has been suffering from COVID-19 ferocious battle since December 2019, China's economy was devastated in the first quarter 2020. Economic Co-operation and Development (OECD) announced that the prospect of China's

growth has been slumped from 6.1% in 2019 to below 5% this year 2020, this negative growth will spillover to all countries as China's cruciality comes from the high levels of demand and supply. Therefore, the global economic growth is expected to fall from 2.9% in 2019 to 2.4% in 2020, and might fall to 1.5% level (Açıkgöz & Günay 2020).

Another detailed study by Venkatachary et al. (2020) discussed OECD announcement in 2020 of the percentage change from November 2019 to March end 2020, OECD predicted that China, India, Japan, Indonesia, and Korea as major economies in Asia will be impacted and the variation would be around -0.9%, India's economy will slow down by -0.98% and will have stable growth afterwards, the overview about Germany, Canada, United Kingdom, Japan, China and USA economies is pessimistic and expecting radical slowdown, with positive view for Canada, Germany, Italy and France in growth stability. The report also expected US, Europe, and China economies to shrink by 6%, 6.6% and 1.2% respectively. In case if the pandemic subsides in the second half of 2020, and 5.8% is expected in economy growth.

International Labour Organization (ILO) announced that the jobs loss because of COVID-19 economic crises is expected to be between 5.3 million and 24.7 million, meaning that the income will deteriorate between USD 860 billion and USD 3.4 trillion by the end of 2020. In March 2020, more than 6.6 million unemployed Americans filed for unemployment claims. Hence, increasing the unemployment rate from 0.9% to 4.4% (Açıkgöz & Günay 2020), those expectations are confirmed by Kraus et al. (2020), in one month, 22 million people were made redundant in the US, and unemployment rate was doubled in Australia. However, in Switzerland the effect was more merciful, 29% of the employees were on short-term furlough.

Kraus et al. (2020) held online and telephone interviews during the peak of COVID-19 pandemic between March 26, 2020 and April 10, 2020 with CEOs and COOs of several family firms in different sectors in 5 Western European countries and found that all firms are affected by COVID-19 equally regardless the differences in timing. However, some differences were noticed between small and large family firms, such as liquidity which was more essential for large family firms. Following the analysis of 27 interviews, five topics are focused on. Firstly, *Safeguarding liquidity*, is a key issue discussed in 25 interviews and was more important for large firms, some of the firms were able to manage their liquidity so far, and other companies have started working on reducing their fixed costs such as rents and banking liabilities cost, in addition to the employees' support by finding possible ways to decrease fixed costs. On the other hand, a company in a financial sector expressed their ability to survive in prolonged crisis because they are well prepared and having enough liquidity, while other firms are postponing or cutting back their investments. Secondly, *Safeguarding operations*, business continuity is the main target of the interviewed firms, many firms allowed working from home with precautions and social distancing measures, when teams were split into two shifts, and by creating a free space. Also, meeting points were closed such as pantries and meeting rooms and converting them into offices. In addition, most of the family firms have supported their employees by establishing their home offices and purchasing laptops, computer screens and smartphones. Also, companies have established crisis management team, so competencies can be distributed to the employees. This situation was not possible for industrial and hospitality sectors. Thirdly, *Safeguarding communication*, interaction between employees, customers and vendors is important to continue, although social distancing measures are applied, employees are worried of the disease and its implications on their families, and also worried about the continuity of their firms. Due to

governments' intervention and travelling limitation, customers are contacted online through digital world. However, the way of interaction is difficult or not possible to take place for new clients. Fourthly, *Business models* adjustments help the firms to continue being successful during the crisis, for example one of the companies has taken an advantage of the large space in their premises to store and sell toilet papers, another company has digitalized their workshops. Most of the interviewed firms are directing their focus on digital meetings and try to find new business models concentrating on long term sustainability and reducing risk. In Italy, six of seven firms were just monitoring the situation and waiting it to improve within the next 3 months before doing any changes in their models. A group of seven companies were not planning for any changes and to push thorough COVID-19 crisis. Lastly, *Cultural change* is one of the major points raised in the interviews, this point is divided into two subcategories, the first one is the synergy created between employees and suppliers and the second one is the tendency towards digitization.

2.4 COVID-19 impact on inflation

The volatility in demand and supply puts inflation under pressure towards the downside. Due to food inflation, China's Consumer Price Index (CPI) has risen by 5.2%, while the Producer Price Index (PPI) has dropped by 0.3% due to deterioration in raw material prices (Açıkgöz & Günay 2020). US consumers' objective was to increase their groceries spending and non-food children products during March 2020 and reduce spending on other products, United Nations Conference on Trade and Development (UNCTAD) estimated 37% decline in overall prices. United Nations Educational, Scientific and Cultural Organization (UNESCO) monitoring has discussed the impact on education sector following the closure of more than 160 countries, over 91% of student's population got involved due to the fact that their parents have lost their jobs or had

wages cut. In the short term, production will have harmful impact, while the human capital is going to worsen in the long run. Therefore, the world's economic development is at risk (Açikgöz & Günay 2020).

Zhang, Hu & Ji (2020) expected the same in their paper, they see that the full quarantine will be striking the economy directly in the short term, and unemployment and businesses collapse is threatening so many sectors in the long-term.

2.5 COVID-19 impact on travel industry

Yan et al. (2020) discussed the preventive lockdown measures taken by countries, travel bans and stay home orders implemented, this quarantine has cancelled universities spring break on March 2020, and the cancelation of usual annual travel was either due to travel bans or people elected not to travel. Therefore, booking cancellations impacted directly and instantly the online travel platforms such as Expedia and Booking.com. Hence, the commission of those bookings are lost. The same situation with hotels, those cancellations left the rooms unoccupied suffering from the same destiny. In addition, not travelling means that people will not be using public transportation such as buses, trains, cruises, and planes, because the virus moves in the air and infecting people around. Hence, World Tourism Organization (UNWTO) announced that tourism sector is one of the most sectors got hit by Covid-19 in both demand and supply sides This situation made the flight bookings to America dropped by 63.2%, and from China to the world has fallen by 56% from the last year's same period. Chinese tourists are about 10% of the globe's tourists, and the drop of outbound tourists from China will definitely shocks many countries negatively (Açikgöz & Günay 2020).

According to Açıkgöz & Günay (2020), World Travel & Tourism Council (WTTC) weight 10.4% of the global GDP comes from tourism business and 10% of the global employment, expecting 20% to 30% falling in international tourists which will be translated to loss between USD 300 to 450 billion, costing airlines USD 252 billion as estimated by International Air Transport Association (IATA) with 44% drop in revenues.

China is the third largest aviation market following the US and UK as of December 2019. A month later and during the first stage of the pandemic, China's rating dropped to 25th place. Many flights were cancelled as well as airports worldwide, in numbers China lost 1.4 million seats in less than a month starting from the week of January 20, 2020. According to Official Airline Guide (OAG) the most three countries in Asia got impacted by coronavirus pandemic were Japan, Thailand, because of the drop in Chinese tourist and thirdly was South Korea, the drops were in the range of 69% to 76% between January 2020 and February 2020. On the other hand, other Asian countries were impacted as well in four weeks' time, Indonesia, Singapore, Hong Kong (SAR) China, and the United States, they lost -92%, -89%, 80% and -86% respectively from their capacity from January 20, 2020 to February 17, 2020, in addition to other countries. The damage in the travel sector is huge as millions of flying seats are missed, and billions of dollars are lost during the quarantine, the damage impacted airlines cashflow and revenues and deprived related sectors from working, such as hotels and retailers who work on tourists (Mhalla 2020).

On February 28, 2020, at financial market opening, the aviation companies have opened at plunge, Air France KLM -7.4%, Lufthansa -4.28% and EasyJet near -4%. The German airline announced hiring freeze and cost cutting measures and changing flight schedule to Asia was

already in place. Air France KLM decided to stop flying to China and giving away EUR 150 to 200 million from 2020 profit. Air New Zealand reported 34% drop in net profit on the first half of 2020, while Qantas the Australian airline announced that 18 of their aircrafts will not fly until end of May 2020 in addition to freezing recruitments and imposing 30,000 employees to use their annual leave, the expected losses could be about USD 98 million dollars (Mhalla 2020).

2.6 COVID-19 impact on technology sector

According to Yan et al. (2020), technology sector is divided into two portions, companies that manufacture hardware and companies produce software. The companies who deal with hardware will be harmed more due to factories and stores' shutdown, as an example Apple sells phones and computers to consumers, and the parts of those products are manufactured in several countries, mostly assembled in China. With globally shutting down predict that Apple will be affected, and their revenue will plunge, because Apple customers will not be stepping in to Apple stores. Therefore, 31% of Apple's income as of 2019 numbers will get hit. Another example is Tesla, the company will not be able to manufacture new models. Hence, disappointing the investors who evaluate the company highly at 189.78X, while automotive industry is evaluated at P/E 20.88X and minicomputers sector at P/E 7.57X. China production has dropped 13.5% beginning 2020 from 2019 end. However, March 2020 shows lower declining in production represented by 1.8% only, which means that Chinese production has started to recover. Similar trend with American manufacturing production, which declined by 6.6%. Considering China as an indicator, American production should recover by May or after.

The COVID-19 widespread has had exceptional societal and financial impacts. The adaption of society to this verifiable occasion within the making all the negative weights that it consolidates,

has brought about in critical investigation, advancement and execution of different innovations and forms, numerous of which are likely to have long-term societal impacts. Manufacturing is one angle of society that has been affected by the COVID-19 widespread. In arrange to adjust to request shifts, manufacturing firms with get to adaptable, differing, and specialized hardware moved their generation center and technique. Collaborative attitudes have too expanded, with competitors constantly working together to meet a set objective, or different enterprises with complementary specialties collaborating to problem solving in a more effective way. Progressed manufacturing frameworks counting those that join mechanical technology are too being explored with recharged intrigued, due to their need of vulnerability to disturbance amid irresistible illness flare-ups. 3D printing particularly has illustrated its adaptability withing the generation of different items, and its capacity to bed utilized by expansive enterprises and person specialists alike. As fabricating adaptability, expanded collaboration, and joining of progressed fabricating technologies has been demonstrated to supply organizations with implies to adjust to extraordinary and changing circumstances, it is anticipated these imaginative approaches will be supported post widespread will the potential to affect the accessibility of careers, the rate of worldwide problem solving, and manufacturing forms for a more extensive extend of items (Zimmerling & Chen 2021).

2.7 COVID-19 impact on entertainment industry

The most entertainment sector will be hit following the outbreak of COVID-19 are theme parks, where so many people meet together at the same place. Disney theme park closure at Chinese Lunar new year have impacted negatively Disney's revenue which represents 34% of the

company's revenue, as well as Universal Corporate and The Walt Disney in the US which will have the same fate (Yan et al. 2020).

2.8 COVID-19 impact on Gold

Gold is known as “safe-haven investment” for investors when markets are volatile Yan et al. (2020), because the intrinsic value of gold, investors move to gold when currencies fluctuate. During SARS pandemic gold price has increased from 310 to 350. Therefore, buying gold is hedging strategy during markets instability. Yan et al. (2020) expect markets to volatile during COVID-19 pandemic and suggest to buy gold because gold returns is anti-correlated with market returns. Corbet, Larkin & Lucey (2020) agree that the correlation between Chinese markets and gold was negative before COVID-19 outbreak. However, gold correlation has grown to +0.347 with Shenzhen and +0.335 with Shanghai stock exchanges.

When expecting a negative impact on markets, investors move to gold as a safeguard, gold price increased when SP 500 fell at SARS pandemic, the same happened during 2008 financial crises, (Yan et al. 2020) recommend to track this trend during COVID-19 pandemic and wait for the peak of gold and bottom of SP 500 to switch and re-enter the market at later stage. Gold trading includes SPDR gold shares, Ishares gold trust and gold Exchange -Traded Funds (ETFs), although the increase was not massive between February 21, 2020 and May 1, 2020 about 3.25% only, because of the dramatic drop in gold price when investors gave up their gold positions to enter the US market when market had significant drop between February 25, 2020 and February 28, 2020 and between March 4, 2020 and March 9, 2020. However, gold resume growing after March 19, 2020.

2.9 COVID-19 impact on Oil

During Organization of the Petroleum Exporting Countries (OPEC) meeting in Vienna on March 6, 2020, Russia's obstinacy to reduce oil production has pushed Saudi Arabia to respond by selling oil at exceptional discounts and threatened to increase oil production, which actually happened by increasing 25% of oil provision comparing to February 2020. The unprecedented production volume caused strongest one day decline in oil price in almost 30 years taking Brent crude from USD 34 per barrel level to USD 25.70 (Nicola et al. 2020). Increasing oil production by Russia and Saudi Arabia rapidly has overwhelmed oil price, and the huge unbalance of oil markets was a result of low demand and high supply. As a result, oil price has declined third of its value since Gulf war 1991, despite the low price of oil, importers were not motivated to buy due to curfews and travel bans (Mhalla 2020).

Corbet, Larkin & Lucey (2020) found that the Chinese stock market has positive relationship with West Texas Intermediate (WTI) before and after COVID-19 pandemic. However, strong dynamic behavior has been observed while the correlation between both Chinese exchanges has increased from 0.889 to 0.967 reflecting on the correlation between Chinese markets and WTI by increasing it from 0.091 to 0.485 when the financial markets have deteriorated. China imports 20.2% of the total crude oil in the world, and the uncertainty of the largest oil importer in the world has harmed the oil prices because of the contraction in Chinese economy as well as transportation oil demand due to travel bans (Açıkgöz & Günay 2020). China as the world's largest importer and second consumer leads the crude market for several years, the oil is needed for China's production and growth, the production has mitigated simultaneously with the lock down across the country (Mhalla 2020). Therefore, the demand on oil has slackened and

directing the price to the downside recording USD 5 plunge in barrel price from USD 62. OPEC reported in their monthly report that the Chinese economic growth is challenging uncertainty and will extend the situation to the global economic growth by influencing demand on oil in 2020. Consequently, the forecasted demand growth was revised from 0.99 million barrels in 2020 to 0.23 million barrels. Chinese oil demand is not limited to industrial sector only, it also includes transportation consumption and aviation industry, and expected to be affected until June end 2020. Hence, OPEC is discussing to cut oil barrels by 600,000 per day. However, Russia is not keen on enforcement cut.

The oil demand curtail was warned by The International Energy Agency (IEA) as well on January 2020 monthly report, as a consequence of coronavirus on the oil demand and they revised down growth forecast in addition to cutting oil production by 365,000 barrels per day and expecting the lowest since 2011 and expecting 825,000 barrels production per day. IEA also recommended that developed countries to revise their energy policy. China's oil demand was increase to 13.7 million barrels per day in 2019 from 5.7 million barrels in 2003. Coronavirus push the oil price barrel from above USD 65 during US and Iran political tension to below USD 50 per barrel and this price is the lowest since 2019 (Mhalla 2020). Due to the quarantine and lack of travel and transportation, China had reduced the oil demand by 20%, (Mhalla 2020) expected that OPEC will reduce production because WTI crude falls under USD 50 per barrel. Similarly, US might curtail some of their production. On February 10, 2020, the new coronavirus confirmed cases have reduced, this impacted the oil price on the second and third days, the price of Brent crude was increased by 73 cents or 1.3% at USD 54.75 per barrel and WTI rose 46 cents or by 0.9% at USD 50.39, the rise did not last for long, the oil price dropped again on February 24, 2020 due to the viral pneumonia spread outside China, then Brent crude lost 4.19% worth

USD 56.05 and WTI lost 3.97% worth USD 51.26 in the same month when the spread of coronavirus infected in excess to 800 people in South Korea, then followed by significant drop for almost 10% for Brent crude and 8% WTI when Italy enforce 12 municipalities to be under quarantine following 5 deaths and 219 new cases. Despite the low oil price and supply abundance, the supply of oil has not attracted importer because businesses, transportation, and aviation are at standstill. The relationship between COVID-19 daily announcements and its influence on oil price was tested by Albulescu (2020) and found that the impact of COVID-19 on oil is indirect.

2.10 Actions to enhance the economy

Governments have prepared support packages to subsidize businesses and citizens, including wage subsidies and cash transfers to low-income families, in addition to rent reductions and tax cuts for businesses. Furthermore, World Bank (WB) and International Monetary Fund (IMF) have contributed USD 14 billion and USD 50 billion respectively to help the countries that suffer from COVID-19 pandemic. Moreover, US Senate agreed to pass a historical rescue package of USD 2.2 trillion as well as the UK government contribution of 80% towards employees who are unable to work during COVID-19 pandemic, this is to avoid layoffs and bankruptcies (Açıkgöz & Günay 2020). Similarly, on March 18, 2020, Turkey announced stimulation package of USD 15.4 billion embedded in pension payout increments and payment deferrals along with tax cuts.

Wenzel, Stanske & Lieberman (2020) discussed how companies should response to crisis in general and COVID-19, four types of responses to crises were discussed as follows, retrenchment, persevering, innovating, and exit. Retrenchment are the measures to be taken by firms to reduce their costs (Pearce & Robbins 1993), cost cutting is adopted strategy to maintain

liquidity which can be availed for the long term recovery. While persevering strategy focuses on the sustainability of business operations, the effectiveness of this strategy is linked to the duration of the crisis, this is because longer crisis dries liquidity resources (Wenzel, Stanske & Lieberman 2020). Innovating strategy stimulates businesses to think of new ideas to enhance the business and renew it by exploring new alternatives and expanding business activities (Wenzel, Stanske & Lieberman 2020). However, low liquidity during the crisis limits this strategy (Kraus et al. 2020). Finally, Exit strategy explains it self, its discontinuation of business activities during the crisis (Wenzel, Stanske & Lieberman 2020), in case if other strategies do no succeed. Nevertheless, an exit of successful firm can create new resources to another firm to innovate (Kraus et al. 2020).

Another study was performed by Nicola et al. (2020) discussed the measures taken by countries to save the economy, a rescue package of EUR 1.7 trillion has pledged by Europe to dampen the pandemic effect, in addition to EUR 750 billion of asset purchase program. Furthermore, EUR 25 billion investment fund were collated by European Commission to increase public spending and support affected businesses, as well as Kreditanstalt für Wiederaufbau (KfW) the state development bank in Germany to provide half a trillion for the same reason calling it “biggest post-war aid package”, another countries gave the same promise, such as France promised EUR 345 billion, Spain promised EUR 200 billion and Italy promised EUR 25 billion, in the UK, GBP 330 billion package announced by Chancellor Rishi Sunak as loan guarantees, in addition to GBP 20 billion as fiscal support for businesses, the package includes retention scheme, deferring tax payments, sick pay aid package for Small and Medium sized Enterprises (SMEs) and business rates holiday for 12 months granted to several businesses, small business were granted GBP 10,000, and GBP 25,000 for retail, leisure, and hospitality businesses plus rated values

from GBP 15,000 to GBP 51,000 for businesses with properties. Furthermore, huge loans up to GBP 5 million to SMEs to support the liquidity of larger firms through the British Business Bank. Moreover, the bank of England had interest rate cut to 0.1%, and to support employers who kept their employees, the Chancellor vowed to pay 80% of the employee's salary up to GBP 2,500 and undertook to support almost 3.8 million self-employed with GBP 9 billion. In the US, the Federal Reserve (Fed) decreased 0.5% from interest rates and announced purchasing USD 125 billion of bonds on March 23, 2020 and USD 300 billion of loans back with assets to main street businesses. In addition, on March 27, 2020 Trump administration announced USD 2 trillion dubbed "virus-aid package" to support the economy, the package will be supporting many segments, USD 1,200 for every American adult with annual income less than USD 75,000 or USD 150,000 for couples, and USD 500 for every child below 17 years old, and increasing unemployment benefit by USD 600 per week, in addition to USD half a trillion in loans to be paid in 5 years to small and large companies and obliging them to keep 90% of their employees until September end 2020 and banning those companies from paying dividends up to a year after repaying those loans. Moreover, Small businesses to be provided USD 377 billion in grants and loans plus USD 10 billion and USD 17 billion for emergency grants and existing payments deferral. Furthermore, deferral on student loan payments until September 30, 2020. Further assistance packages for several sectors were granted as follows, food assistance USD 25 billion, healthcare USDD 100 billion, Disaster Relief Fund USD 45 billion, national security USD 17 billion, farmers USD 14 billion and USD 29 billion in loans, fuel tax relief, excise, loan guarantees and USD 29 billion in grants. Finally, foreclosures ban on federally backed mortgages and ban on evacuating tenants in federal. The action in China and Japan was not

different, to maintain liquidity People's Bank of China (PBoC) and the Bank of Japan (BoJ) provided equivalent of USD 240 billion and USD 43 billion, respectively (Nicola et al. 2020).

Yan et al. (2020) have selected stocks portfolio of companies and categorized them as follows, online travel agencies, airlines companies, hotel companies, and cruise companies and found that shorting selected stocks from February 21, 2020 until May 1, 2020 has made 50.24% average return. On the other hand, Yan et al. (2020) found that shorting Universal corporate and Disney between February 21, 2020 and March 1, 2020 returns 9.72% and 24% respectively, and recommend to buy back the same stocks when ticket boxes resume selling.

When major events occur, stock markets respond to those events. Al-Awadhi et al. (2020) have tested the effect of Coronavirus disease in Chinese stock market at special dates during COVID-19 pandemic, starting from December 31, 2019 when Chinese government informed WHO about occurrences of viral flu symptom cases in Wuhan, then when the first death of Coronavirus reported in Wuhan on January 11, 2020, followed by the first death outside China which was in Thailand on January 13, 2020. The actual first death outside China was in Philippines for 44 years old man as reported by (Times 2020). In addition, when the new daily cases confirmed at 15,152 in China on February 3, 2020, and lastly, when the new daily cases in China falls under 100 March 7, 2020. The results included companies across Shanghai Stock Exchange and Hang Seng Index between January 10, 2020 and March 16, 2020 for A-shares which are traded by Chinese investors and B-shares which are traded by foreign investors. Al-Awadhi et al. (2020) reported that when the total positive COVID-19 and death cases increase, the more negative performance on the Chinese financial market. However, the study assume that this assumption does not apply to some industries and some of them performed better during COVID-19

pandemic, especially medicine manufacturing and information technology industries. In addition, the study has reported that B-shares had bigger hit on returns than A-shares, this negative effect bruises the stocks with high market capitalization more than the stocks with low market capitalization.

Capital markets have responded to global economic effects with high volatility, US market hit circuit breaker pre COVID-19 pandemic once in 1997 since 1987. While on March 2020 the US market has triggered the breaker four times. Asian and Europe markets have responded to the pandemic as well, FTSE the main index in the UK has dropped over 10% on March 12, 2020 recording the lowest day return since 1987 as well. Japanese stock market has slumped 20% from December 19 highest position (Zhang, Hu & Ji 2020).

Previous infectious viruses have not impacted stock markets powerfully as how COVID-19 did, including Spanish Flu. Baker et al. (2020) used text-based methods to prove this assumption, taking in consideration past market volatilities in 1900 and 1985. When the situation of Novel coronavirus changed from regional epidemic in China to global pandemic, the equities have plummeted, and the volatility has shoot up around the global markets, the volatility levels in the US stock market has exceeded the levels seen in late 1929 and early 1930s and October 1987 then latter financial crisis in 2008, finding that COVID-19 news were driving the market performance since February 24, 2020. The powerful impact of COVID-19 on US stock market since late February 2020 is due to the serious implication of the virus on human's health and economy. Apparently, the ease of virus spread, and the significant mortality rates make the pandemic serious and critical, although the mortality rates of Spanish flu was worse, Spanish flu did not impact US stock Baker et al. (2020), market's return even with small jumps, second

potential reason is that the news of COVID-19 diffuses rapidly much more than Spanish flu news in the new century, according to the explanations, the impact can be temporary and controls stock market returns more than what Spanish flu did. However, this explanation is not obvious enough and does not rationalize the huge drop in the US stock market, because the negative impact of Spanish flu pandemic on stock market was modest over several months. Third explanation emphasizes the interconnection of current economy and the ease of travel within Europe and the globe, in addition to low transportation cost and tariffs as well as the expensive supply and appropriate inventory systems, while during the Spanish flu, the world was suffering from world war I. Furthermore, shifting the economy to services over the time, and physical interaction was involved. Hence, this interaction had to change during COVID-19 pandemic whether compulsory or voluntary by implementing social distancing methodology. Therefore, the demand of those services has mitigated. The most compelling explanation of unprecedented stock market reaction is that stock markets intuit the economic damage following policies restrictions, as travelling ban, and reducing labors' flow to business will definitely have negative consequences on economy (Baker et al. 2020).

Similar study was performed by He et al. (2020) on COVID-19 timeliness' effect on stock market indices of eight countries, USA , Italy ,China, , South Korea, Spain , France, Japan and Germany. The study found that the impact of COVID-19 was limited on China and Asian countries in the beginning of the pandemic, while European and American markets underperformed at middle and later stages. US and European negative performance spanned back to Asian markets and China was mostly affected. In addition, He et al. (2020) argued that the impact of COVID-19 is on the short term of the tested eight countries and markets are spilling over the negative performance bidirectionally between USD and Europe from one side

and China along with Asian countries on the other side. Hence, there is no proof that COVID-19 has direct impact on market indices compared to S&P Global 1200. Conversely, Sansa (2020) tested the daily returns of two financial markets, Shanghai Stock Exchange and New York Dow Jones representing China and US stock exchanges respectively from March 1, 2020 till March 25, 2020. The study found that there is positive relationship between confirmed cases and stock markets returns.

COVID-19 has impacted every sector in the world, in this section, the study discusses the impact of COVID-19 on Developed and Emerging markets from the day of announcing that corona disease is a pandemic on March 11, 2020 until August 31, 2020 and comparing the outcomes of markets movements with the day prior to the pandemic announcement on March 10, 2020.

2.11 Exponential Generalized Autoregressive Conditional Heteroscedastic (EGARCH)

This section tests the volatility of all markets performance during the pandemic, many studies discussed the volatility and market risk such as (Zhang, Hu & Ji 2020) tested the relationship between COVID-19 outbreak and stock market risks by checking top ten countries with confirmed COVID-19 cases as of March 27, 2020, the countries are US, Italy, Spain, France, Germany, Netherlands, Switzerland, UK and China Mainland, in addition to Singapore, Korea South and Japan excluding Iran due to unavailability of market data, in total 12 countries, those countries have 466,693 confirmed cases together, considering the standard deviation of market returns as market risk. Zhang, Hu & Ji (2020) analyzed February and March 2020 period, following WHO declaration that China's status become PHEIC on January 30, 2020. When China managed to control coronavirus spread on March 2020, Europe and US started suffering from coronavirus widespread, the study found that the pandemic had strong impact on capital

markets by rising the risk for the markets from 0.0071 in February 2020 to 0.0196 in March 2020, China had the highest standard deviation in February 2020 and lowest in March 2020 unlike US market which had the highest volatility in 2020 and almost consistent with number of confirmed COVID-19 cases. Hence, the pandemic has created risk and instability in global capital markets. COVID-19 crisis has increased markets' systematic risk, and correlations are used to measure the relationship between the pandemic and the systematic risk by testing 8 observations from weekly returns of the 12 countries during February and March 2020, the outcome shows low correlation in February 2020, but spiked in March 2020 with highest level on March 6, 2020 week when US and Europe lost control on confirmed new cases, then WHO announced that coronavirus is a pandemic on March 11, 2020. However, the correlation has surprisingly become low in the week of March 20, 2020, it was a positive reaction from investors when the US lowered the interest rate to zero. To split the sample to before and after COVID-19, the date of the pandemic announcement by WHO as a breaking point is used, US and Europe continue to show high correlation, while China, Mainland, Singapore, South Korea, and Japan show different behavior, Chinese market shows isolation from the rest of the markets before the pandemic, as well as other tested countries in Asia who are moving away from US and Europe markets. However, they become highly correlated post the pandemic (Zhang, Hu & Ji 2020).

Similar study was done by (Corbet, Larkin & Lucey 2020), Shenzhen and Shanghai Stock Exchanges at pre and post the pandemic announcement and found that COVID-19 has a strong impact on those markets volatility, the interaction between the US and Chinese markets is quite sheltered, +0.119 for Shanghai and +0.160 for Shenzhen.

A previous study of (Baker Nicholas Bloom Steven J Davis Kyle J Kost et al. 2019) examined the next day news of US stock market when moved more than 2.5% on both sides, the study

found that the US market jumps 1,129 times between January 2, 1900 and March 24, 2020, those jumps represent 3.5% of the overall trading days during the tested period and 47% of the daily return squared variation, those jumps were characterized by going through newspapers and articles. The articles classified those jumps into 16 categories, as an example, Government Spending, Macroeconomic News and Outlook, Monetary Policy, Unknown, and Other, comparing the previous study with current COVID-19 pandemic situation, (Baker et al. 2020) found that none of the 1,129 jumps news over 120 years was related to a disease, and US market never responded to such outbreaks including Spanish Flu. However, it's a difference scenario with COVID-19 news from February 24, 2020 to March 24, 2020 when 18 jumps in 22 trading days recorded 23 times more in jumps frequency on average since 1900, 15 or 16 of those 18 jumps were followed by next day news related to COVID-19 pandemic development and policy responses.

Chapter 3: Data and Methodology

3.1 Introduction

This chapter discusses the methodology employed in the study which has been taken to achieve the findings and conclusion. Moreover, this chapter defines the collected data and tested variables. The tactic of the study will be spotting the methods followed, to have the full picture of markets behavior during the tested period, by finding the summery statistic of market variables such as daily closing prices, markets turnover and markets volume for the period March 11, 2020 - August 31, 2020. In addition, the study analyses the performance of P/E ratio components (price and earnings) to find their effect on P/E ratios. Furthermore, the volatility of daily closing prices is measured by calculating EGARCH.

The chapter will also discuss Morgan Stanley Capital International (MSCI) markets classification. Those markets are illustrated in below table (MSCI 2020).

Table 3.1: Capital markets classification

Developed markets				Emerging markets				Frontier and standalone markets			
Country name	Grand total	MSCI constituents	Non-MSCI constituents	Country name	Grand total	MSCI constituents	Non-MSCI constituents	Country name	Grand total	MSCI constituents	Non-MSCI constituents
Australia	1091	235	856	Argentina	128	18	110	Bahrain	43	13	30
Austria	58	27	31	Brazil	402	126	276	Bangladesh	104	43	61
Belgium	117	45	72	Chile	135	33	102	Benin	1	1	
Canada	943	300	643	China	7335	734	6601	Bosnia and Herzegovina	9	2	7
Denmark	135	45	90	Colombia	56	13	43	Botswana	10	1	9
Finland	149	39	110	Czech Republic	11	5	6	Bulgaria	18	2	16
France	548	157	391	Egypt	119	18	101	Burkina Faso	3	2	1
Germany	464	175	289	Greece	114	20	94	Croatia	37	8	29
Hong Kong	883	124	759	Hungary	20	5	15	Estonia	9	6	3
Ireland	82	17	65	India	1105	340	765	Iceland	13	12	1
Israel	383	72	311	Indonesia	361	74	287	Ivory Coast	23	2	21
Italy	303	103	200	Korea	1268	430	838	Jamaica	13	7	6
Japan	3371	1298	2073	Malaysia	348	102	246	Jordan	48	10	38
Netherlands	134	59	75	Mexico	168	55	113	Kazakhstan	33	3	30
New Zealand	101	27	74	Pakistan	191	22	169	Kenya	30	7	23
Norway	200	65	135	Peru	124	3	121	Kuwait	137	19	118
Portugal	43	13	30	Philippines	155	40	115	Lebanon	15	4	11
Singapore	559	77	482	Poland	150	34	116	Lithuania	10	2	8
Spain	167	71	96	Qatar	48	23	25	Mali	1		1
Sweden	562	139	423	Russia	236	38	198	Malta	9	3	6
Switzerland	251	123	128	Saudi Arabia	181	70	111	Mauritius	29	11	18
United Kingdom	1125	368	757	South Africa	228	105	123	Morocco	40	22	18
United States	4250	2459	1791	Taiwan	997	351	646	Niger	1		1
Totals	15919	6038	9881	Thailand	424	116	308	Nigeria	74	20	54
				Turkey	200	46	154	Oman	51	11	40
				United Arab Emirates	118	21	97	Palestine	5	4	1
				Totals	14622	2842	11780	Panama	5	2	3
								Romania	21	8	13
								Senegal	2	1	1
								Serbia	11	2	9
								Slovenia	12	6	6
								Sri Lanka	58	7	51
								Trinidad and Tobago	19	1	18
								Tunisia	27	12	15
								Ukraine	40	4	36
								Vietnam	106	42	64
								Zimbabwe	22	6	16
								Totals	1089	306	783

¹ Used to derive the MSCI Global Equity Indexes as of the date the product file is updated

* Domestic version



MSCI Country Classification Standard | msci.com

Source MSCI Country Classification Standard

3.2 Markets Classification

MSCI (2019) classifies financial markets into four categories, Developed markets, Emerging markets, Frontier markets and Standalone markets. MSCI is one of the main leaders in providing services and tools for the financial sector, they are expertise in research and technology having a rich data base built over 45 years. MSCI covers more than 31,000 securities across the four markets within MSCI equity indexes. Moreover, MSCI classification includes countries and

Moreover, under those four categories, MSCI sort financial markets by regions.

[illegible]

31

3.2.1 Developed markets

Developed markets or called advanced markets include the countries that have high level of growth as well as stable and regulated financials. Also they have market exchange and enough liquidity for their debts and equity markets , those markets are mostly in North America, Australia, and Western Europe (IG 2020). Another feature spotted by Akhtar (2020) that the stock prices of developed economies are reflected by information and their markets are more efficient than developing markets and can be predicted in unexpected situations like financial crisis. There is no identifiable difference between developed markets and emerging markets, only hallmarks can be characteristics of each market (Acorns 2020). For example, developed countries are having better economies and better infrastructure, their capital markets are more mature and better living standards, in addition to regulatory bodies and higher income per capita. Those characteristics do not mean that investing in developed markets is riskless, it's about reliable financial reporting and less volatile. Currently, developed markets are above historical averages which makes it difficult to accommodate unpredicted shocks.

3.2.2 Emerging markets:

The term Emerging Market Economy (EME) was used for the first time by Antoine W. Van Agtmael in 1981 (thetstreet 2020), he attended an investment meeting in New York at investment bank Salomon Brothers and he proposed a new stock markets' fund in developing countries called "Third World Equity Fund", the name got objected by a banker works with JP Morgan and he explained that it would be impossible for International Finance Corporation (IFC) to sell the fund under this name, Mr. Agtmael agreed and spent his weekend thinking of replacement name , then he promoted the term to "emerging markets" (Ifc 2020). Emerging markets are the

economies of countries who are progressing to become developed. Also, they are moving towards free or mixed markets. In addition, their equity markets are often having enough liquidity and regulated through exchanges. Furthermore, they have lower income per capita. Emerging market constitute 80% of the global economy, including large countries as India, Russia, and China. Because EME grow rapidly, this growth creates market volatility and instability. Moreover, emerging markets do not have enough control on some industries with an exception to China and India, and their capital markets are immature compared to the US market. In addition, they do not have complete information about companies traded in their exchanges (thestreet 2020).

Emerging markets are about 50% of the of the globe's GDP (Ruziev 2012). Before 2008, investors used to look at emerging markets inferiorly, especially when stock markets plunged 55% immediately in 2008 crisis. However, the fast recovery of 86% comparing to 46% in developed markets has changed investors' mentality and made them realize that they have missed a great opportunity and returns from investing in emerging markets, which exceeded 75% per annum (p.a) (Lesmond 2005). The value of shares traded had increased from USD 15 billion to over USD 200 billion from 1991 to 2000 and the growth of emerging markets rose to USD 47 billion in 2000 from USD 0.1 billion in 1985. High volatility of emerging markets and low correlation with world markets, make the risk and estimating discount rates unstandardized, and the definition of risk in emerging markets is more complicated. Practically, Capital Asset Pricing Model (CAPM) is still used as the model of estimating discount rates for emerging markets, although many other models were proposed, practitioners have not yet adopted any of those models (Estrada 2005).

3.3 Data

This study focuses on developed and emerging markets only during COVID-19 Pandemic and how the markets had reacted in terms of performance, by finding the summery statistics of daily closing prices for all indices , trading volume, markets turnover, P/E ratios and earnings from the day of announcing COVID-19 as a pandemic on March 11, 2020 till August 31, 2020 and comparing findings with the day before announcing the pandemic March 10, 2020.

Tested variables are explained in below section, in addition to the description of each market index.

3.3.1 Definition of variables

Variable	Definition
Market indices	Represents the sum value of the traded securities belong to the market index, the total sum value is in the index's domestic currency. The price comes from multiplying the number of shares of each security, then summed all together, the total is scaled by factor of 100 and the result is the market index price, (Source: Bloomberg).
Turnover	Is the value of traded shares in million, and the value is in the country's currency, (Source: Bloomberg)
Volume	Market volume is the total number of traded shares in million for a security in a trading day, when the market is off, then the number of the last trading day applies. When the exchange sends the closing price without the volume, then the return is zero. To have volume by the end of a trading day, market closing price must be available, (Source: Bloomberg).
P/E ratio:	Price earnings ratio can be utilized as a common indicator for deciding if stocks or mutual funds are decently estimated, and this applies for market indices. For example, if S&P 500 P/E ratio is lower than the historical mean, then it might indicate and good buy opportunity (Thebalance 2021).
Earnings	Markets Earnings gives the ability to measure the earnings of the companies who report their annual or quarterly earnings. A customizable earnings calendar is used to know when public companies announce their earning and to sort them by market cap. In addition, to know the historical data of the equities. Moreover, earning reports and news can be known (Insider 2020). If market earning is negative, data will not be available. Also, earnings can be computed from market's price and P/E ratio as well by dividing market price by P/E ratio.

3.3.2 Market Indices:

3.3.2.1 Developed Markets:

- **Canada - SPTSX60 Index:** capitalization-weighted index, also known as S&P/TSX 60 (Toronto Stock Exchange 60) Index, the index composes the largest and the most tradable stocks in TSX (Toronto Stock Exchange), those stocks belong to domestic or multinational companies (Bloomberg 2020am).
- **United States - SPX Index:** The Index covers several investment products and contains the largest 500 companies reflecting approximately 80% of the market capitalization (Bloomberg 2020an).
- **Austria - ATX Index:** Capitalization-weighted index represents the heaviest trading stocks in Vienna Stock Exchange. The calculation uses free-float adjusted shares, as of January 2, 1991, the base level was 1000. (Bloomberg 2020e).
- **Belgium - BEL20 Index:** Free float market capitalization weighted index represents 20 largest and actively traded equities listed on Euronext Brussels. ETFs, futures, options and structure products are part of this index, and operated by Euronext and the pan-European exchange (Bloomberg 2020f).
- **Denmark - KFX Index:** OMXC20 is a market weighted price index, represents the most 20 tradable stocks in Copenhagen Stock Exchange where options and futures are issued, the index is revised twice a year and July 3, 1989 is the base date of the index with 100 base value (Bloomberg 2020w).
- **Finland - HEX Index:** OMX Helsinki consists all shares listed in Helsinki Stock Exchange, the index aims to reflect market changes. As of December 28, 1990, the index

was developed with a base level of 1,000, then broken down on February 1, 2012 using the ICB Classification (Bloomberg 2020q).

- **France - CAC Index:** Free float market capitalization weighted index. Also known as CAC40, the index represents the largest and most tradable 40 equities listed and operated by Euronext Paris, the pan-European exchange. The index is used as an indicator for Paris stock market and the underlying of the index serves many asset classes such as structured products, options and futures, funds and exchange traded funds (Bloomberg 2020h).
- **Germany - DAX Index:** Free float shares used in the index calculation. DAX is the German stock index is the total return of 30 blue chip stocks. The base value of DAX is 1,000 as of December 31, 1987 and only XETRA equity prices are used for calculating all DAX indices since June 18, 1999 (Bloomberg 2020j).
- **Ireland - ISEQ Index:** capitalization-weighted index. ISEQ is The Ireland Stock Exchange Overall Index tracks the performance of all companies in Irish Stock Exchange except UK registered companies, with base value 1,000 as of January 4, 1988 (Tradingeconomics 2020b).
- **Israel - TA-35 Index:** (Bloomberg 2020ao) presents the name of the exchange as Tel AVIV stock exchange 35 index.
- **Italy - FTSEMIB Index:** The index reflects the most 40 liquid and capitalized equities in Borsa Italiana, foreign equities are eligible to be included in the index. However, secondary lines and not. Methodology and calculation of FTSEMIB index is as same as S&P MIB Index (Bloomberg 2020p).

- **Netherlands - AEX Index:** Free float market capitalization weighted index represents the most actively traded stocks' performance in Euronext Amsterdam, AEX Index is the most used indicator for Dutch stock market and operated by Euronext, the pan-European exchange. The underlying of the index are structured products, options and futures, funds, and exchange traded funds (Bloomberg 2020b).
- **Norway - OBX Index:** Is a tradable index considered the most important index in Oslo Bors. The index reflects the performance of 25 companies, including dividend payments of the companies, which makes the index a total returns index. The index was founded on January 1, 1987 at 200 and did not include companies dividend payments on the early years, then the index split into four on April 21, 2006 (Oslobors 2013).
- **Portugal - PSI20 Index:** Free float market capitalization weighted index. PSI20 reflects the largest and most traded equities performance. The index is listed and operated by Euronext, the pan-European exchange with underlying of structured products, options and futures, funds, and exchange traded funds (Bloomberg 2020ae).
- **Spain - IBEX Index:** Free float shares are used in the index calculation. IBEX index or IBEX 35 comprises the most liquid and tradable 35 stocks. The index was created on December 29, 1989 with 3000 base level and supervised, published, and calculated by the Sociedad de Bolsas (Bloomberg 2020s).
- **Sweden- OMX Index:** OMX Stockholm 30 Index is weighted price index revised twice a year and represents the most 30 actively traded equities on Stockholm Stock Exchange. The index was developed on September 30, 1986 with base level 125, there was 4 to 1 split on April 27, 1998 in index value (Bloomberg 2020ac).

- **Switzerland - SMI Index:** Swiss Market Index contains the largest and most liquid traded equities on three stock exchanges, Basel, Geneva and Zurich. The base level is 1500 as of June 1988 (Bloomberg 2020ak).
- **United Kingdom - UKX Index:** Capitalization-weighted index. FTSE 100 reflects the 100 highly capitalized companies traded in London Stock Exchange, with base level 1,000 as of December 30, 1983 (Bloomberg 2020ar).
- **Australia - AS51 Index:** Float-adjusted market capitalization index, S&P/ASX 200 indicates the performance of the largest 200 liquid and tradable stocks listed on the ASX, the index was launched in April 2000 (Bloomberg 2020c).
- **Hong Kong - HSI Index:** Free-float capitalization-weighted index. Four selected components reflect HSI Index, Commerce and Industry, Utilities, Finance, and Properties. The Index doesn't have official ISIN and was developed at base level 100 as of July 31, 1964 (Bloomberg 2020r).
- **Japan - NKY Index:** The index is a price-weighted average for 225 top rated listed companies in Tokyo Stock Exchange in Japan. Nikkei-225 average was published in May 16, 1949 with average JPY 176.21 and divisor 225 (Bloomberg 2020aa).
- **New Zealand - NZSE50FG Index:** Modified market capitalization weighted index and a free float adjusted market capitalization of the top 50 listed companies on the New Zealand Exchange Limited. The index is known as "The New Zealand Exchange 50 Gross Index" as well (Bloomberg 2020ab).
- **Singapore - STI Index:** is The Straits Times Index. The index reflects the largest and most liquid 30 listed companies in Singapore exchange since 1966, the ticker used to be FSSTO on September 10, 2015 and was revamped on January 10, 2008, prior prices can

be seen by looking for STIOLD Index. STI index is calculated and maintained by FTSE (Bloomberg 2020o).

3.2.2.2 Emerging Markets:

- **Argentina - Merval Index:** The S&P Merval Index represents the performance of the largest and most liquid trading domestic stocks in BYMA (Bolsas y Mercados Argentinos Exchange) who are meeting the minimum liquidity and size requirements (Spglobal 2020b). The Merval is a basket weighted index, and its value comes from the number of transactions, quotation price, and the market share in the Buenos Aires Stock Exchange. As of June 30, 1986 the base value was USD 0.01(Tradingeconomics 2020a).
- **Brazil - IBOV Index:** The index is weighted by free float market cap of gross total return. Most liquid traded stocks in Sao Paulo Stock Exchange reflect this index. Since Jan 1, 1985 the index was divided 10 times and the shares scaled by 10,000,000 (Bloomberg 2020t).
- **Chile - IPSA Index:** is “Índice de Precios Selectivo de Acciones”. The S&P IPSA consists the largest and most liquid equities listed in Santiago Exchange (Spglobal 2020a).
- **Colombia - COLCAP Index:** Market-capitalization weighted index. The index includes the most 25 liquid stocks in the Bolsa de Valores de Colombia (BVC). The companies weighting in the index is represented by their market cap (Bloomberg 2020i).
- **Mexico - MEXBOL Index:** The constituents of this index are subject to diversification requirements and weighted by modified market cap. The S&P/BMV IPC reflects the most liquid and largest equities listed in Bolsa Mexicana de Valores (Bloomberg 2020z).

- **Peru - SPBLPGPT Index:** The index criteria is minimum float-adjusted market cap and liquidity, the index used to be known as IGBVL back in 1991, and maintains tracking its historical data. S&P/BVL Peru General Index, uses adjusted market cap weighting in order to reduce the concentration of the stocks (Bloomberg 2020al).
- **Czech Republic - PX Index:** on September 24, 2012 the methodology of the index has changed to Free Float of members. Back on March 20, 2006 PX index replaced PX50 and PX-D indices and the calculation took over PX50 index values to become the Prague Stock Exchange official index. The index started on April 5, 1994 with base value 1,000 points (Bloomberg 2020af).
- **Egypt - EGX30 Index:** Free-float capitalization weighted index reflecting the most 30 liquid and highly capitalized traded equities in Egyptian Exchange. The constituents of EGX 30 are reviewed and changed on semi annual basis at end of January and July. The index was developed on January 1, 1998 with previous name CASE 30 Index at base level 1,000 (Bloomberg 2020m).
- **Greece - ASE Index:** Capitalization-weighted index. The Athens Stock Exchange reflects the Greek stocks listed on ASE. On December 31, 1980 the index was developed with 100 base value (Bloomberg 2020d).
- **Hungary - BUX Index:** A total return index and adjusted free float of capitalization-weighted index. The Budapest Stock Exchange Index tracks the daily performance of largest and most actively traded equities consisting 58% of domestic equity market capitalization. The base value is 1,000 As of January 2, 1991 (Bloomberg 2020g).
- **Poland - WIG Index:** Total return index includes subscription rights and dividends. Warsaw Stock Exchange Index consists all domestic listed companies and exclude

investment funds. The index was developed with base value 1,000 as of April 16, 1991 (Bloomberg 2020as).

- **Qatar - DSM Index:** Capitalization weighted index. The index used to be known as DSM20 Index prior to May 6, 2020 when the name was rebranded. Currently, the index represents the most 20 liquid, and highly capitalized traded companies in Qatar Exchange. The development of the index was on December 31, 1999 with base value 1,000, and rebalance twice a year with maximum weight of a stock may hold is 15% (Bloomberg 2020l).
- **Russia- IMOEX Index:** Cap-weighted composite index. MOEX Russia Index formerly known as MICEX Index, and calculates the prices of the most liquid stocks of the largest Russian issuers and dynamically developing companies. The number of constituents is not fixed. However, does not exceed 50 equities. On September 22, 1997 MOEX Russia Index was issued with base value 100 (Bloomberg 2020u).
- **Saudi Arabia - SASEIDX Index:** Also known as TASI (Tadawul All Share Index), it is published by Saudi Stock Market. The index was developed on 1985 with base value 1,000 and restructured on June 30, 2008. The volume of the index does not include the trades less than SAR 15,000. Another index named VOLTADA Index presents the volume of all trades including the small ones (Bloomberg 2020ag).
- **South Africa - TOP40 Index:** Capitalization weighted index. FTSE/JSE All Shares Index represents the 40 largest market capitalization companies. On June 21, 2002 the index was developed with base value of 10399.53 (Bloomberg 2020ap).
- **Turkey - XU100 Index:** Capitalization-weighted index. The Borsa Istanbul 100 Index composes national market companies excluding investment trusts. The BIST National

100 index components are selected based on pre-determined criteria known to the companies who are included in the index such as average traded value and average free float market value. Base value is 0.01 for Turkish Lira and January 1986 is the base date (Bloomberg 2020at).

- **United Arab Emirates / Abu Dhabi - ADSMI Index:** Free float market capitalization weighted index of listed stocks in Abu Dhabi Securities Exchange. The stock needs to be traded 5 working days to be listed in the index which has started with base value 1,000. (Bloomberg 2020a)
- **United Arab Emirates / Dubai - DFMGI Index:** Free-float market-capitalization weighted price index. Dubai Financial Market General Index includes equities of listed companies. On January 1, 2004 the index was developed with base value 1,000 (Bloomberg 2020k).
- **China - SHCOMP Index:** Capitalization-weighted index. The Shanghai Stock Exchange Composite Index tracks the daily performance of all A-shares and B-shares. On December 19, 1990 the index was developed with a base value of 100 and the volume on Q is lowered by factor of 1,000 (Bloomberg 2020aj).
- **India - SENSEX Index:** Cap-weighted index and shifted to free-float methodology on September 1, 2003. The members of S&P BSE Sensex Index are selected based on industry representation, liquidity, depth, industry representation, and floating-stock-adjustment depth. Base value is 100 and base date 1978-1979 (Bloomberg 2020ah).
- **Indonesia- JCI Index:** Modified capitalization-weighted index reflects all equities listed in Indonesia Stock Exchange. As of August 10, 1982 Jakarta Stock Price Index was developed with base value 100 (Bloomberg 2020v).

- **Korea - KOSPI Index:** Capitalization-weighted index reflects all common shares excluding preferred shares in KRX main board since June 14, 2002. Volume is quoted in thousands (Bloomberg 2020x).
- **Malaysia - FBMKLCI Index:** Launched, on July 6, 2009 and replaced Bursa Malaysia KLCI Index. The FTSE Bursa Malaysia KLCI Index carried over the closing price of KLCI Index on July 3, 2009 and kept it's full historical closing prices. The index contains the largest 30 companies in Bursa Malaysia's Main Board by full market capitalization (Bloomberg 2020n).
- **Pakistan - KSE100 Index:** total return index of top companies in market capitalization from 34 sectors in Pakistan Stock Exchange. In addition to those companies, Karachi Stock Exchange -100 comprises other companies based on their market cap ranking without considering from which sector they are, this is to make them in total 100 companies with base value 1,000. (Bloomberg 2020y).
- **Philippines - PCOMP Index:** Capitalization-weighted index and adjusted to free-float on April 3, 2006, formerly known as PSE Composite. The Philippine Stock Exchange PSEi Index composes equities of several sectors such as, Properties, Industrial, Financial, Holding Firms, Services, and Mining & Oil Sector. As of February 28, 1990, the base value was 1,022.045 (Bloomberg 2020ad).
- **Taiwan - TWSE Index:** Capitalization-weighted index, also known as TSEC Index. TWSE or TAIEX Index consists all listed and traded common shares in Taiwan Stock Exchange. On 1966, the index had base value 100 (Bloomberg 2020aq)

- **Thailand - SET Index:** Capitalization-weighted index. The Bangkok SET Index consists traded stocks in Stock Exchange of Thailand. The index was developed on April 30, 1975 with base value 100 (Bloomberg 2020ai).

3.4 Empirical methodology

Since COVID-19 started, numerous studies and researches were conducted, the affect of this virus has impacted all sectors across the glob. On the financial and economic side, previous studies were dicussing the impact of COVID-19 for a short time and focused on few markets, this study discusses the impact of COVID-19 on all developed and emerging markets indices by finding the summary statistics such as averages, medians, minimums, maximums and standard deviations of daily closing prices, daily volumes, daily turnovers, daily P/E ratios, daily earnings, in addition to calculating EGARCH of daily market closing prices to find their voltiity, the summary statistics are extracted for the published values.

The first output is the general impact of the pandemic for the tested period in general, by finding the difference between the closing price in the day prior to pandemic announcement on March 10, 2020 and the closing price of August 31, 2020.

Following the basic results, the study goes through deep details of the daily activities, those results are found using Excel software and NumXL tool installed within Excel and the results are calculated and sorted as follows:

1. Market indices daily closing prices from March 11, 2020 to August 31, 2020: Summary statistics results are found such as averages closing prices, medians, minimums, and maximum closing prices during the pandemic, and standard deviations. In addition to the difference between closing prices prior to pandemic announcement and minimum prices during pandemic, and the recovery percentages from minimum prices to highest prices during the pandemic were calculated.
2. Daily markets turnover from March 11, 2020 to August 31, 2020: Summary statistics are calculated such as averages turnover during the pandemic along with medians, maximums, minimum turnovers in million and standard deviations. Moreover, the difference between turnovers prior to pandemic announcement and minimum turnovers during pandemic, and the difference between minimum and maximum turnovers during pandemic. The reason of finding the difference between turnovers prior to pandemic announcement and minimum turnover during pandemic is to prove that the turnover trend was on the downside during the pandemic as illustrated in turnover charts in the appendix.
3. Daily markets volume from March 11, 2020 to August 31, 2020: Summary statistics are obtained such as average traded volumes, medians, minimum, maximum volumes in million during the pandemic and standard deviations. In addition to the difference between the volumes prior to pandemic announcement and minimum volumes during pandemic, and the difference between minimum and maximum volumes during pandemic. The trading volumes were decreasing as well as illustrated in volume chart under each market in the appendix.

4. Daily P/E ratios from March 11, 2020 to August 31, 2020: Median, minimum, maximum P/E ratios and standard deviations are found during the pandemic. In addition, the difference between P/E ratios prior to pandemic announcement and minimum P/E ratios during pandemic, and the percentage of maximum recovery of P/E ratios from minimum values during the pandemic.
5. Daily markets earning from March 11, 2020 to August 31, 2020: The summary statistics of given period were calculated, such as medians, minimums, and maximum markets earning during the pandemic, in addition to standard deviations. Moreover, additional percentage was extracted, which is the difference between markets earning prior to the pandemic announcement and minimum earnings during pandemic, this is because the earnings in most markets had a few and sharp plunges.
6. EGARCH model is like GARCH model, it captures volatility clustering and other facts in financial time series, since the EGARCH is on log variance not specifically variance, there are no restrictions required on parameters. The main advantage of EGARCH model is that variance positivity is satisfied automatically. In general, faster, and more reliable optimized results comes from maximizing likelihood without restrictions (V-LAB 2020). EGARCH methodology is used in this study to determine the size of the volatility for indices daily closing price for the period from March 11, 2020 to August 31, 2020.

Chapter 4: Results and Discussion

4.1 Introduction

Global capital markets have fallen dramatically because the investors are worried about economic uncertainty. Dow Jones Industrial Average, Nikkei, and FTSE were declined by more than 25% since COVID-19 has begun (Açıkgöz & Günay 2020). COVID-19 has impacted all sectors across the world, creating an opportunity to profit from market correction.

Yan et al. (2020) suggested to short sectors that will have immediate affect from Coronavirus pandemic such as travel, technology, entertainment industries, as well as gold, then to buy the stocks back when those sectors are dropped significantly at the turning point, believing that the stocks of travel industry will continue to decrease in the upcoming period.

This study examines the overall performance of developed and emerging markets for the period between March 10, 2020 and August 31, 2020 during the pandemic.

Section 4.2 reports a cursory overall performance of market indices during the tested period and the implication of COVID-19 pandemic on both developed and emerging markets. Then section 4.3 reports detailed summary statistics of markets daily closing price, followed by summary statistics of markets turnover and trading volume in sections 4.4 and 4.5, respectively. Lastly, the chapter discusses markets P/E ratio and markets earning in section 4.6, along with markets volatility in section 4.7 measured by EGARCH.

4.2 The impact of COVID-19 on developed and emerging markets.

The overall impact of COVID-19 is examined in this section, by finding the difference of closing prices between the day prior to the pandemic announcement March 10, 2020, and the closing prices of August 31, 2020 for developed and emerging markets.

4.2.1 Developed markets comparison between closing price on August 31, 2020 and the day prior to pandemic announcement on March 10, 2020.

The impact of COVID-19 on stocks closing prices varies among countries. Surprisingly, most of the developed markets had a positive return, however, only 4 out of 23 developed markets had negative returns in the tested dates namely Singapore, Spain, Austria, and Hong Kong markets with negative returns 10.95%, 6.59%, 6.11% and 0.85% returns, respectively. While remaining markets had positive impacts, the most markets that benefited from the pandemic are Germany 23.58% Denmark 23.51% and United States 21.44%. All developed markets made 8.36% positive returns on average.

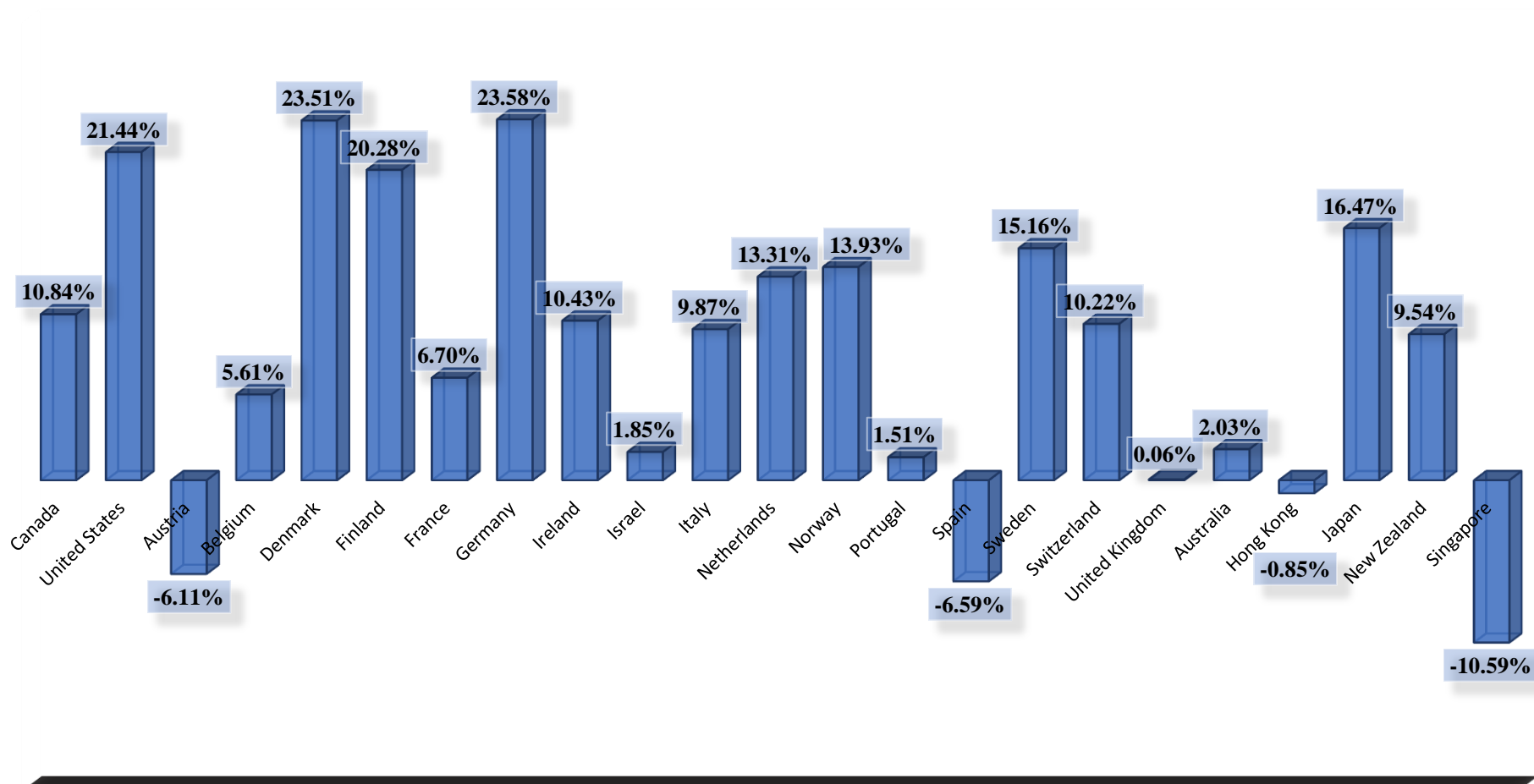
The results imply that developed markets have responded positively to COVID-19 pandemic due to governments support. The respective governments have injected money into the markets in order to avoid the collapse of the financial system. This suggests that investors should hold their positions in future crisis and wait until markets recover, this action will require investors to know more about the markets they are investing in, and look at country's reserve and market's support plan in case of crisis.

Table 4.2.1 and Figure 4.2.1 below show the impact of COVID-19 on all developed markets as of August 31, 2020.

Table 4.2.1: COVID-19 impact on developed market as of August 31, 2020

Developed markets						
Region	Country	Market name	Market currency	Closing price on the day prior to the pandemic announcement 10.03.2020	Closing price on 31.08.2020	Impact of COVID-19 pandemic from 10.03.2020 to 31.08.2020
Americas	Canada	SPTSX60 Index	CAD	893.62	990.52	10.84%
	United States	SPX Index	USD	2,882.23	3,500.31	21.44%
Europe & Middle East	Austria	ATX Index	EUR	2,361.41	2,217.05	-6.11%
	Belgium	BEL20 Index	EUR	3,155.60	3,332.53	5.61%
	Denmark	KFX Index	DKK	1,069.75	1,321.23	23.51%
	Finland	HEX Index	EUR	8,362.17	10,058.03	20.28%
	France	CAC Index	EUR	4,636.61	4,947.22	6.70%
	Germany	DAX Index	EUR	10,475.49	12,945.38	23.58%
	Ireland	ISEQ Index	EIR	5,826.65	6,434.44	10.43%
	Israel	TA-35 Index	ILS	1,368.87	1,394.16	1.85%
	Italy	FTSEMIB Index	EUR	17,870.18	19,633.69	9.87%
	Netherlands	AEX Index	EUR	484.70	549.20	13.31%
	Norway	OBX Index	NOK	662.58	754.90	13.93%
	Portugal	PSI20 Index	EUR	4,237.23	4,301.08	1.51%
	Spain	IBEX Index	EUR	7,461.50	6,969.50	-6.59%
	Sweden	OMX Index	SEK	1,533.79	1,766.33	15.16%
	Switzerland	SMI Index	CHF	9,195.93	10,135.56	10.22%
	United Kingdom	UKX Index	GBP	5,960.23	5,963.57	0.06%
Pacific	Australia	AS51 Index	AUD	5,939.65	6,060.46	2.03%
	Hong Kong	HSI Index	HKD	25,392.51	25,177.05	-0.85%
	Japan	NKY Index	JPY	19,867.12	23,139.76	16.47%
	New Zealand	NZSE50FG Index	NZD	10,897.48	11,937.56	9.54%
	Singapore	STI Index	SGD	2,832.54	2,532.51	-10.59%

Figure 4.2.01: Developed Markets closing prices on August 31, 2020 comparing to closing prices on March 10, 2020.



4.2.2 Emerging markets comparison between closing price on August 31, 2020 and the day prior to pandemic announcement on March 10, 2020.

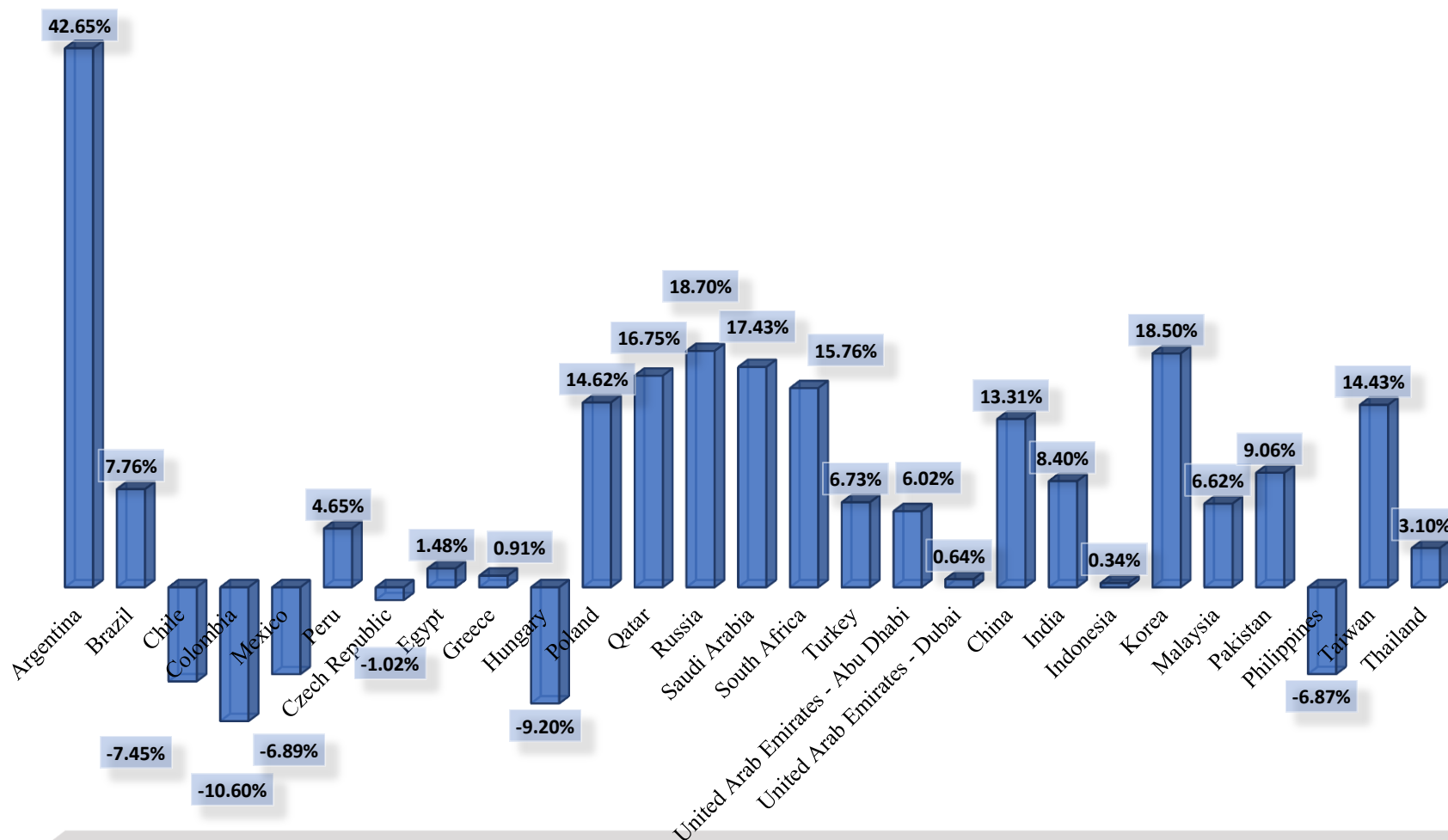
Similar to developed markets, most of the emerging markets had positive returns except 6 markets out of 27 had negative returns namely Colombia, Hungary, Chile, Mexico, Philippines, and Czech Republic 10.60%, 9.20%, 7.45%, 6.89%, 6.87%, and 1.02%, respectively). Argentina had the maximum positive return of 42.65% followed by Russia 18.70%, Korea 18.50% and Saudi Arabia 17.43%. In relation to the United Arab Emirates, the closing prices were also positive in both Abu Dhabi and Dubai financial markets. The closing prices for Abu Dhabi Securities Exchange (ADX) was 6.02% and for Dubai Financial Market (DFM) was only 0.064%.

Table 4.2.2 and Figure 4.2.2 below table reveal the closing prices on March 11, 2020 and August 31, 2020 and the difference between both closure prices. In summary, Emerging markets response to the pandemic were not significantly different from developed markets except Argentinian market index which has the most positive performance (42.65%). This suggests that the opportunity of benefiting from emerging markets comparable to that of developed markets, and investors can also trust those markets who can adapt with global crisis as same as developed markets. Furthermore, the reported performance of those markets can be an indicator to assist investors in the future to assess how the consequences of future crisis will look like, unless it is financial crisis.

Table 4.2.2: COVID-19 impact on emerging market as of August 31, 2020.

Emerging markets						
Region	Country	Market name	Market currency	Closing price on the day prior to the pandemic announcement 10.03.2020	Closing price on 31.08.2020	Impact of COVID-19 pandemic from 10.03.2020 to 31.08.2020
Americas	Argentina	MERVAL Index	ARS	32,832.26	46,835.42	42.65%
	Brazil	IBOV Index	BRL	92,214.50	99,369.20	7.76%
	Chile	IPSA Index	CLP	4,070.29	3,767.15	-7.45%
	Colombia	COLCAP Index	COP	1,360.21	1,216.03	-10.60%
	Mexico	MEXBOL Index	MXN	39,565.44	36,840.73	-6.89%
	Peru	SPBLPGPT Index	PEN	17,750.63	18,576.89	4.65%
Europe, Middle East & Africa	Czech Republic	PX Index	CZK	912.76	903.49	-1.02%
	Egypt	EGX30 Index	EGP	11,199.96	11,365.99	1.48%
	Greece	ASE Index	EUR	628.25	633.98	0.91%
	Hungary	BUX Index	HUF	38,380.60	34,851.29	-9.20%
	Poland	WIG Index	PLN	45,043.23	51,629.45	14.62%
	Qatar	DSM Index	QAR	8,433.03	9,845.17	16.75%
	Russia	IMOEX Index	RUB	2,498.94	2,966.20	18.70%
	Saudi Arabia	SASEIDX Index	SAR	6,762.03	7,940.70	17.43%
	South Africa	TOP40 Index	ZAR	44,252.34	51,225.46	15.76%
	Turkey	XU100 Index	TRY	1,010.63	1,078.61	6.73%
	United Arab Emirates - Abu Dhabi	ADSMI Index	AED	4,262.64	4,519.32	6.02%
	United Arab Emirates - Dubai	DFMGI Index	AED	2,231.09	2,245.29	0.64%
Asia	China	SHCOMP Index	CNY	2,996.76	3,395.68	13.31%
	India	SENSEX Index	INR	35,634.95	38,628.29	8.40%
	Indonesia	JCI Index	IDR	5,220.83	5,238.49	0.34%
	Korea	KOSPI Index	KRW	1,962.93	2,326.17	18.50%
	Malaysia	FBMKLCI Index	MYR	1,430.47	1,525.21	6.62%
	Pakistan	KSE100 Index	PKR	37,695.75	41,110.93	9.06%
	Philippines	PCOMP Index	PHP	6,318.38	5,884.18	-6.87%
	Taiwan	TWSE Index	TWD	11,003.54	12,591.45	14.43%
	Thailand	SET Index	THB	1,271.25	1,310.66	3.10%

Figure 4.2.2: Emerging Markets closing prices on August 31, 2020 comparing to closing prices on March 10, 2020.



4.2.3 Actions taken by governments to enhance capital markets.

To help the economy to pick up again, central banks have lowered interest rates in many countries, in addition to supporting capital markets by injecting liquidity. For example, Bank of England and US Federal Reserve have lowered the interest rates near to Zero, and the European Central Bank (ECB) is planning to spending EUR 750 billion to buy back government debts and private securities by end of 2020 (Açıkgöz & Günay 2020). Similarly, FED announced zero interest rate percent, with USD 700 billion Quantitative Easing (QE) program on March 15, 2020. However, this policy had negative impact on US market, which forced FED to announce unlimited QE after eight days (Zhang, Hu & Ji 2020).

4.3 Markets closing prices summary statistics for the period March 11, 2020 - August 31, 2020

In the previous section, we provide a general view of the pandemic impact on capital markets closing process during the study period. However, markets witnessed severe movements and volatility, which will be discussed later in Section 7.

This section discusses the summary statistics of indices closing prices for developed and emerging capital markets between March 11, 2020 and August 31, 2020. In addition, the maximum drop during the given period plus the difference between the minimum closing price and the maximum closing price during the pandemic, the reason of spotting those two levels is that most of the markets had short term downward trend and then continued to recover for the rest of the period. Figure 3 below illustrates the overall trend of S&P500 as an example, noting that all closing prices of developed and emerging markets are available in the appendix.

Figure 4.03 : Example SP500 daily closing prices between March 11, 2020 and August 31, 2020



4.3.1 Developed markets daily closing prices summary statistics

During the study period, markets have dropped significantly, and all markets have recovered from the minimum levels, the biggest drops were in Austria, Ireland, and Australia as 30.94%, 25.06%, and 23.46% respectively, and the lowest drops were in Denmark 12.15%, Norway 11.59% and Switzerland 11.26%. The negative performance at the beginning of the pandemic implies that many of the investors have driven the markets to the downward direction, by pressuring the markets when they sold their positions, believing that this would be the best thing to do to stop their losses. On the other hand, investors who have resumed investing in financial markets following the governments support have benefited from markets recovery, especially in the United States which was recovered by 56.79%, then Germany 56.25%, and Austria 54.07%, even the lowest rises were still attractive as

Singaporean index has risen by 25.39%, and Hong Kong index by 21.40%. Table 4.3.1 presents the summary statistics of closing prices of each market in domestic currencies, along with minimum drop percentage and maximum recovery percentage during the pandemic.

Table 4.3.1: Summary statistics: Developed markets closing prices for the period March 11, 2020 - August 31, 2020.

Developed Markets										
Region	Country	Market name	Average closing prices between 11.03.2020 and 31.08.2020	Median	Market closing price on the day prior to the pandemic announcement 10.03.2020	Minimum price	Maximum price following market recovery	Standard deviation	Difference between closing prices prior to the pandemic announcement and minimum price during the pandemic	Recovery % from minimum price to highest price during the pandemic
Americas	Canada	SPTSX60 Index	909.06	923.91	893.62	687.27	1,009.30	72.26	-23.09%	46.86%
	United States	SPX Index	3,008.20	3,053.20	2,882.23	2,237.40	3,508.00	294.40	-22.37%	56.79%
Europe & Middle East	Austria	ATX Index	2,186.99	2,224.20	2,361.41	1,630.84	2,512.68	147.07	-30.94%	54.07%
	Belgium	BEL20 Index	3,196.88	3,302.92	3,155.60	2,528.77	3,553.27	107.54	-19.86%	40.51%
	Denmark	KFX Index	1,207.96	1,234.93	1,069.75	939.77	1,341.52	255.08	-12.15%	42.75%
	Finland	HEX Index	8,882.20	9,195.36	8,362.17	6,833.00	10,135.32	868.35	-18.29%	48.33%
	France	CAC Index	4,704.24	4,852.94	4,636.61	3,754.84	5,197.79	337.94	-19.02%	38.43%
	Germany	DAX Index	11,581.00	12,091.67	10,475.49	8,441.71	13,190.15	1,310.28	-19.41%	56.25%
	Ireland	ISEQ Index	5,766.55	5,973.90	5,826.65	4,366.53	6,579.62	555.14	-25.06%	50.68%
	Israel	TA-35 Index	1,378.59	1,396.00	1,368.87	1,171.21	1,471.67	64.13	-14.44%	25.65%
	Italy	FTSEMIB Index	18,496.44	19,091.93	17,870.18	14,894.44	20,723.42	1,529.99	-16.65%	39.14%
	Netherlands	AEX Index	531.32	546.12	484.70	404.10	581.29	42.46	-16.63%	43.85%
	Norway	OBX Index	710.61	722.66	662.58	585.76	775.52	48.21	-11.59%	32.40%
	Portugal	PSI20 Index	4,270.41	4,347.85	4,237.23	3,596.08	4,636.33	226.37	-15.13%	28.93%
	Spain	IBEX Index	7,042.18	7,055.70	7,461.50	6,107.20	7,896.10	357.07	-18.15%	29.29%
	Sweden	OMX Index	1,621.02	1,657.66	1,533.79	1,292.27	1,798.31	132.99	-15.75%	39.16%
	Switzerland	SMI Index	9,810.66	10,021.99	9,195.93	8,160.79	10,470.92	530.94	-11.26%	28.31%
	United Kingdom	UKX Index	5,962.20	6,048.59	5,960.23	4,993.89	6,484.30	310.04	-16.21%	29.84%
Pacific	Australia	AS51 Index	5,689.27	5,847.81	5,939.65	4,546.04	6,167.64	398.29	-23.46%	35.67%
	Hong Kong	HSI Index	24,395.20	24,431.30	25,392.51	21,696.13	26,339.16	886.24	-14.56%	21.40%
	Japan	NKY Index	21,140.49	22,133.85	19,867.12	16,552.83	23,296.77	1,857.42	-16.68%	40.74%
	New Zealand	NZSE50FG Index	10,939.74	11,121.32	10,897.48	8,498.70	12,093.52	775.52	-22.01%	42.30%
	Singapore	STI Index	2,574.54	2,572.36	2,832.54	2,233.48	2,800.57	88.91	-21.15%	25.39%

Figure 4.3.1A: Developed markets minimum closing price for the period March 11, 2020 - August 31, 2020

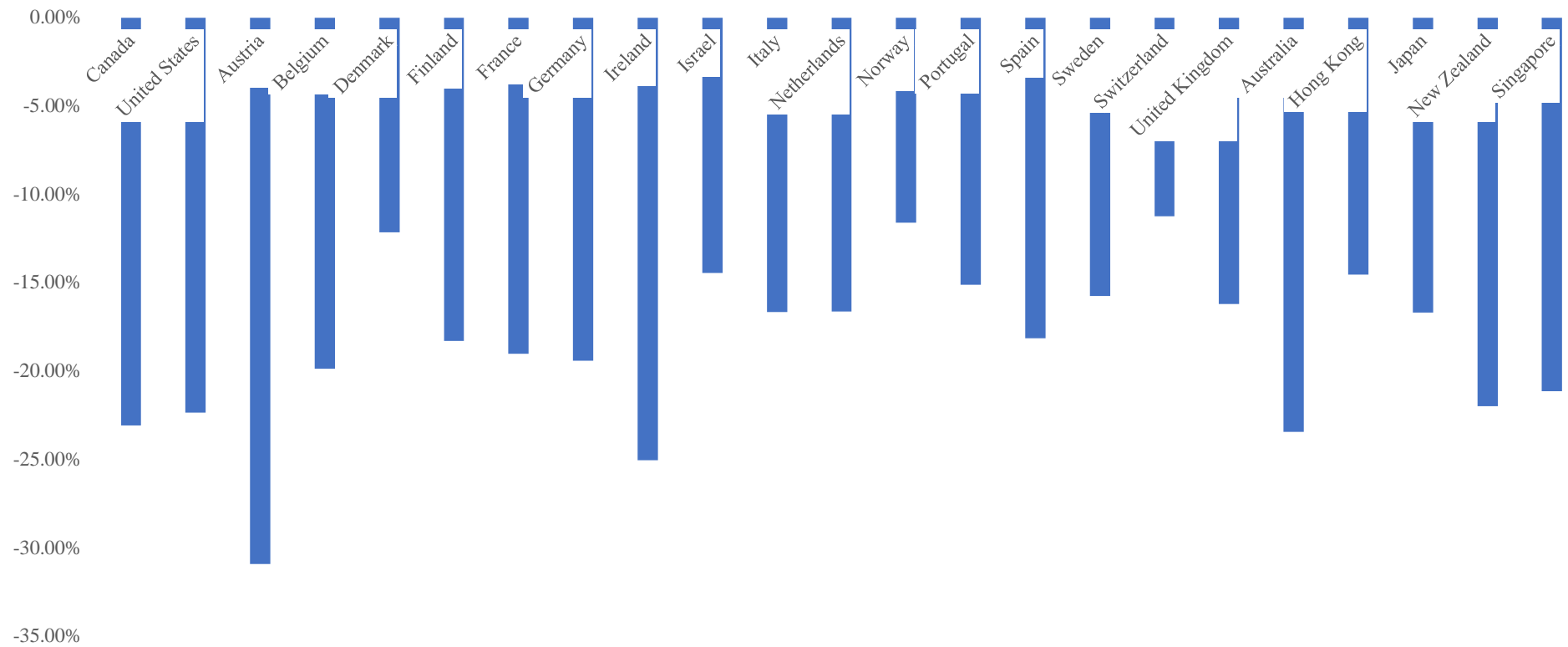


Figure 4.3.1A above compares the maximum plunges in developed markets during the pandemic and illustrates the difference of drop levels among the markets. As can be seen from Figure 4, Austrian market had the highest drop, while the Swiss market had the lowest drop.

Figure 5.3.1B: Developed markets maximum recovery from minimum closing price for the period March 11, 2020 - August 31, 2020

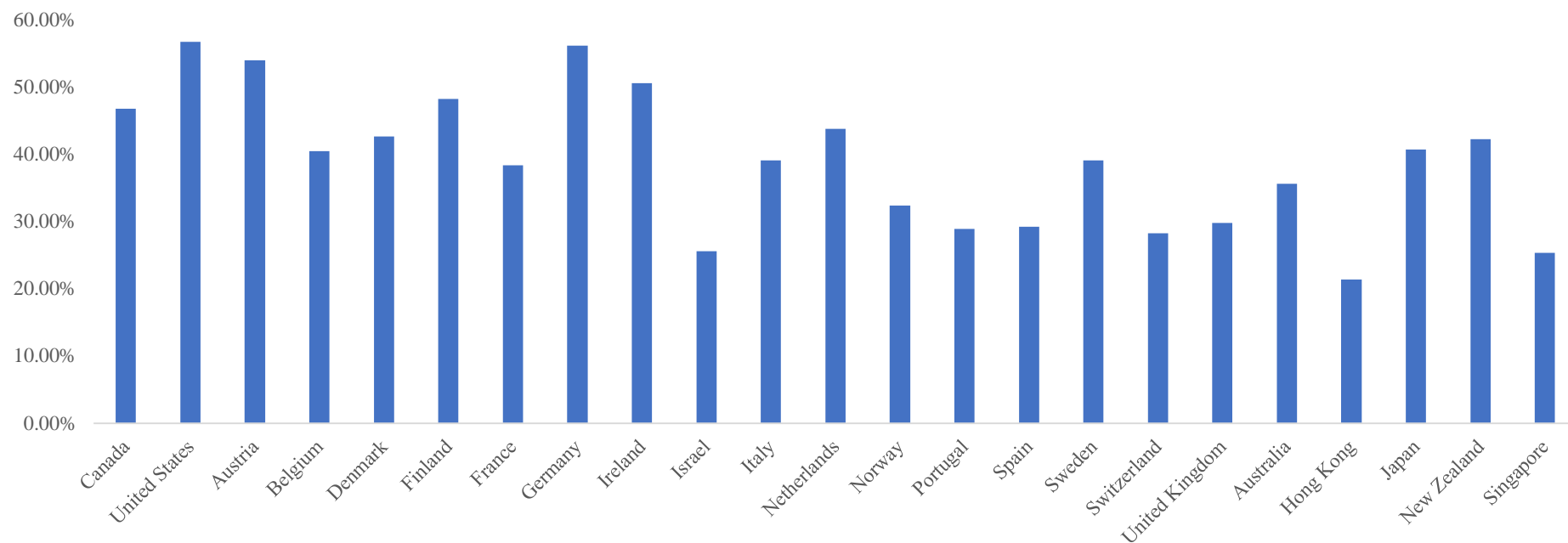


Figure 4.3.1B illustrates the maximum recovery of developed markets. As can be seen from the Figure, the US, German, Austrian, and Irish markets had the highest recoveries (Above 50%) . While HSI the index of Hong Kong had the lowest recovery 21.40%.

4.3.2 Emerging markets daily closing prices summary statistics

Emerging markets did not vary from developed markets in terms of responding to the pandemic. Similarly, markets have dropped and recovered afterwards from the minimum levels, the biggest drops were in Colombia 34.27%, Argentina 32.73%, and Brazil 31.06%, and the lowest drops were in Saudi Arabia, China and Qatar with 11.87%, 11.23% and 2.82%, respectively. On the recovery side, the most rises were in Argentina 137.71%, followed by Korea 67.22% and Brazil 66.13%, and the lowest rises were in Hungary 29.64%, Mexico 21.2%, and Qatar 21.08%. Argentinian's high recovery of 137.71% shows the potential of this market and makes it a target by future investors.

In relation to GCC markets, four markets are classified as emerging markets namely Saudi Stock Exchange (Tadawul), Abu Dhabi Securities Exchange (ADX), Dhahi Financial Market (DFM) and Qatar Stock Exchange (QSE), while Muscat Securities Market (MSM), Bahrain Stock Exchange (BSE), and Kuwait Stock Exchange (KSE) are classified as frontier markets. GCC emerging markets have dropped then recovered. For example, Tadawul has dropped by 11.87% then recovered by 33.96%, while ADX and DFM have dropped by 22.04% and 4.61%, then recovered by 37.51% and 37.00%, respectively. The lowest drop was in QSE 2.82% then recovered by 21.08%. Those markets performed similar to all markets across the world and the investors in those markets were able to take the opportunity and benefit from the recovery and make profit.

It is obvious that investors across all financial markets have experienced the same consequences of COVID-19 pandemic. By and large, markets have witnessed drop at the beginning of the crisis then recovered. The findings of this study show that markets responded to the crisis in a similar fashion. This may suggest that investors can focus on their domestic markets and pick up the opportunity at the right time to make profit.

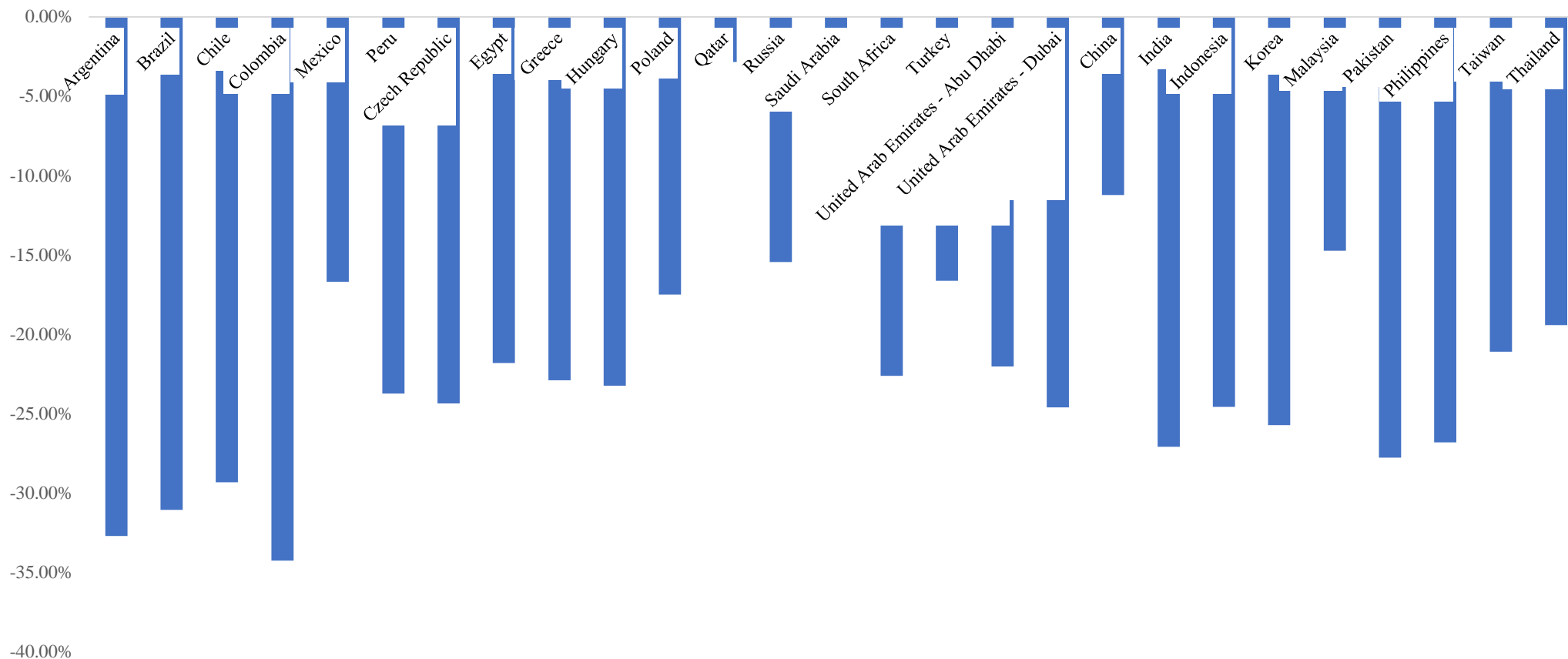
Table 4.3.2 below presents the summary statistics of closing prices of each market in domestic currency, along with the percentages of minimum drop and maximum recovery.

Table 4.3.2: Summary statistics: Emerging markets closing prices for the period March 11, 2020 - August 31, 2020.

Emerging markets										
Region	Country	Market name	Average closing prices between 11.03.2020 and 31.08.2020	Median	Market closing price on the day prior to the pandemic announcement 10.03.2020	Minimum price	Maximum price following market recovery	Standard deviation	Difference between closing prices prior to the pandemic announcement and minimum price during the pandemic	Recovery % from minimum price to highest price during the pandemic
Americas	Argentina	MERVAL Index	39,331.31	40,435.34	32,832.26	22,087.13	52,504.21	8,302.26	-32.73%	137.71%
	Brazil	IBOV Index	89,373.16	93,266.65	92,214.50	63,569.60	105,605.20	11,693.39	-31.06%	66.13%
	Chile	IPSA Index	3,828.97	3,919.91	4,070.29	2,876.03	4,284.42	282.09	-29.34%	48.97%
	Colombia	COLCAP Index	1,132.37	1,142.11	1,360.21	894.03	1,295.46	64.67	-34.27%	44.90%
	Mexico	MEXBOL Index	36,751.54	37,002.94	39,565.44	32,964.22	39,954.01	1,557.38	-16.68%	21.20%
	Peru	SPBLPGPT Index	16,154.08	16,603.50	17,750.63	13,538.79	18,576.89	1,443.41	-23.73%	37.21%
Europe, Middle East & Africa	Czech Republic	PX Index	882.88	901.15	912.76	690.37	962.71	58.26	-24.36%	39.45%
	Egypt	EGX30 Index	10,493.72	10,545.26	11,199.96	8,756.70	11,462.45	564.68	-21.81%	30.90%
	Greece	ASE Index	619.67	632.63	628.25	484.40	683.46	41.41	-22.90%	41.09%
	Hungary	BUX Index	34,937.85	35,205.74	38,380.60	29,464.28	38,198.17	1,854.89	-23.23%	29.64%
	Poland	WIG Index	47,813.51	49,727.10	45,043.23	37,164.02	52,889.00	4,248.40	-17.49%	42.31%
	Qatar	DSM Index	9,037.91	9,087.76	8,433.03	8,195.02	9,922.52	443.33	-2.82%	21.08%
	Russia	IMOEX Index	2,721.54	2,748.30	2,498.94	2,112.64	3,080.44	204.85	-15.46%	45.81%
	Saudi Arabia	SASEIDX Index	7,087.16	7,228.22	6,762.03	5,959.69	7,983.82	494.50	-11.87%	33.96%

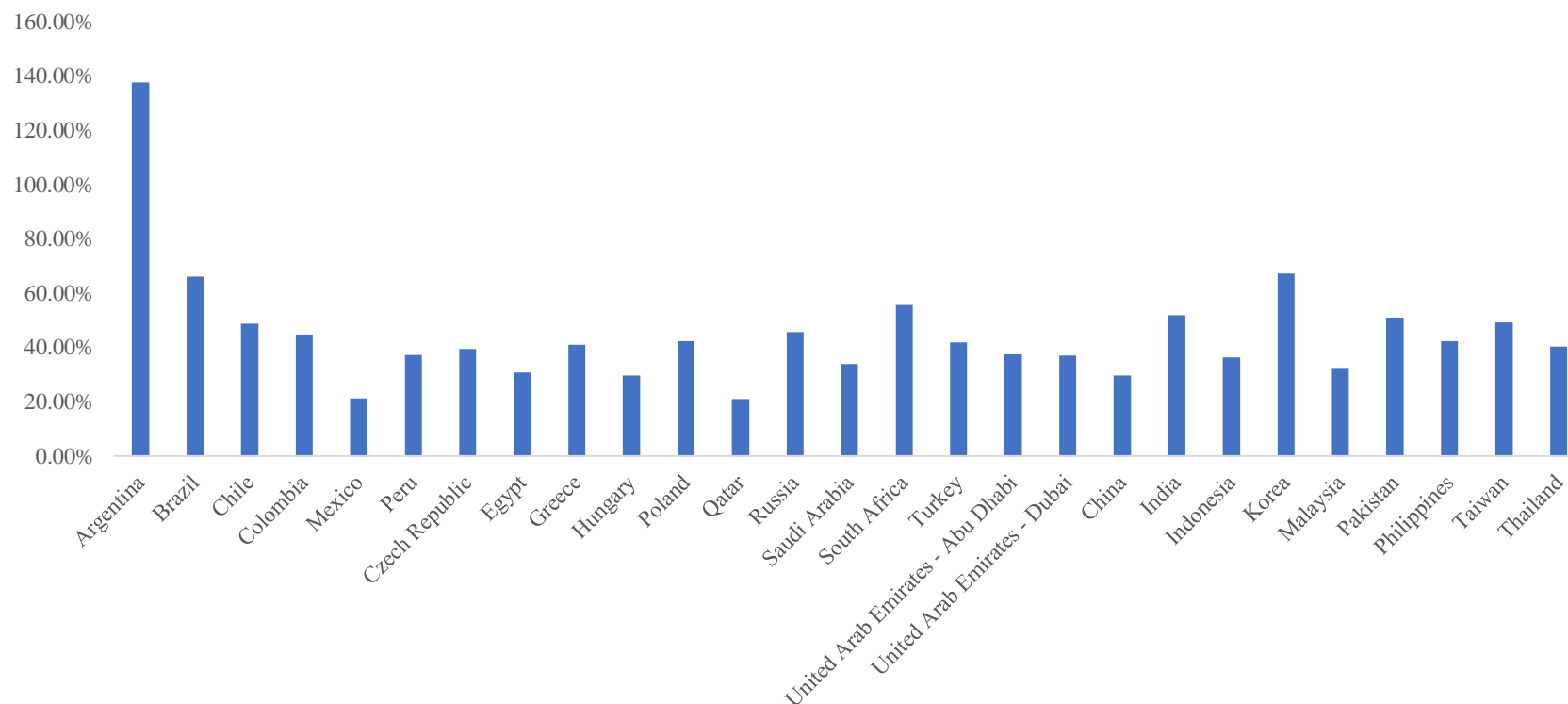
	South Africa	TOP40 Index	47,540.92	49,048.47	44,252.34	34,239.30	53,350.88	4,733.16	-22.63%	55.82%
	Turkey	XU100 Index	1,050.43	1,079.79	1,010.63	842.46	1,195.67	98.31	-16.64%	41.93%
	United Arab Emirates - Abu Dhabi	ADSMI Index	4,164.15	4,256.22	4,262.64	3,323.35	4,569.91	255.67	-22.04%	37.51%
	United Arab Emirates - Dubai	DFMGI Index	2,000.59	2,049.49	2,231.09	1,682.08	2,304.50	143.87	-24.61%	37.00%
Asia	China	SHCOMP Index	3,031.73	2,923.43	2,996.76	2,660.17	3,451.09	244.49	-11.23%	29.73%
	India	SENSEX Index	34,010.42	34,042.09	35,634.95	25,981.24	39,467.31	3,361.30	-27.09%	51.91%
	Indonesia	JCI Index	4,835.86	4,902.95	5,220.83	3,937.63	5,371.47	304.27	-24.58%	36.41%
	Korea	KOSPI Index	2,050.31	2,108.33	1,962.93	1,457.64	2,437.53	223.92	-25.74%	67.22%
	Malaysia	FBMKLCI Index	1,470.36	1,498.83	1,430.47	1,219.72	1,611.42	104.95	-14.73%	32.11%
	Pakistan	KSE100 Index	34,883.75	34,082.13	37,695.75	27,228.80	41,110.93	3,381.52	-27.77%	50.98%
	Philippines	PCOMP Index	5,847.00	5,912.07	6,318.38	4,623.42	6,583.84	397.31	-26.83%	42.40%
	Taiwan	TWSE Index	11,325.62	11,393.23	11,003.54	8,681.34	12,956.11	1,085.48	-21.10%	49.24%
	Thailand	SET Index	1,286.90	1,321.23	1,271.25	1,024.46	1,438.66	96.74	-19.41%	40.43%

Figure 6.3.2A: Emerging markets minimum closing price for the period March 11, 2020 - August 31, 2020



The above Figure compares the maximum drops in emerging markets during the pandemic and illustrates the difference of drop levels among emerging markets. Colombian market had the highest drop, while the Qatari capital market had the lowest.

Figure 7.3.2B: Emerging markets maximum recovery from minimum closing price for the period March 11, 2020 - August 31, 2020

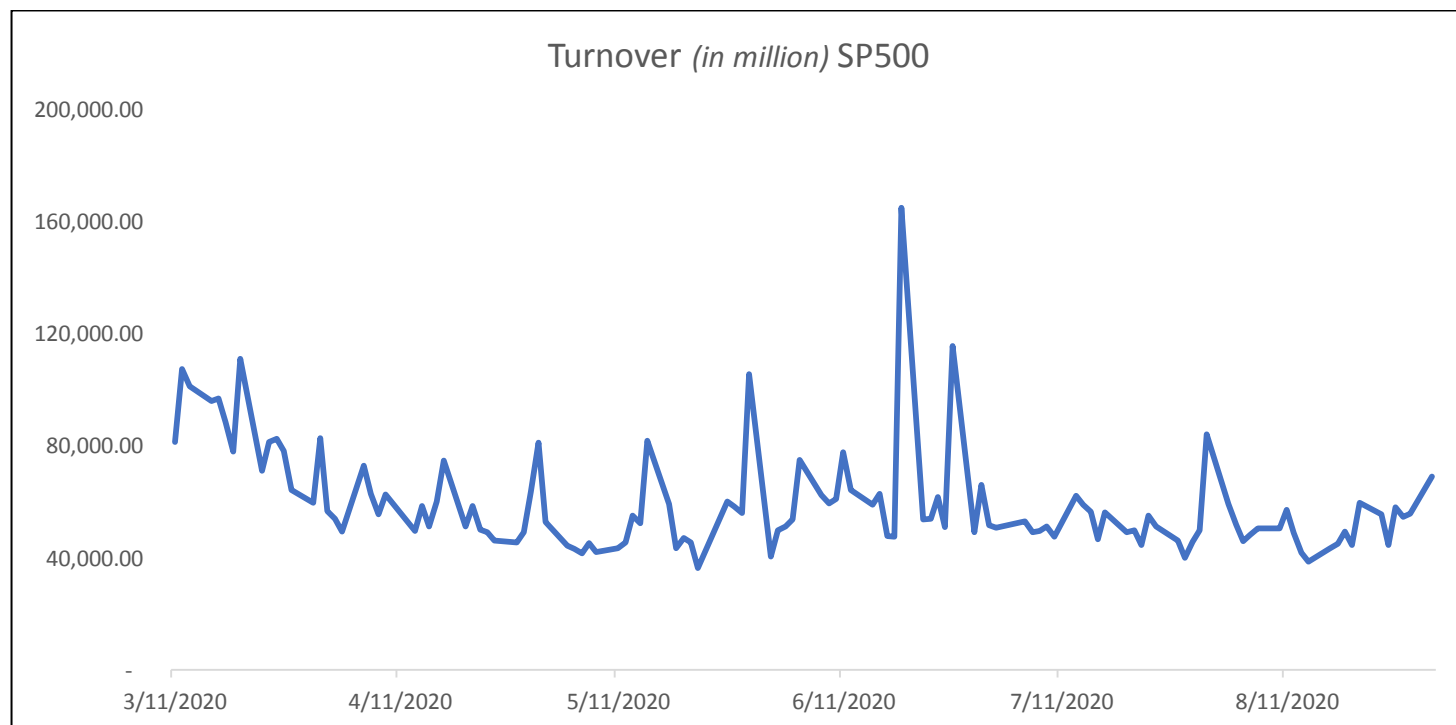


Emerging markets have increased following the maximum drop in indices prices. The above chart illustrates the maximum recovery of developed markets and shows that the Argentinian market had the highest recovery of 137.71%, while Mexican and Qatari indices had the lowest recovery of about 21%.

4.4 Markets turnover for the period March 11, 2020 - August 31, 2020

Turnover of the market is the value of traded shares in country's currency. The trend in most of the markets is in the downward direction with occasional high levels during the study period. Figure 4.4 below shows S&P 500 is an example of the trend for many of the markets, noting that all turnover charts of developed and emerging markets are available in the appendix.

Figure 8.4: SP500 turnover for the period March 11, 2020 - August 31, 2020



4.4.1 Developed markets turnover for the period March 11, 2020 - August 31, 2020

During financial crises or instability of the financial markets, most of the investors prefer to step out from the market and watch out, believing that stop losses at early stages is better than having significant losses later. During COVID-19 pandemic, the trading turnover has been reduced substantially in all developed markets. Table 4.4.1 below, shows the trading turnover in millions and the changes during the pandemic, along with the summary statistics during the study period.

As can be seen from the table, New Zealand, and Canadian markets had the most decline in the trading turnover between March 11, 2020 and August 31, 2020 with 90.20% and 89.34%, respectively. While, the other markets like Denmark, US, and Hong Kong had the least drop with 66.35%, 58.42% and 58.29%, respectively. It is worth noting that, the drop in the trading turnover was high in all markets with more than 50%.

The decline in the trading turnover suggests less liquidity in the markets. This drop can be attributed to two main reasons. First, investors prefer to keep their positions or less buyers are interested to invest in the markets, and this situation decreases the value of traded shares. Second, the drop is due to decline in the market value of shares. Therefore, the low value of traded shares drops the turnover, in this case we should look at market volume which represents the number of traded shares and identify whether the volume has maintained same levels or not. If the volume decreases as well as turnover, then the first reason is the cause of this drop, which is less trading activity, and if the volume continues to maintain the same levels, then the second reason is the cause for this drop, i.e. lower values of traded shares had dropped the turnover. The impact of COVID-19 on the trading volume will be discussed in Section 4.5.

The trading turnover reached high levels during the pandemic when investors resumed trading to benefit from the low levels of market values of shares. For example, New Zealand index had made 3,723.76% times in trading turnover during the pandemic, followed by Canadian index 1,311.42%, while the lowest increases in trading turnover were in Japan, Finland, and Hong Kong with 340.25%, 330.17% and 290.86% times, respectively. The high levels of trading turnover imply that more cash were injected into the markets. This may be due to government intervention and support, which make investors feel more confident on the markets.

Table 4.4.1: Summary statistics: Developed markets turnover for the period March 11, 2020 - August 31, 2020, 2020

Developed markets										
Region	Country	Market name	Average turnover between 11.03.2020 and 31.08.2020 in million	Median in million	Market turnover - the day prior to the pandemic announcement 10.03.2020 in million	Minimum Turnover during the pandemic in million	Maximum turnover during the pandemic in million	Standard deviation in million	Difference between turnovers prior to the pandemic announcement and minimum turnover during the pandemic	Difference between minimum and maximum turnover during the pandemic
Americas	Canada	SPTSX60 Index	5,876.73	5,532.99	12,672.82	1,351.08	19,069.32	2,199.46	-89.34%	1,311.42%
	United States	SPX Index	59,421.00	53,835.00	87,660.31	36,446.00	164,787.33	18,708.00	-58.42%	352.14%
Europe & Middle East	Austria	ATX Index	123.32	105.64	299.47	52.95	441.30	62.02	-82.32%	733.43%
	Belgium	BEL20 Index	655.47	570.01	1,329.57	322.09	1,771.31	2,228.39	-75.77%	449.94%
	Denmark	KFX Index	6,110.12	5,648.65	8,732.45	2,938.11	19,155.35	267.71	-66.35%	551.96%
	Finland	HEX Index	606.68	560.32	948.51	306.82	1,319.85	205.63	-67.65%	330.17%
	France	CAC Index	3,825.79	3,286.17	9,262.37	1,694.89	11,588.54	1,688.06	-81.70%	583.73%
	Germany	DAX Index	4,377.91	3,945.16	9,917.04	1,707.98	12,864.29	1,914.67	-82.78%	653.19%
	Ireland	ISEQ Index	241.64	216.40	420.74	97.15	717.38	101.21	-76.91%	638.47%
	Israel	TA-35 Index	891.34	812.57	2,069.72	191.27	2,613.47	460.46	-90.76%	1266.39%
	Italy	FTSEMIB Index	2,009.57	1,780.20	4,667.39	898.02	5,604.04	857.32	-80.76%	524.04%
	Netherlands	AEX Index	2,353.61	2,098.34	5,012.76	1,139.23	5,557.67	878.33	-77.27%	387.84%
	Norway	OBX Index	4,369.49	4,093.81	8,841.84	1,600.61	8,855.11	1,712.78	-81.90%	453.23%
	Portugal	PSI20 Index	118.70	110.94	260.16	48.68	414.39	52.92	-81.29%	751.17%
	Spain	IBEX Index	1,462.19	1,315.37	2,708.49	634.75	4,117.46	654.57	-76.56%	548.67%
	Sweden	OMX Index	13,124.55	11,996.40	21,735.21	6,391.90	32,300.14	4,848.24	-70.59%	405.33%
	Switzerland	SMI Index	4,171.82	3,695.84	9,743.51	1,776.98	13,337.18	2,122.54	-81.76%	650.55%
	United Kingdom	UKX Index	3,856.82	3,449.13	7,346.17	1,760.57	9,189.77	1,566.12	-76.03%	421.98%
Pacific	Australia	AS51 Index	6,891.36	6,032.47	13,037.01	3,455.98	17,710.44	2,478.15	-73.49%	412.46%
	Hong Kong	HSI Index	42,490.72	39,402.31	56,753.44	23,670.43	92,517.52	13,215.98	-58.29%	290.86%
	Japan	NKY Index	1,455,753.37	1,339,415.15	2,346,843.23	731,284.37	3,219,446.94	460,498.14	-68.84%	340.25%
	New Zealand	NZSE50FG Index	201.16	179.93	231.70	22.70	867.90	110.00	-90.20%	3723.76%
	Singapore	STI Index	1,104.15	961.37	1,868.91	493.62	3,557.19	478.12	-73.59%	620.64%

Figure 4.4.1A shows the maximum turnover drop in developed markets during the pandemic. The trading turnover was declined by more than 90% in two markets, and the lowest drop in turnover was about 60% in two markets, this is still high drop in trading turnover.

Figure 4.4.1A: Developed markets minimum trading turnover for the period March 11, 2020 - August 31, 2020.

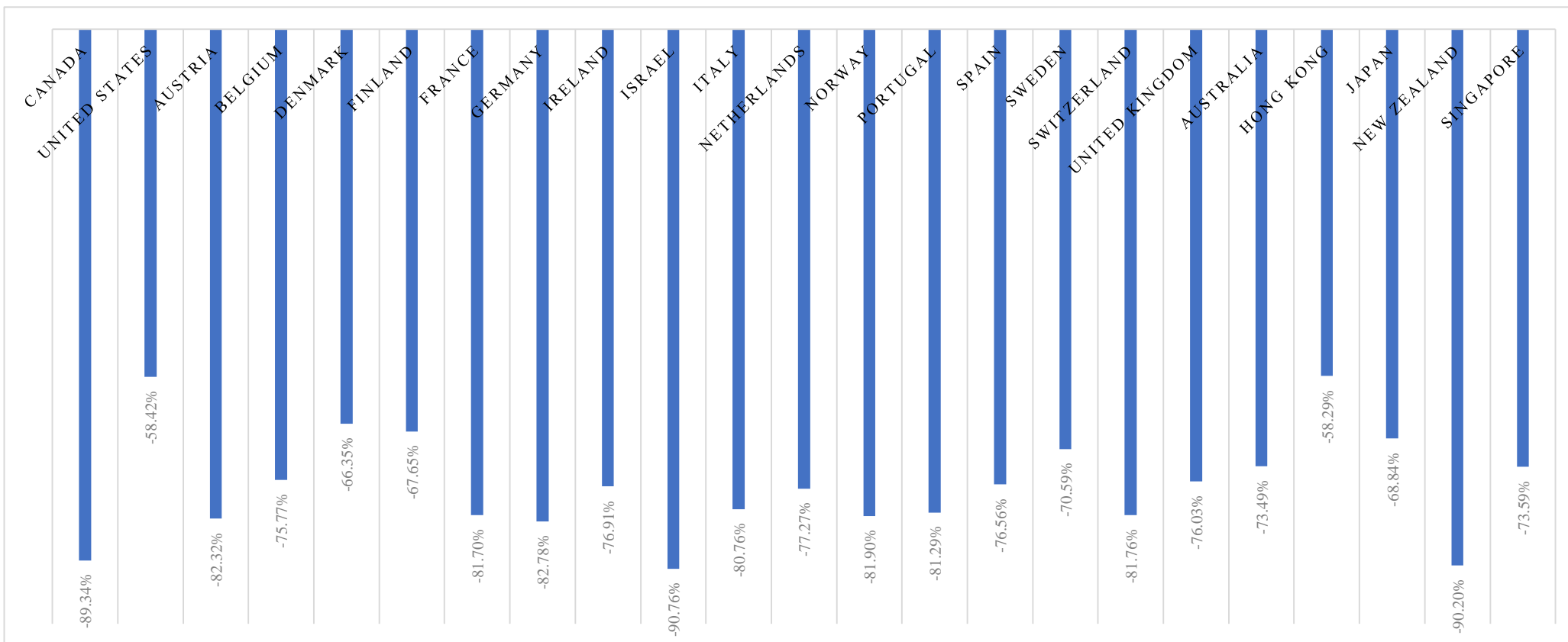
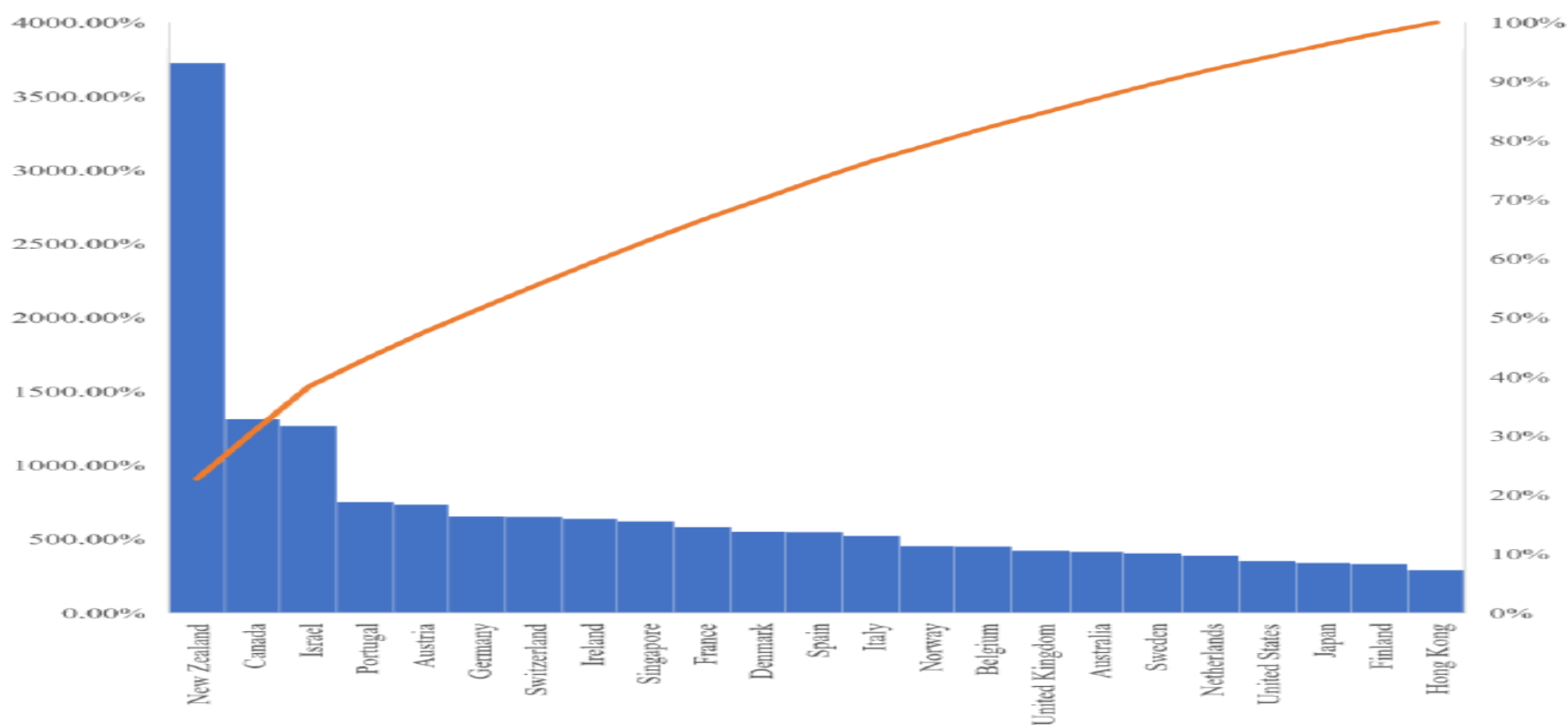


Figure 4.4.1B below illustrates the maximum turnover level achieved during the pandemic for developed markets. NZSE50FG Index in New Zealand turnover had outperformed all the markets and the trading turnover reached to 3723.76% during the period March 11, 2020 - August 31, 2020, while HSI Index in Hong Kong had the lowest increase in trading turnover by 290.86%, and this is less than 10% of the highest recovery.

Figure 4.4.1B: Developed markets maximum turnover percentage from minimum turnover for the period March 11, 2020 - August 31, 2020



4.4.2 Emerging markets turnover for the period March 11, 2020 - August 31, 2020

The analysis shows that emerging markets did not differ significantly from developed markets in response to the pandemic in terms trading volumes. Investors seem to behave in similar way, first they have stopped trading then they have resumed trading heavily afterwards. However, it has been observed some emerging markets have significantly higher levels of turnover as compared to developed markets.

Table 4.4.2 below presents the summary statistics of turnover for all emerging markets along with the percentage changes in minimum turnover level during the pandemic and the percentage changes between minimum and maximum turnover levels during the pandemic. As can be seen from the table, the maximum drops in trading turnovers during the pandemic were in Peru 94.37%, Czech Republic 93.21%, and Colombia 92.27%. While India 34.38%, Turkey 30.13% and Korea 17.81% were less affected. The turnover recovery levels are much higher than developed markets, Peru had significant increase in turnover during the pandemic the increase was 10,568.64%, followed by Saudi Arabia 9,798.70%, and Colombia 6,072.15%. While the lowest turnover increases were in Brazil 228.60%, Taiwan 213.62%, Korea 161.89%.

In the GCC markets, the lowest drop in trading turnover was in Saudi Arabia by 65.93% while Dubai has dropped by 71.07%, followed by Qatar 74.65% and Abu Dhabi 84.84%. On the maximum trading turnover level during the period March 11, 2020 - August 31, 2020, Saudi Arabia outperformed GCC markets in turnover, with an increased by 9,798.70%, then Abu Dhabi 1,582.55% and Dubai 1,065.40%, followed by Qatar 1,017.77%, and those numbers indicate high trading value during the period March 11, 2020 – August 31, 2020. As announced by Alarabiya (2020), Aramco bought 70% of SABIC at USD 69.1 billion, and this deal has increased the turnover for Saudi's index to 9,798.70% level in June, 2020 and made SASEIDX index at the highest turnover level in GCC region.

Table 4.4.2: Summary statistics: Emerging markets turnover for the period March 11, 2020 - August 31, 2020

Emerging markets										
Region	Country	Market name	Average turnover between 11.03.2020 and 31.08.2020 in million	Median in million	Market turnover - the day prior to the pandemic announcement 10.03.2020 in million	Minimum turnover during the pandemic in million	Maximum turnover during the pandemic in million	Standard deviation in million	Difference between turnovers prior to the pandemic announcement and minimum turnover during the pandemic	Difference between minimum and maximum turnover during the pandemic
Americas	Argentina	MERVAL Index	1,048.96	976.34	975.67	326.73	3,870.96	511.86	-66.51%	1,084.74%
	Brazil	IBOV Index	21,292.05	20,926.85	29,946.50	10,278.76	33,776.30	4,034.37	-65.68%	228.60%
	Chile	IPSA Index	114,395.38	103,866.55	87,972.19	36,300.13	443,621.07	53,159.03	-58.74%	1,122.09%
	Colombia	COLCAP Index	113,133.93	95,110.43	175,010.79	13,533.33	835,297.62	95,906.38	-92.27%	6,072.15%
	Mexico	MEXBOL Index	6,247.07	5,554.87	8,020.42	709.16	26,533.54	3,422.84	-91.16%	3,641.55%
	Peru	SPBLPGPT Index	22.20	16.34	29.66	1.67	178.23	21.06	-94.37%	10,568.64%
Europe, Middle East & Africa	Czech Republic	PX Index	543.25	467.60	765.32	51.98	1,357.37	301.95	-93.21%	2,511.31%
	Egypt	EGX30 Index	669.65	648.87	634.26	213.62	1,467.03	234.50	-66.32%	586.75%
	Greece	ASE Index	56.27	47.40	104.12	19.69	389.71	38.33	-81.09%	1,879.31%
	Hungary	BUX Index	13,495.19	12,069.58	27,592.86	2,658.93	35,065.72	6,985.24	-90.36%	1,218.79%
	Poland	WIG Index	1,069.79	1,019.64	1,043.51	412.13	2,693.33	372.25	-60.51%	553.52%
	Qatar	DSM Index	278.68	260.12	374.37	94.89	1,060.67	131.12	-74.65%	1,017.77%
	Russia	IMOEX Index	86,052.75	80,492.29	249,909.08	36,695.96	191,198.62	31,905.99	-85.32%	421.03%
	Saudi Arabia	SASEIDX Index	7,668.82	5,235.11	7,823.05	2,665.58	263,858.15	24,267.35	-65.93%	9,798.70%
	South Africa	TOP40 Index	19,925.71	18,304.44	27,493.49	9,102.06	54,135.66	6,995.21	-66.89%	494.76%
	Turkey	XU100 Index	16,187.47	15,080.97	9,117.39	6,370.13	35,065.54	5,951.10	-30.13%	450.47%
	United Arab Emirates - Abu Dhabi	ADSMI Index	179.21	148.94	253.03	43.42	730.64	112.48	-82.84%	1,582.55%
	United Arab Emirates - Dubai	DFMGI Index	257.33	232.18	406.22	117.54	1,369.78	160.52	-71.07%	1,065.40%
Asia	China	SHCOMP Index	332,693.96	270,846.15	403,613.65	176,647.42	737,914.73	133,524.48	-56.23%	317.73%
	India	SENSEX Index	15,011.07	11,614.69	11,154.56	7,319.68	126,379.22	17,334.41	-34.38%	1,626.57%
	Indonesia	JCI Index	6,777,018.72	6,348,367.83	6,106,692.95	3,513,123.55	16,319,062.48	2,071,456.33	-42.47%	364.52%
	Korea	KOSPI Index	11,951,374.74	11,602,001.31	8,764,352.59	7,203,817.62	18,865,994.19	2,823,703.39	-17.81%	161.89%
	Malaysia	FBMKLCI Index	1,199.04	1,112.81	1,289.96	379.07	4,272.81	534.50	-70.61%	1,027.18%
	Pakistan	KSE100 Index	8,949.50	7,953.36	15,466.01	2,253.50	21,449.12	4,490.06	-85.43%	851.81%
	Philippines	PCOMP Index	4,778.43	4,047.41	6,348.17	1,876.41	19,290.84	2,581.98	-70.44%	928.07%
	Taiwan	TWSE Index	185,878.79	181,813.21	177,576.78	104,485.86	327,688.58	39,093.58	-41.16%	213.62%
	Thailand	SET Index	58,720.15	56,859.47	68,297.85	30,934.40	114,569.91	16,022.47	-54.71%	270.36%

Figure 4.4.2A below shows the maximum percentage drop in trading turnover for emerging markets during the pandemic and illustrates the difference of turnover plunges in emerging markets. Five markets had dropped by more than 90% and four markets had dropped by more than 80%. While the lowest drop in turnover was in Malaysia 17.81%.

Figure 4.4.2A: Emerging markets minimum trading turnover for the period March 11, 2020 - August 31, 2020.

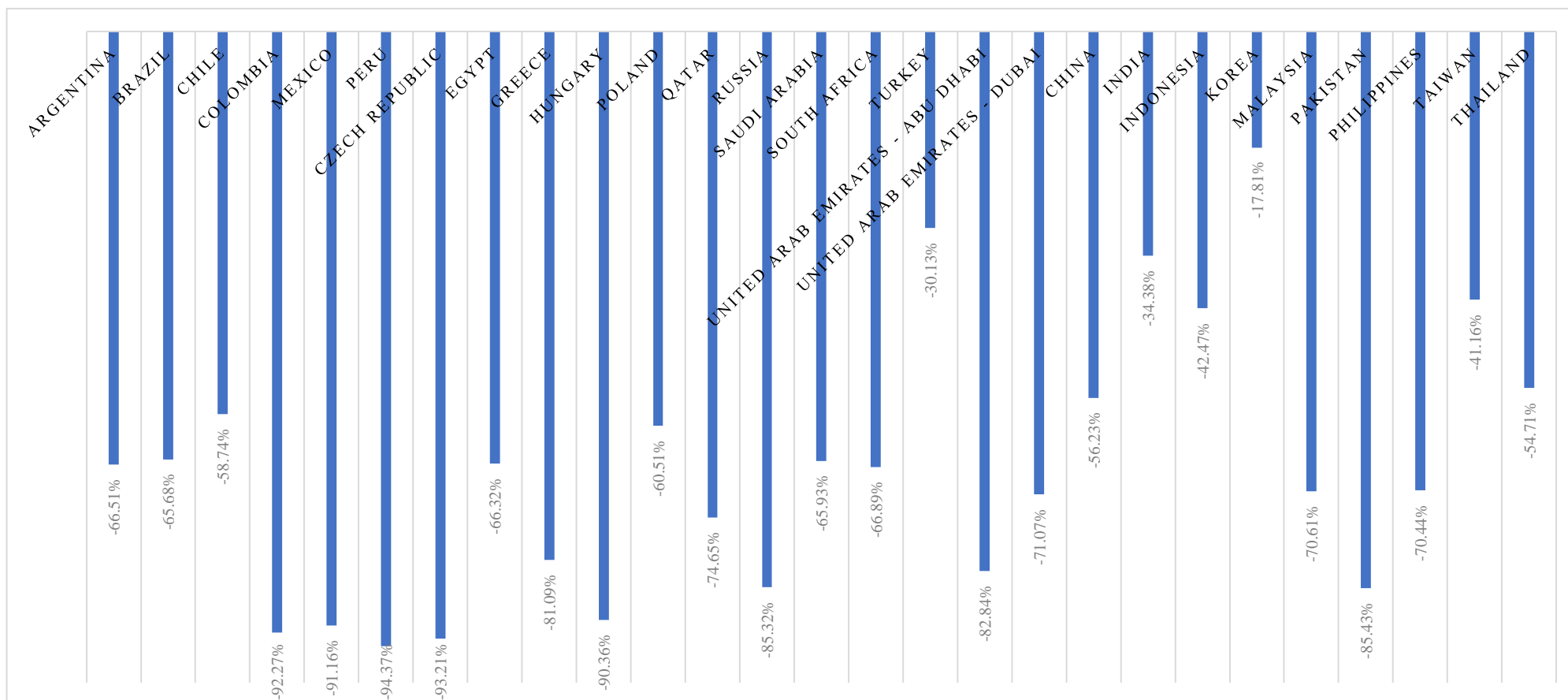
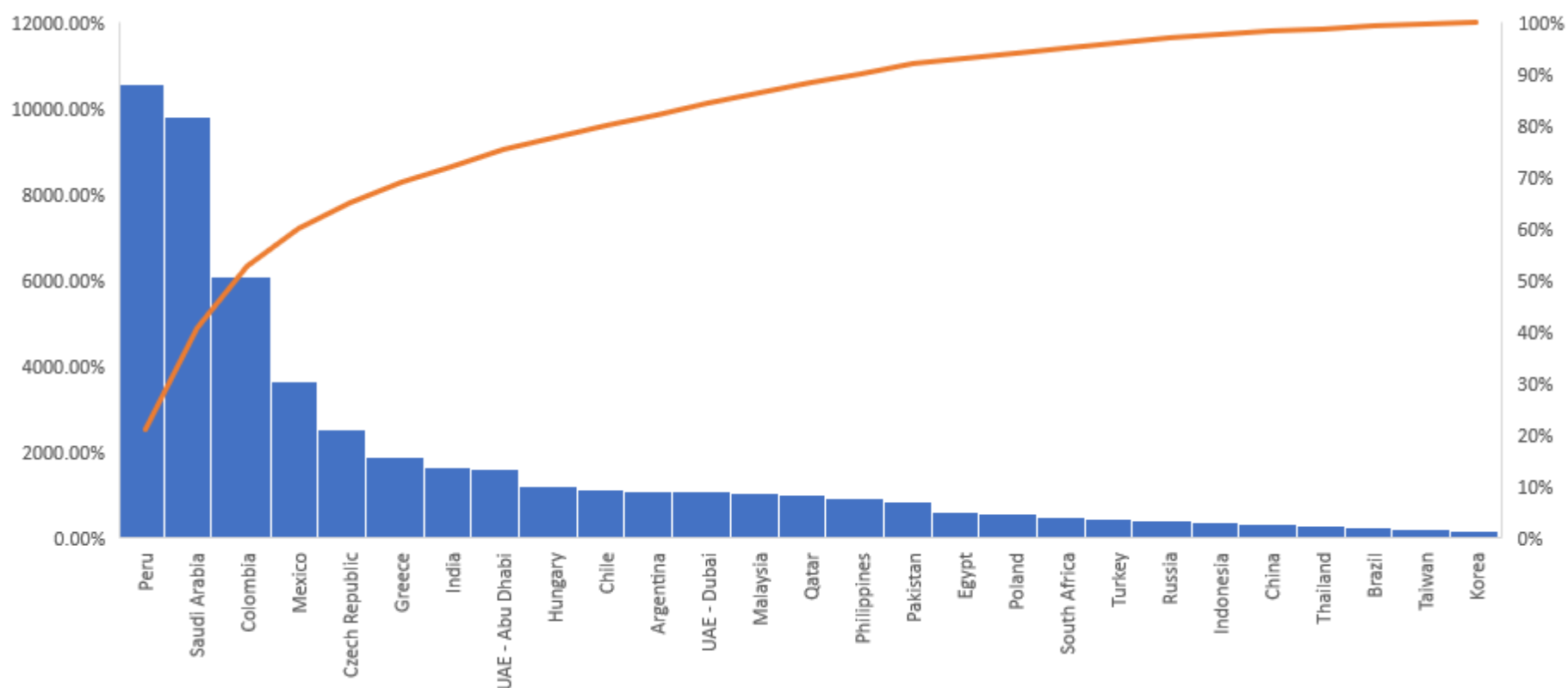


Figure 4.4.2B illustrates the maximum turnover level achieved during the pandemic for emerging markets. For example, S&P/BVL Peru General Index had outperformed all the markets with a trading turnover reached 10,568.64% during the period March 11, 2020 - August 31, 2020, and this increase happened gradually during the pandemic achieving this high level on August 31, 2020. While the Korea Composite Stock Price Index or KOSPI had the lowest increase in trading turnover with 161.89%, and this is almost 1.5% of the highest recovery.

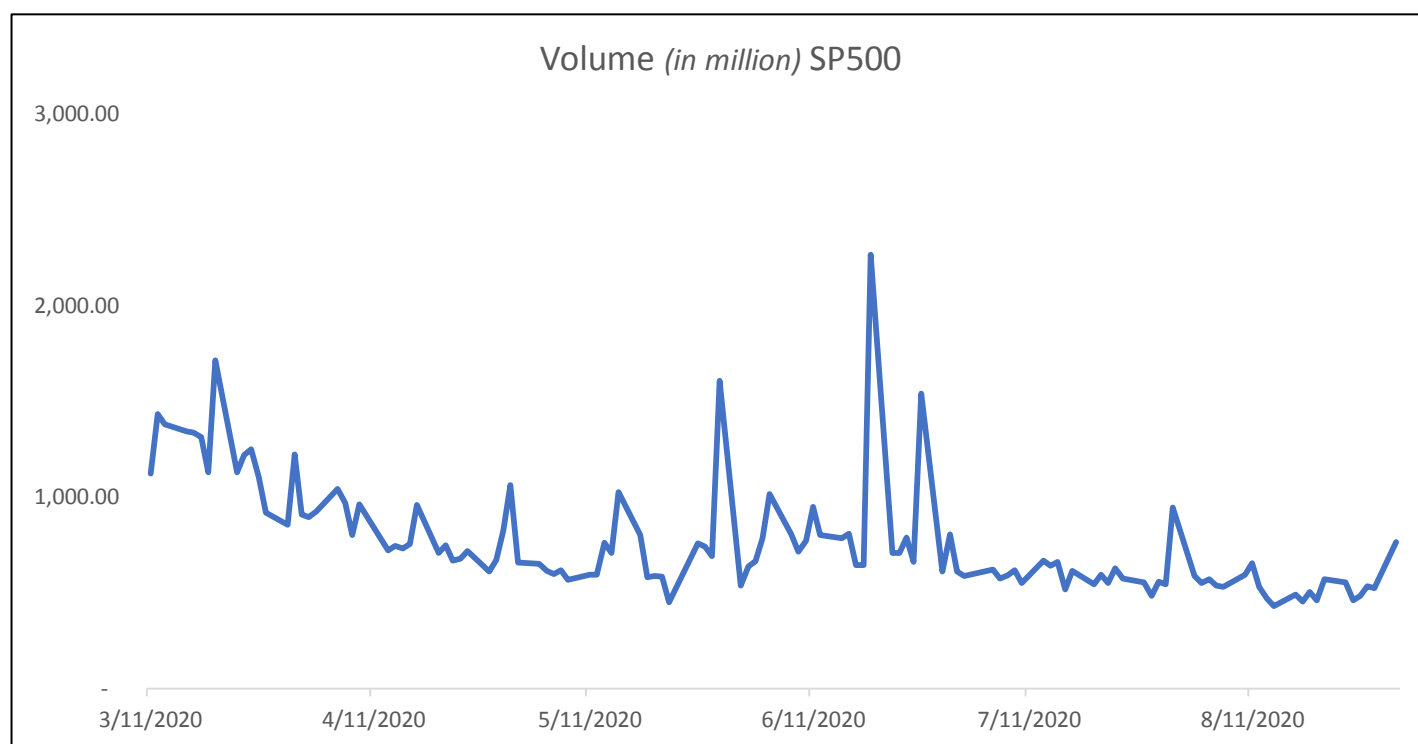
Figure 4.4.2B: Emerging markets maximum turnover percentage from minimum turnover between March 11, 2020 and August 31, 2020



4.5 Trading volume for the period March 11, 2020 - August 31, 2020

Trading volume is the total number of traded shares in a trading day, volume does not have identical chart with turnover, because the turnover is amount traded in value and volume is the number of traded shares. In other words, what 1 dollar buys in a trade at time X will not buy the same number of shares in the next trade at time X+1, because the price keeps moving. Figure 4.5 below illustrates the trading volume for S&P500 during the pandemic. Note that most of other markets have similar pattern. The charts for other developed and emerging markets are available in the appendix.

Figure4.5: SP500 volume for the period March 11, 2020 - August 31, 2020



4.5.1 Developed markets: Trading volume for the period March 11, 2020 - August 31, 2020

Trading volume represents the number of traded shares in the market. Trading volume gets affected during financial crisis and markets instability likewise trading turnover, the trend during the study period was on the downside with occasional high levels, the table below shows the summary statistics of trading volume along with percentage of minimum volume level compared with the day prior to pandemic announcement on March 10, 2020, and the percentage between minimum and maximum volume levels during the pandemic.

The biggest drop in trading volume for the period March 11, 2020 - August 31, 2020 was in Canadian and Norwegian markets, 990.68% and 88.39%, respectively. On the other hand, the lowest decline in trading volume was in Singapore, Hong Kong, and United States, 68.47%, 66.51% and 62.87%, respectively, which means that those markets were trading more activity than other developed markets.

Furthermore, trading volumes have increased massively during some days and the highest 3 rises were in New Zealand 3,993.60%, and Norway 2,292.55%. On the other hand, the lowest rises were in United States 425.73%, Hong Kong 420.99%, and Australia 407.54%. Those percentages indicate the rise in number of traded shares during the tested period within the pandemic, following governments support packages announcement and therefore restoring investors' confidence in capital markets.

Table 4.5.1: Summary statistics: Developed markets volume for the period March 11, 2020 - August 31, 2020

Developed markets										
Region	Country	Market name	Average traded volume between 11.03.2020 and 31.08.2020	Median	Market volume in the day prior to the pandemic announcement 10.03.2020 in million	Minimum volume	Maximum volume during the pandemic	Standard deviation	Difference between volume prior to the pandemic announcement and minimum volume during the pandemic	Difference between minimum and maximum volume during the pandemic
Americas	Canada	SPTSX60 Index	154.05	137.60	302.83	28.22	572.16	75.52	-90.68%	1,927.49%
	United States	SPX Index	767.85	668.87	1,159.35	430.45	2,263.00	295.87	-62.87%	425.73%
Europe & Middle East	Austria	ATX Index	5.89	5.00	13.45	2.43	18.84	3.20	-81.94%	675.46%
	Belgium	BEL20 Index	41.48	37.19	71.86	13.77	118.51	8.12	-80.84%	760.82%
	Denmark	KFX Index	17.62	16.34	27.32	8.15	60.00	19.43	-70.16%	636.13%
	Finland	HEX Index	66.86	60.07	107.98	32.11	169.71	25.35	-70.26%	428.59%
	France	CAC Index	114.94	99.27	280.31	49.32	371.40	55.09	-82.41%	653.08%
	Germany	DAX Index	115.14	103.75	267.40	44.40	390.48	58.38	-83.40%	779.44%
	Ireland	ISEQ Index	37.35	33.53	51.36	11.76	201.54	22.79	-77.11%	1,614.40%
	Israel	TA-35 Index	54.05	48.64	108.46	10.45	265.03	32.54	-90.36%	2435.40%
	Italy	FTSEMIB Index	529.64	475.74	1,096.97	221.32	1,535.61	236.47	-79.82%	593.85%
	Netherlands	AEX Index	129.81	113.94	254.52	56.79	420.31	59.41	-77.69%	640.07%
	Norway	OBX Index	94.11	71.03	166.51	19.33	462.41	63.19	-88.39%	2,292.55%
	Portugal	PSI20 Index	95.31	84.21	217.04	28.27	234.15	47.50	-86.97%	728.20%
	Spain	IBEX Index	328.83	291.66	540.63	141.61	951.07	151.33	-73.81%	571.61%
	Sweden	OMX Index	105.11	93.70	174.31	47.94	305.01	47.49	-72.50%	536.24%
	Switzerland	SMI Index	78.13	68.14	183.36	31.16	255.37	42.94	-83.01%	719.54%
	United Kingdom	UKX Index	991.74	897.02	1,694.48	393.55	2,573.67	441.61	-76.77%	553.97%
Pacific	Australia	AS51 Index	971.49	869.75	1,803.13	482.25	2,447.64	363.36	-73.25%	407.54%
	Hong Kong	HSI Index	2,138.12	1,857.40	3,225.66	1,080.34	5,628.40	886.72	-66.51%	420.99%
	Japan	NKY Index	884.38	786.58	1,646.67	405.89	2,334.06	341.13	-75.35%	475.05%
	New Zealand	NZSE50FG Index	51.08	43.68	47.33	6.29	253.73	28.67	-86.70%	3,931.60%
	Singapore	STI Index	359.13	321.59	473.99	149.43	1,472.75	168.10	-68.47%	885.57%

Figure 4.5.1A below illustrates the maximum percentage drop in trading volume for developed markets during the pandemic. As can be seen, 10 markets had dropped by more than 80% in trading volume and the lowest drop was still above 60%.

Figure 4.5.1A: Developed markets minimum volume for the period March 11, 2020 - August 31, 2020.

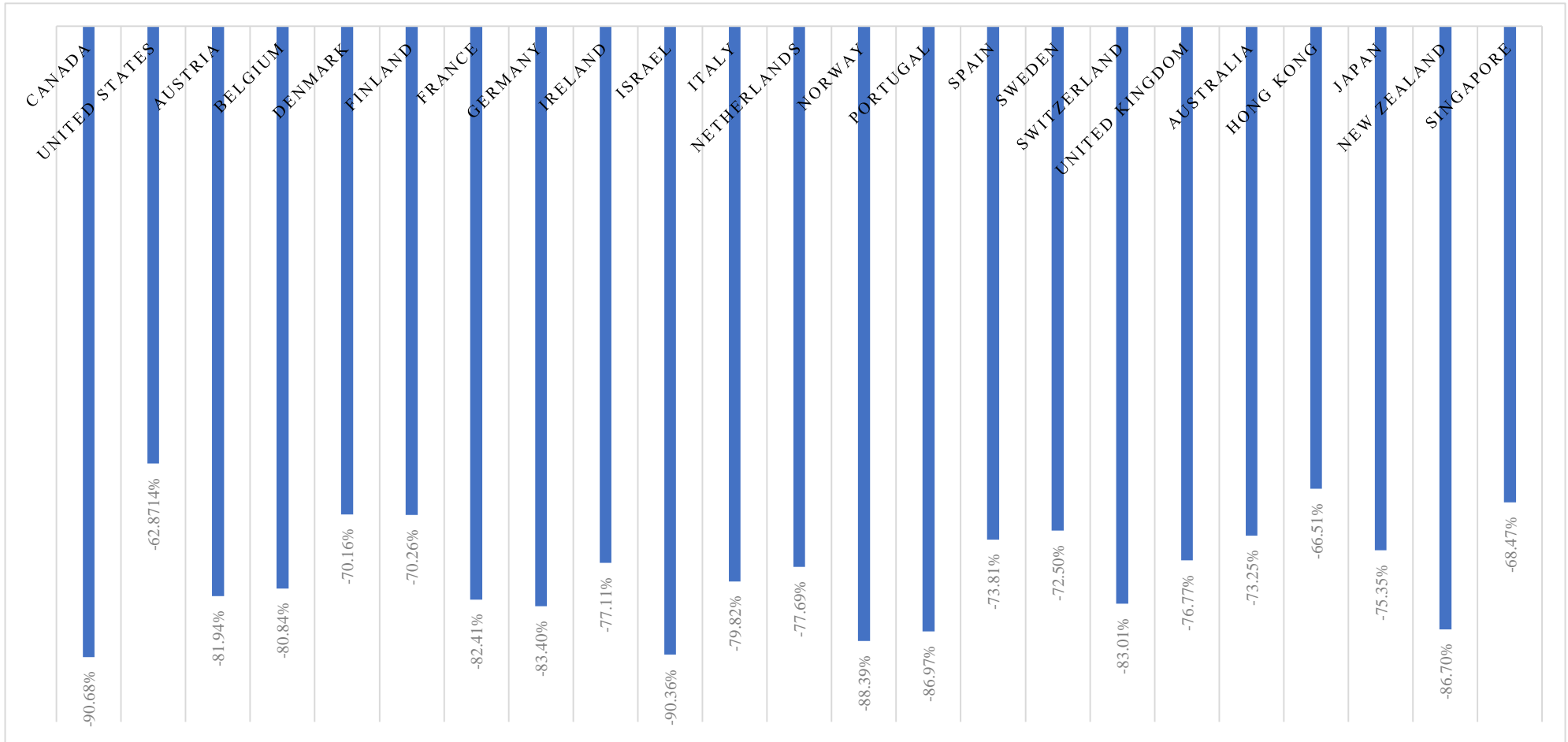
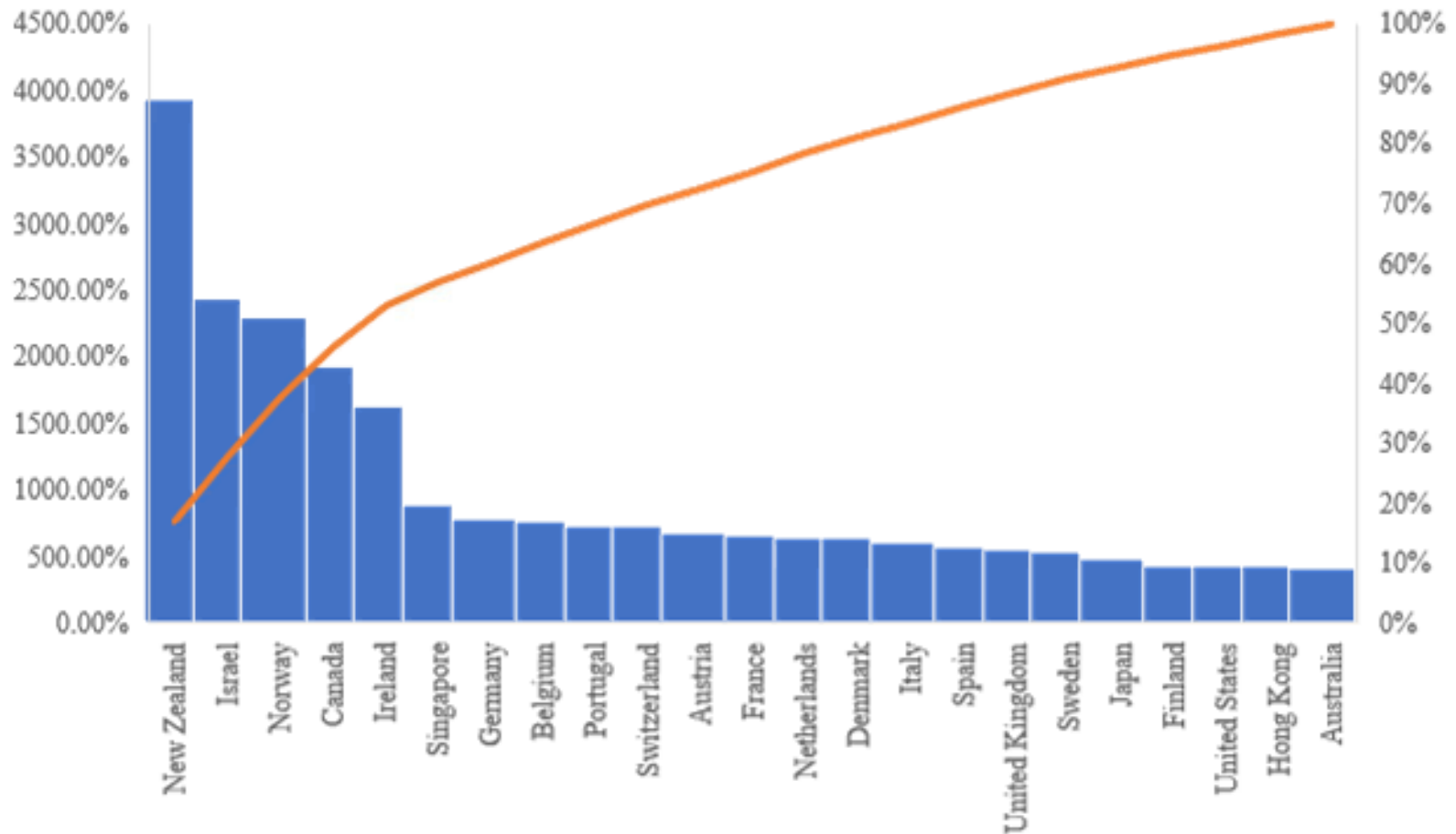


Figure 4.5.1B shows the biggest trading volume recovery among developed markets. The highest recovery was in New Zealand 3931.60 and the lowest recovery was in Australia 407.54%, and this is less than 10% of the highest recovery.

Figure 4.5.1B: Developed markets maximum volume percentage from minimum volume for the period March 11, 2020 - August 31, 2020



4.5.2 Emerging markets: Trading volume for the period March 11, 2020 - August 31, 2020

The trading volume response in emerging markets was similar to developed markets response, the number of traded shares was dropped as well. However, rises are significantly higher in some countries, Table 4.5.2 below shows the summary statistics of all emerging markets' trading volume in millions along with minimum volume level percentage compared with the day prior to pandemic announcement on March 10, 2020, in addition to the difference in percentage between minimum and maximum volume level during the pandemic.

The most drop in trading volumes during the pandemic was in Colombia 93.95%, Mexico 92.44% and Czech Republic 90.51%. However, the lowest decline in trading volume was in Thailand 30.38%, Turkey 23.72%, and Korea 10.85%, which indicates that the investors in Colombia, Mexico, and Czech Republic, reduced their trading activity massively and more than all other emerging capital markets, while the investors in Thailand, Turkey, and Korea were more active in trading than other emerging markets' investors.

Trading volumes have increased massively during some trading days and the highest 3 rises were in Colombia, Peru, and Mexico with 20,646.85%, 6,088.91%, and 4,607.38%, respectively. On the other hand, the lowest rises were in Taiwan, Brazil, and Korea with 173.74%, 213.02% and 248.53%, respectively. Those percentages indicate the rise in number of traded shares during the study period within the pandemic.

Table 4.5.2: Summary statistics: Emerging markets volume for the period March 11, 2020 - August 31, 2020

Emerging markets										
Region	Country	Market name	Average traded volume between 11.03.2020 and 31.08.2020	Median	Market volume in the day prior to the pandemic announcement 10.03.2020 in million	Minimum volume	Maximum volume during the pandemic	Standard deviation	Difference between volume prior to the pandemic announcement and minimum volume during the pandemic	Difference between minimum and maximum volume during the pandemic
sAmericas	Argentina	MERVAL Index	18.55	18.00	25.65	8.40	44.96	6.32	-67.24%	435.19%
	Brazil	IBOV Index	1,068.18	1,027.33	1,353.17	535.16	1,675.15	203.66	-60.45%	213.02%
	Chile	IPSA Index	1,472.56	1,297.64	832.65	481.51	5,637.08	787.35	-42.17%	1070.71%
	Colombia	COLCAP Index	33.50	25.65	36.95	2.23	463.46	45.08	-93.95%	20646.85%
	Mexico	MEXBOL Index	191.69	163.51	260.40	19.68	926.38	119.31	-92.44%	4607.38%
	Peru	SPBLPGPT Index	8.74	6.50	8.19	0.82	50.80	7.31	-89.98%	6088.91%
Europe, Middle East & Africa	Czech Republic	PX Index	3.06	2.46	3.33	0.32	8.71	1.84	-90.51%	2652.63%
	Egypt	EGX30 Index	201.57	181.12	203.40	68.39	682.79	86.14	-66.38%	898.42%
	Greece	ASE Index	42.90	33.12	62.34	10.02	461.52	44.96	-83.92%	4504.92%
	Hungary	BUX Index	4.53	3.82	7.54	1.14	15.19	2.65	-84.92%	1236.25%
	Poland	WIG Index	71.03	64.42	59.08	33.66	175.51	26.55	-43.02%	421.37%
	Qatar	DSM Index	112.68	103.19	106.10	40.15	292.92	51.19	-62.16%	629.46%
	Russia	IMOEX Index	54,685.85	42,074.69	124,049.92	16,423.70	190,582.55	35,179.79	-86.76%	1060.41%
	Saudi Arabia	SASEIDX Index	220.23	210.90	290.00	113.11	478.06	65.65	-60.99%	322.63%
	South Africa	TOP40 Index	221.89	196.74	249.49	76.25	820.50	116.68	-69.44%	976.11%
	Turkey	XU100 Index	3,109.61	2,835.82	1,815.74	1,385.12	7,668.06	1,217.03	-23.72%	453.60%
	United Arab Emirates - Abu Dhabi	ADSMI Index	63.86	54.81	76.42	19.80	180.20	36.05	-74.09%	809.98%
	United Arab Emirates - Dubai	DFMGI Index	260.66	244.58	286.41	101.05	885.35	116.12	-64.72%	776.18%
Asia	China	SHCOMP Index	28,803.65	24,915.41	38,898.60	16,542.38	64,728.63	10,460.09	-57.47%	291.29%

	India	SENSEX Index	24.31	19.81	18.83	12.76	188.28	21.90	-32.22%	1,375.32%
	Indonesia	JCI Index	6,774.95	6,305.26	4,449.40	2,638.37	14,642.96	2,616.75	-40.70%	455.00%
	Korea	KOSPI Index	891.76	854.59	638.56	569.30	1,984.18	220.96	-10.85%	248.53%
	Malaysia	FBMKLCI Index	164.32	144.74	220.29	65.97	595.84	80.24	-70.05%	803.16%
	Pakistan	KSE100 Index	190.11	171.37	225.88	53.91	401.60	83.31	-76.13%	644.94%
	Philippines	PCOMP Index	177.95	151.93	240.03	61.82	626.45	88.63	-74.24%	913.29%
	Taiwan	TWSE Index	3,456.47	3,386.30	3,573.96	2,238.07	6,126.46	718.90	-37.38%	173.74%
	Thailand	SET Index	5,404.93	4,842.92	4,058.74	2,825.54	10,590.70	1,617.66	-30.38%	274.82%

Figure 5.5.2A presents the maximum drop in trading volume for emerging markets during the pandemic, the drop indicates that the traded number of shares was lowered by illustrated percentages in a minimum trading day during the pandemic, 7 markets were dropped more than 80%, and the lowest drop was in Korean capital market (10.85%).

Figure 5.5.2A: Emerging markets minimum volume for the period March 11, 2020 - August 31, 2020.

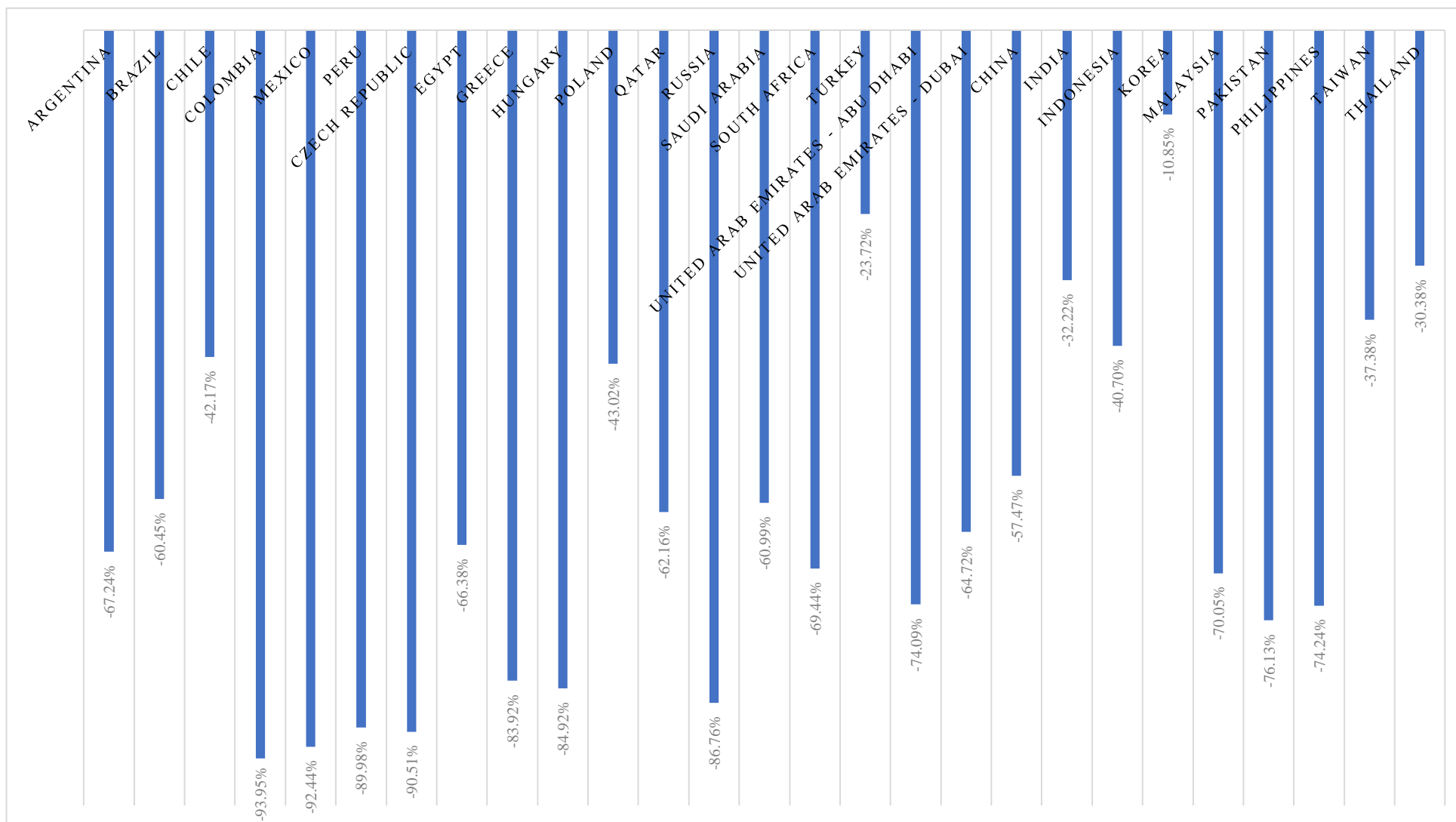
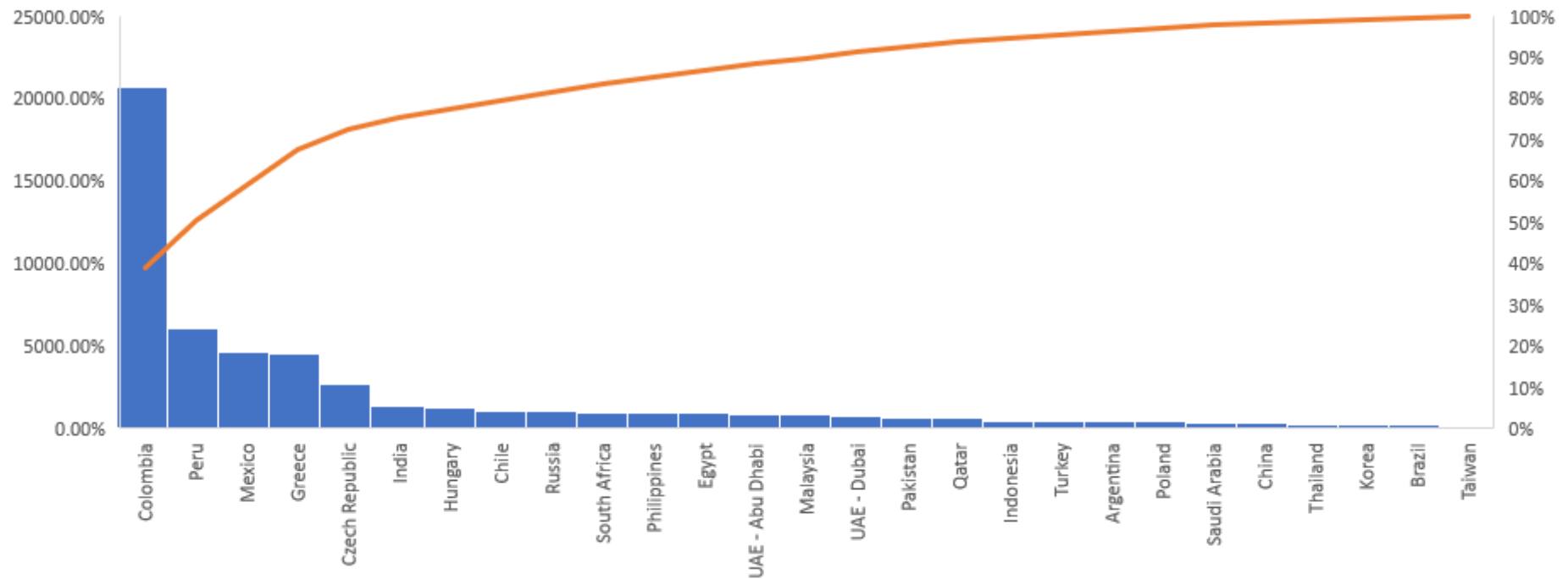


Figure 4.5.2B shows the highest volume recovery in emerging markets and compares those levels within emerging markets, the highest recovery was in Colombian capital market 20,646.85% and the lowest recovery was in TWSE Taiwan Index 173.74%, which represents 0.84% of the highest recovery.

Figure 4.5.2B: Emerging markets maximum volume percentage from minimum volume for the period March 11, 2020 - August 31, 2020



4.6 P/E ratios & Earnings for the period March 11, 2020 - August 31, 2020

This section discusses the P/E ratios of all developed and emerging markets. The P/E ratio is the price to earnings for a company or index. As shown earlier, the impact of COVID-19 on developed and emerging markets' indices was positive during the pandemic. However, the circumstances were not in favor of making positive returns during quarantine period, and negative businesses performance. Hence, P/E ratio will help us to assess markets' conditions and find whether the increase of indices prices was because of positive indices performance only or decrease in earnings (i.e. the denominator of P/E ratio is earning, so a decrease in earnings will artificially enlarge the P/E ratio).

In general, high P/E ratio is a positive sign for investors, and companies with high P/e ratios have good potential growth. However, during crisis and pandemics, investors should look at P/E ratio from a different perspective. Investors should look at price and earnings separately, not only on the overall P/E ratio.

During COVID-19 pandemic, P/E ratios had increased because of two reasons. First, the governments intervention to support the financial markets which pushed stock prices, and secondly because of the drop in earnings.

Figure 4.6A illustrates P/E ratio and earnings of S&P500, which is an example representing the response of most capital markets. As discussed previously, the positive performance of most of the capital markets reflects on the P/E ratios. This section discusses markets earning along with P/E ratios of capital markets and how P/E ratios have responded to the changes.

Figure 4.6A: Example SP500 P/E ratio for the period March 11, 2020 - August 31, 2020

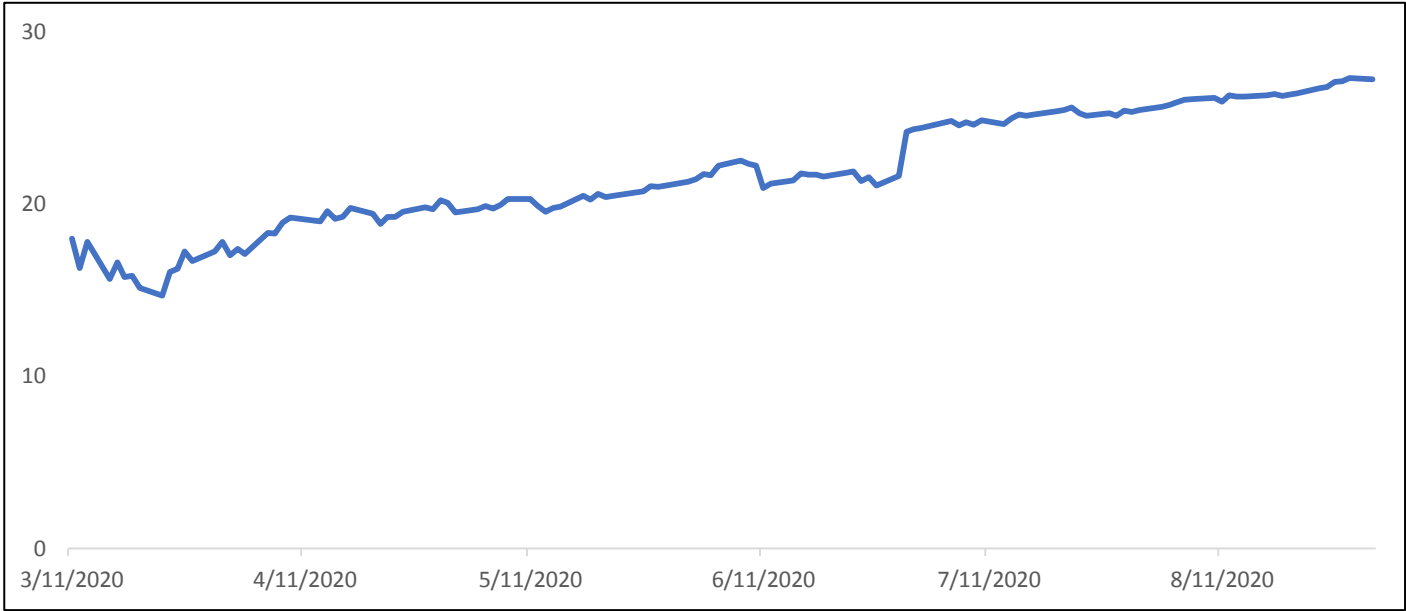
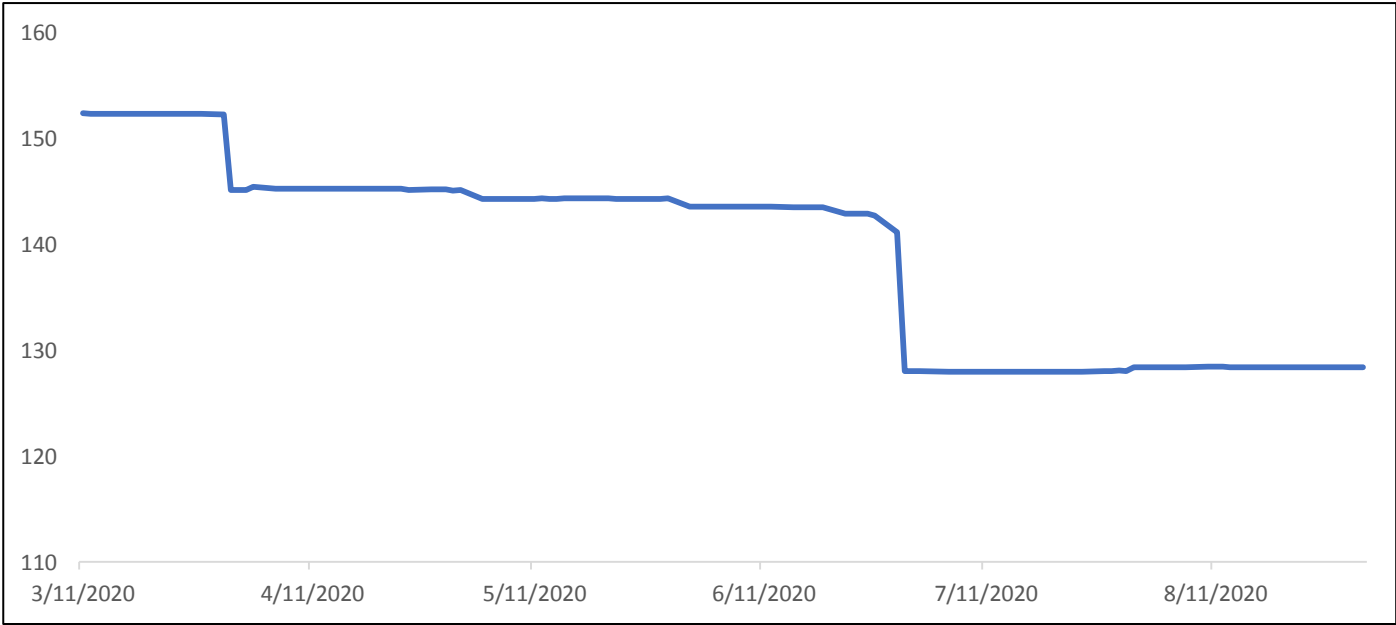


Figure 4.6B: Example SP500 earnings for the period March 11, 2020 - August 31, 2020



4.6.1 Developed markets: P/E ratio & Earnings for the period March 11, 2020 - August 31, 2020

During the first period of the pandemic and when market indices used to make negative returns, earnings did not respond instantly. Hence, P/E ratios used to decrease on the early days of the pandemic, because of the drop in prices only. Afterwards, markets earning have responded negatively to the crises. In the meantime, governments support packages helped market indices to recover, and the double effect of higher indices and lower earnings, made P/E ratios increase.

The section below sections discusses each market P/E ratio and earnings for the period March 11, 2020 - August 31, 2020

Below sections discuss each market P/E ratio and earnings for the period March 11, 2020 - August 31, 2020

4.6.1.1 Developed markets P/E ratio for the period March 11, 2020 - August 31, 2020

Table 4.6.1.1 shows the summary statistics of P/E ratios for all developed markets, in addition to the percentage drop in P/E ratios comparing to the day prior the pandemic announcement March 10,2020. Also table shows the minimum P/E ratios during pandemic along with the difference between the minimum and maximum P/E ratios during the pandemic.

As can be seen from the table, P/E ratios have dropped during the period March 11, 2020 - August 31, 2020, with a maximum drop in Austria 30.94%, Belgium 25.39% and Ireland 25.04% and a minimum drop in Switzerland 12.57%, Denmark 12.15%, and Norway 11.62%. On the other hand, P/E ratios have risen from the minimum level in most countries with a maximum increase in Italy 704.43%, United Kingdom 598.60% and Netherlands 437.19% and a lowest increase in Hong Kong 59.09%, Denmark 58.05%, and

Switzerland 41.42%. The P/E ratios chart of S&P500 shows upward performance following a slight drop in the beginning of the pandemic, this is because of the positive return, as discussed earlier, and the finding justifies the positive P/E ratios from one side, this section examines indices earning, to have the full picture behind the positive P/E ratios.

Table 4.6.1.1: Summary statistics: Developed markets P/E ratios for the period March 11, 2020 - August 31, 2020, 2020

Developed markets										
Region	Country	Market name	Average P/E ratio between 11.03.2020 and 31.08.2020	Median	Market P/E ratio in the day prior to pandemic announcement1 10.03.2020	Minimum P/E ratio	Maximum ratio during the pandemic	Standard deviation	Difference between P/E ratio prior to the pandemic announcement and minimum P/E during the pandemic	Difference between minimum and maximum P/E during the pandemic
Americas	Canada	SPTSX60 Index	17.48	17.09	14.19	10.90	22.09	3.10	-23.14%	102.62%
	United States	SPX Index	21.79	21.35	18.92	14.69	27.32	3.38	-22.3593%	85.9973%
Europe & Middle East	Austria	ATX Index	11.19	10.11	8.51	5.88	14.98	2.71	-30.94%	155.02%
	Belgium	BEL20 Index	16.61	13.94	13.07	9.75	24.12	3.30	-25.39%	147.30%
	Denmark	KFX Index	28.17	28.39	23.26	20.44	32.30	5.12	-12.15%	58.05%
	Finland	HEX Index	19.10	19.07	16.86	13.77	23.66	3.01	-18.30%	71.78%
	France	CAC Index	28.29	19.53	16.88	13.67	47.14	13.72	-19.02%	244.77%
	Germany	DAX Index	27.55	23.35	18.29	14.74	41.44	8.74	-19.41%	181.21%
	Ireland	ISEQ Index	28.35	19.71	16.73	12.54	49.43	14.49	-25.04%	294.19%
	Israel	TA-35 Index	22.89	24.30	17.31	14.81	26.34	3.04	-14.44%	77.83%
	Italy	FTSEMIB Index	42.65	22.37	13.00	10.84	87.20	30.68	-16.65%	704.43%
	Netherlands	AEX Index	39.63	21.27	16.90	14.09	75.71	26.32	-16.63%	437.19%
	Norway	OBX Index	40.23	40.29	19.37	17.12	50.99	9.70	-11.62%	197.84%
	Portugal	PSI20 Index	16.26	15.84	13.77	10.59	19.35	2.29	-23.07%	82.68%
	Spain	IBEX Index	24.19	25.39	16.50	13.51	30.16	4.86	-18.15%	123.31%
	Sweden	OMX Index	16.89	17.67	12.20	10.26	19.60	2.33	-15.91%	91.06%
	Switzerland	SMI Index	21.16	20.83	19.36	16.93	23.94	1.94	-12.57%	41.42%
	United Kingdom	UKX Index	49.05	22.49	17.11	14.37	100.41	37.51	-16.01%	598.60%
Pacific	Australia	AS51 Index	24.29	18.43	17.77	13.60	37.22	9.42	-23.46%	173.72%
	Hong Kong	HSI Index	11.34	10.68	10.09	8.62	13.72	1.46	-14.56%	59.09%
	Japan	NKY Index	28.07	27.17	17.56	14.63	37.77	7.32	-16.68%	158.22%
	New Zealand	NZSE50FG Index	40.70	31.80	23.40	18.25	66.86	18.85	-22.01%	266.39%
	Singapore	STI Index	13.91	11.17	10.97	8.65	20.42	4.30	-21.09%	136.00%

The decrease in P/E ratios was between 11.62% in OBX Index and 30.94% in ATX Index, those percentages present the drop in P/E ratios at the beginning of the pandemic, the reason of this reduction is due to the decline in indices prices only. However, P/E ratios have increased for the rest of the period.

In addition, the average of P/E ratio for the period March 11, 2020 - August 31, 2020 indicates the overall effect of indices prices increase, and indices earning decrease. Higher P/E ratios in this case is not a good indicator when earnings are low. The highest average P/E ratios were in United Kingdom 49.05%, Italy 42.65%, and New Zealand 40.70%, and the lowest average P/E ratios were in Singapore 13.91%, Hong Kong 11.34% and Austria 11.19% as illustrated in chart below.

Figure 4.6.1.1A : Developed markets average P/E ratio for the period March 11, 2020 - August 31, 2020

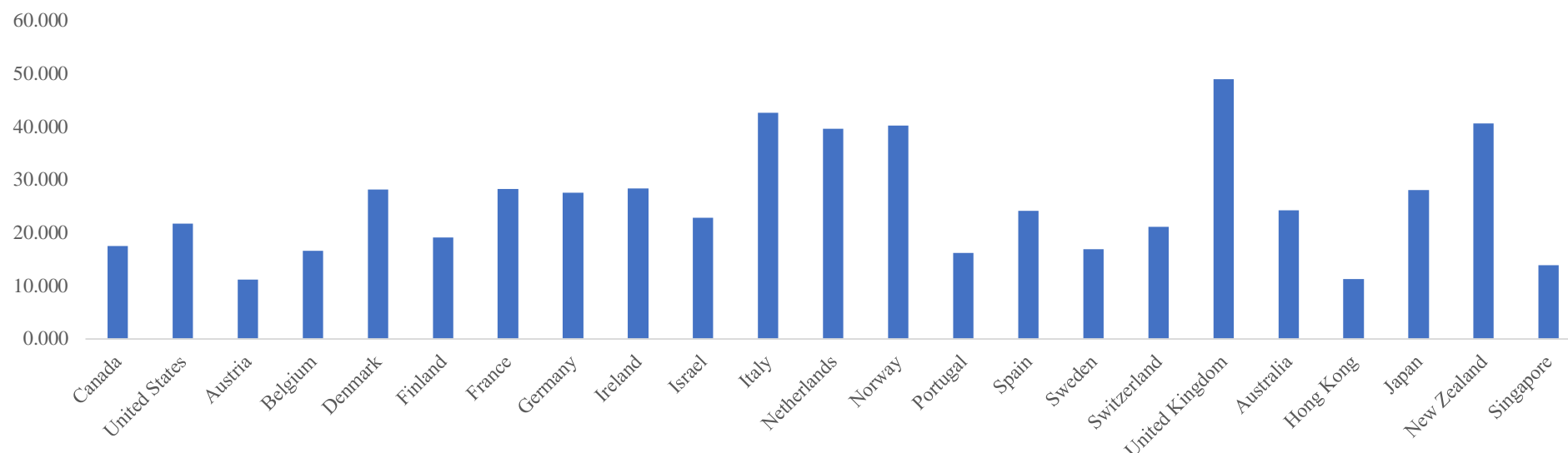
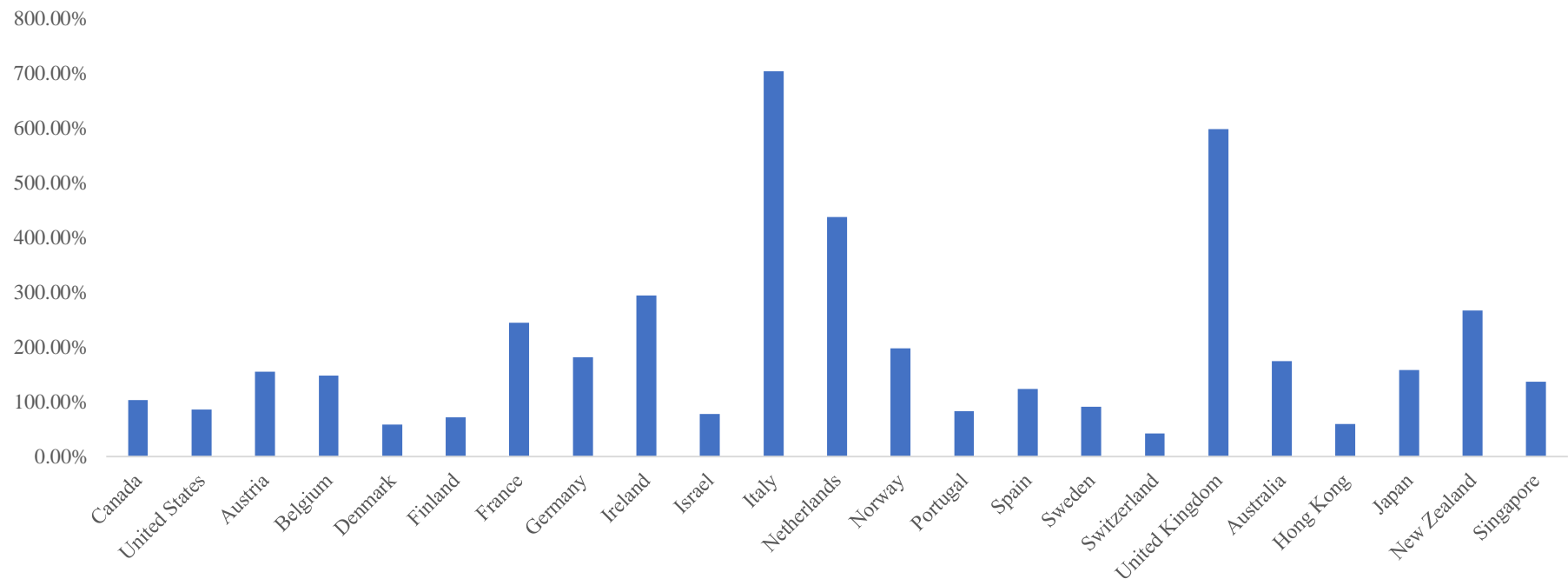


Figure 4.6.1.1B below illustrates the maximum increase in P/E ratios among developed markets during the pandemic, the highest increases were in Italy, UK, and Netherlands capital markets, noting that those 3 markets are not the top 3 indices in positive performance as shown earlier. Therefore, indices earnings should be examined. The lowest increase in P/E ratios was in, Switzerland, Denmark, Hong Kong, and Finland.

Figure 4.6.1.1B: Developed markets maximum P/E ratio percentage to minimum P/E ratio for the period March 11, 2020 - August 31, 2020.



4.6.1.2 Developed markets earnings for the period March 11, 2020 - August 31, 2020

Companies earning were hit strongly during the pandemic, and therefore impacted market indices negatively in few and sharp decreases, below table contains the summary statistics of markets earning along with the percentage of markets earning prior to pandemic announcement and the minimum earnings during the pandemic.

Table 4.6.1.2: Summary statistics: Developed markets earning for the period March 11, 2020 - August 31, 2020, 2020

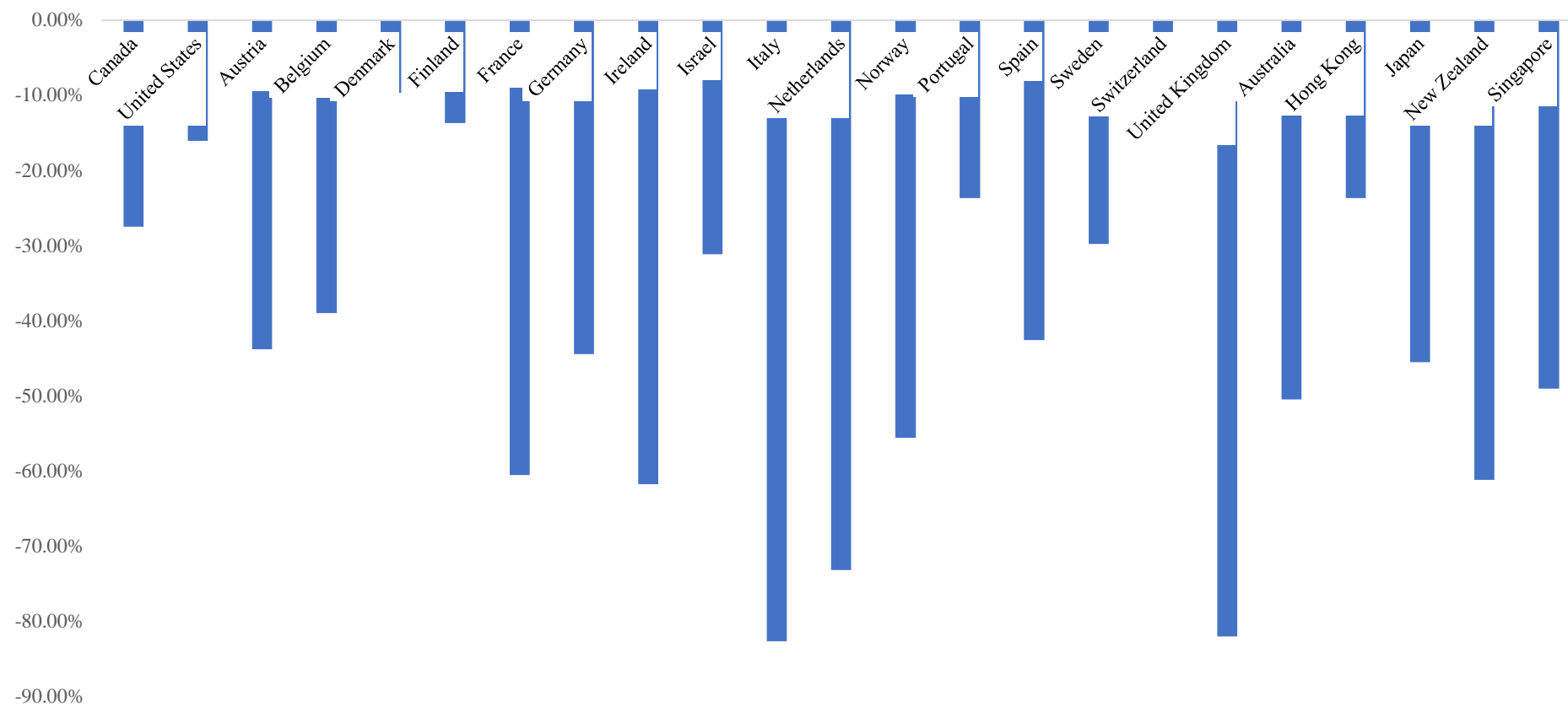
Developed markets									
Region	Country	Market name	Average market earnings between 11.03.2020 and 31.08.2020	Median	Market earnings in the day prior to the pandemic announcement 10.03.2020	Minimum earnings	Maximum markets earning during the pandemic	Standard deviation	Difference between markets earning prior to the pandemic announcement and minimum earnings during the pandemic
Americas	Canada	SPTSX60 Index	52.97	54.17	62.99	45.69	63.04	5.66	-27.47%
	United States	SPX Index	139.34	143.52	152.33	127.95	152.33	8.85	-16.01%
Europe & Middle East	Austria	ATX Index	205.28	225.10	277.55	156.06	277.55	41.46	-43.77%
	Belgium	BEL20 Index	206.393	238.126	241.398	147.328	273.168	46.242	-38.97%
	Denmark	KFX Index	43.035	43.495	45.983	41.533	45.983	1.432	-9.68%
	Finland	HEX Index	469.794	487.579	496.103	428.346	502.653	32.851	-13.66%
	France	CAC Index	200.680	251.201	274.611	108.374	274.612	71.687	-60.54%
	Germany	DAX Index	449.016	496.481	572.785	318.258	576.862	92.624	-44.44%
	Ireland	ISEQ Index	249.086	304.415	348.311	133.115	348.279	90.435	-61.78%
	Israel	TA-35 Index	61.234	57.418	79.086	54.488	79.905	7.824	-31.10%
	Italy	FTSEMIB Index	689.780	854.863	1374.111	237.667	1412.697	382.814	-82.70%
	Netherlands	AEX Index	19.399	25.626	28.673	7.678	30.032	9.123	-73.22%
	Norway	OBX Index	18.985	17.872	34.201	15.197	34.213	5.821	-55.57%

	Portugal	PSI20 Index	266.380	276.555	307.822	234.971	339.938	28.361	-23.67%
	Spain	IBEX Index	300.692	263.026	452.201	259.693	452.202	72.733	-42.57%
	Sweden	OMX Index	97.308	91.810	125.696	88.270	125.944	10.985	-29.77%
	Switzerland	SMI Index	465.483	482.048	474.918	437.351	484.410	22.113	-7.91%
	United Kingdom	UKX Index	205.710	275.479	348.264	62.626	348.403	112.257	-82.02%
Pacific	Australia	AS51 Index	262.947	316.929	334.321	165.511	334.656	75.026	-50.49%
	Hong Kong	HSI Index	2178.163	2288.377	2516.178	1920.093	2516.184	212.047	-23.69%
	Japan	NKY Index	793.063	821.357	1131.540	616.693	1131.543	160.373	-45.50%
	New Zealand	NZSE50FG Index	320.718	350.080	465.728	180.880	465.728	114.159	-61.16%
	Singapore	STI Index	200.981	234.506	258.255	131.683	258.255	52.360	-49.01%

Figure 4.6.1.2 below shows the negative earnings of all developed markets. All developed markets had negative earnings and the most harmed markets were Italy, United Kingdom, and Netherlands, their earnings have dropped during the pandemic by 82.70%, 82.02%, and 73.22%, respectively. Those are the markets which had the highest P/E ratios as discussed in previous previously.

On the other hand, the lowest earning declines were in Finland 13.66%, Denmark 9.68%, and Switzerland 7.91%, and those markets had the lowest increase in P/E ratios. Below chart illustrates the percentages of the decline in developed markets earning.

Figure 4.6.1.2: Developed markets minimum earnings between March 11, 2020 and August 31, 2020



4.6.2 Emerging markets: P/E ratios & Earnings for the period March 11, 2020 - August 31, 2020

Similar to developed markets, all emerging markets had a drop in P/E ratios during the first period of the pandemic, due to the drop in price indices and slow market earnings response. Afterwards, P/E ratios started increasing gradually, this is due the increase in indices price and reduction in earnings.

4.6.2.1 Emerging markets P/E ratio for the period March 11, 2020 - August 31, 2020

Table 4.6.2.1 below shows the summary statistics, in addition to the difference between P/E ratios prior to pandemic announcement on March 10, 2020 and the minimum P/E ratios during pandemic, along with the difference between minimum and maximum P/E ratios during pandemic.

Generally, P/E ratios have dropped during the period March 11, 2020 - August 31, 2020, and the maximum decline was in Indonesia 47.98%, Colombia 34.27%, and Argentina 32.72%. On the other hand, the lowest drop was in Saudi Arabia 11.88%, China 11.08%, and Qatar 4.59%. Furthermore, the maximum increase from the minimum level was in Argentina 4,130.91%, Peru 564.29%, and Brazil 511.47% and the lowest increase was in China 49.35%, Egypt 48.30%, and Qatar 24.62%. Noting that P/E ratio for Greece is not available. Therefore, ASE Index earnings are unknown.

P/E ratios of emerging markets show upward performance following a slight drop in the beginning of the pandemic, the positive return as discussed earlier justifies the positive P/E ratios from one side which is the increase in indices price, this part examines the earnings of indices, to have both components of P/E ratio equation.

Table 4.6.2.1: Summary statistics: Emerging markets P/E ratio for the period March 11, 2020 - August 31, 2020

Emerging markets										
Region	Country	Market name	Average P/E ratio between 11.03.2020 and 31.08.2020	Median	Market P/E ratio on the day prior to the pandemic announcement 10.03.2020	Minimum P/E ratio	Maximum ratio during the pandemic	Standard deviation	Difference between P/E ratio prior to the pandemic announcement and minimum P/E during the pandemic	Difference between minimum and maximum P/E during the pandemic
Americas	Argentina	MERVAL Index	69.54	10.35	6.8012	4.58	193.58	80.20	-32.73%	4,130.91%
	Brazil	IBOV Index	43.29	35.25	16.9073	11.65	71.25	20.48	-31.08%	511.47%
	Chile	IPSA Index	21.78	23.14	14.5616	10.29	28.33	5.16	-29.34%	175.31%
	Colombia	COLCAP Index	11.18	11.51	11.8897	7.81	12.91	1.17	-34.27%	65.23%
	Mexico	MEXBOL Index	18.83	18.13	15.1667	12.64	23.10	2.91	-16.68%	82.78%
	Peru	SPBLPGPT Index	50.12	30.04	18.3756	14.38	95.54	31.29	-21.73%	564.29%
Europe, Middle East & Africa	Czech Republic	PX Index	10.77	10.58	10.4911	7.94	12.72	1.29	-24.36%	60.33%
	Egypt	EGX30 Index	10.38	10.41	10.2389	8.01	11.87	0.84	-21.81%	48.30%
	Greece	ASE Index	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hungary	BUX Index	11.85	10.68	9.7532	7.49	15.95	2.83	-23.23%	112.98%
	Poland	WIG Index	18.48	19.29	12.9564	10.70	21.52	2.69	-17.40%	101.08%
	Qatar	DSM Index	14.48	14.44	13.5801	12.96	16.15	0.83	-4.59%	24.62%
	Russia	IMOEX Index	7.50	6.90	5.829	4.93	9.83	1.46	-15.46%	99.47%
	Saudi Arabia	SASEIDX Index	23.30	22.50	19.8528	17.49	29.14	3.44	-11.88%	66.60%
	South Africa	TOP40 Index	16.12	15.80	13.6514	10.52	19.34	2.41	-22.91%	83.79%
	Turkey	XU100 Index	8.67	8.67	7.8641	6.56	10.54	1.20	-16.64%	60.71%
	United Arab Emirates - Abu Dhabi	ADSMI Index	14.25	14.58	12.238	9.54	16.68	1.71	-22.04%	74.81%
	United Arab Emirates - Dubai	DFMGI Index	6.74	6.49	6.3721	4.89	8.71	1.06	-23.22%	78.10%
Asia	China	SHCOMP Index	15.71	14.85	14.15	12.58	18.79	1.84	-11.08%	49.35%
	India	SENSEX Index	23.63	23.02	21.6646	15.80	29.38	3.84	-27.09%	86.00%
	Indonesia	JCI Index	10.20	9.89	15.9389	8.29	16.08	2.02	-47.98%	93.90%

	Korea	KOSPI Index	24.44	25.49	20.0852	14.92	29.61	3.50	-25.72%	98.49%
	Malaysia	FBMKLCI Index	19.85	18.94	15.964	13.61	24.55	3.41	-14.73%	80.34%
	Pakistan	KSE100 Index	9.10	8.82	9.2434	6.68	10.98	1.07	-27.73%	64.31%
	Philippines	PCOMP Index	15.77	14.60	13.9935	10.24	20.77	3.27	-26.83%	102.84%
	Taiwan	TWSE Index	18.91	19.22	17.8929	14.13	21.34	1.73	-21.04%	51.07%
	Thailand	SET Index	19.16	19.39	14.5856	11.76	22.70	3.06	-19.39%	93.10%

The decrease in P/E ratios was between 11.08% in SHCOMP Index and 47.98% in JCI Index, those percentages present the drop in P/E ratios at the beginning of the pandemic, and the reduction was because of the decline in indices price only. However, P/E ratios had increased for the rest of the period.

In addition, the average of P/E ratios for the period March 11, 2020 - August 31, 2020 indicates the overall effect of indices price increase and indices earning decrease. Higher P/E ratios in this case is not a good indicator when earnings declined. The highest average P/E ratios was in Argentina 69.54%, Peru 50.12%, and Brazil 43.29%. While the lowest P/E ratios was in Turkey 8.67%, Russia 7.5%, and United Arab Emirates- Dubai 6.74%, as shown in the chart below.

Figure 4.6.2.1A : Emerging markets average P/E ratio for the period March 11, 2020 - August 31, 2020

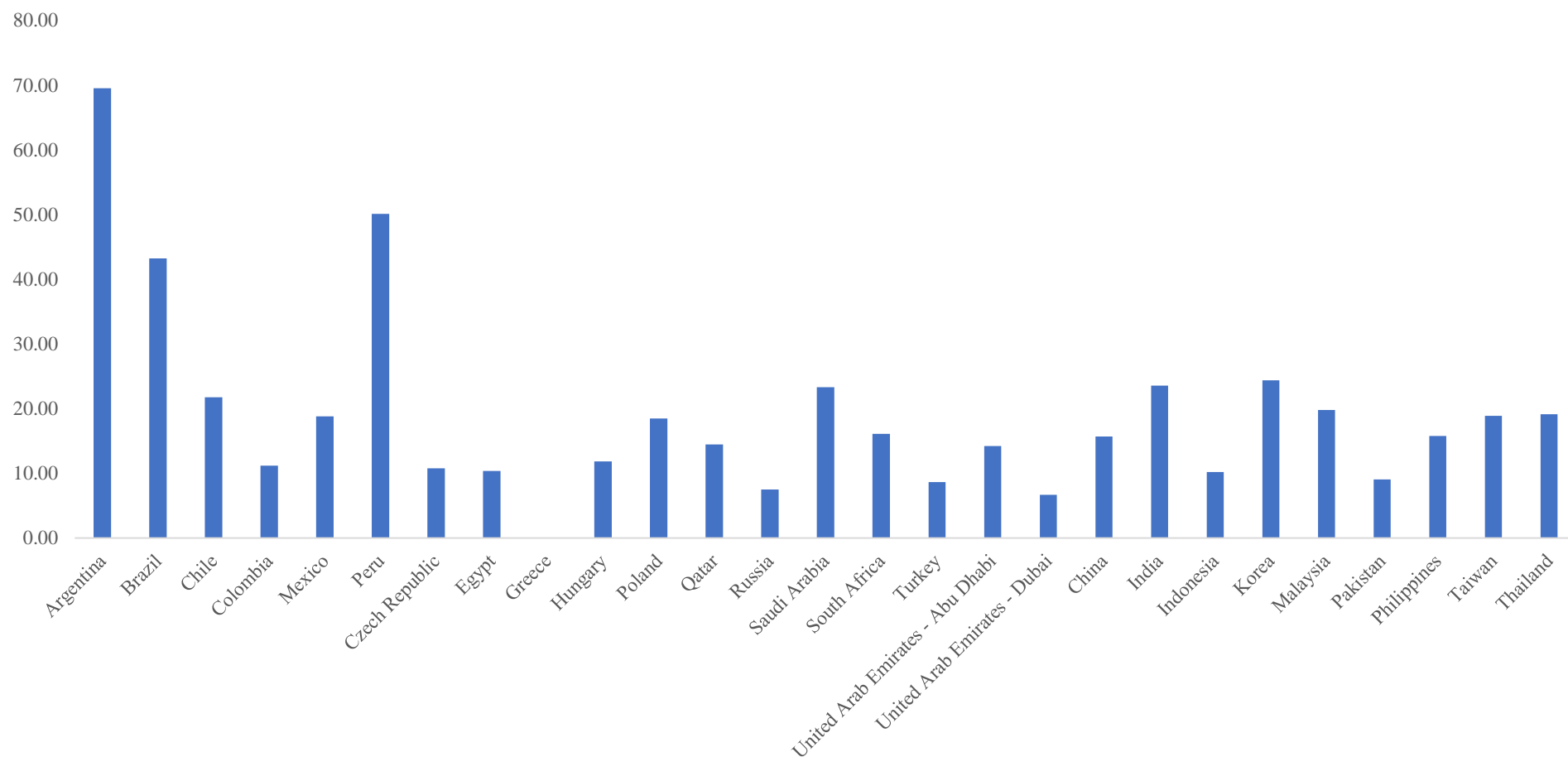
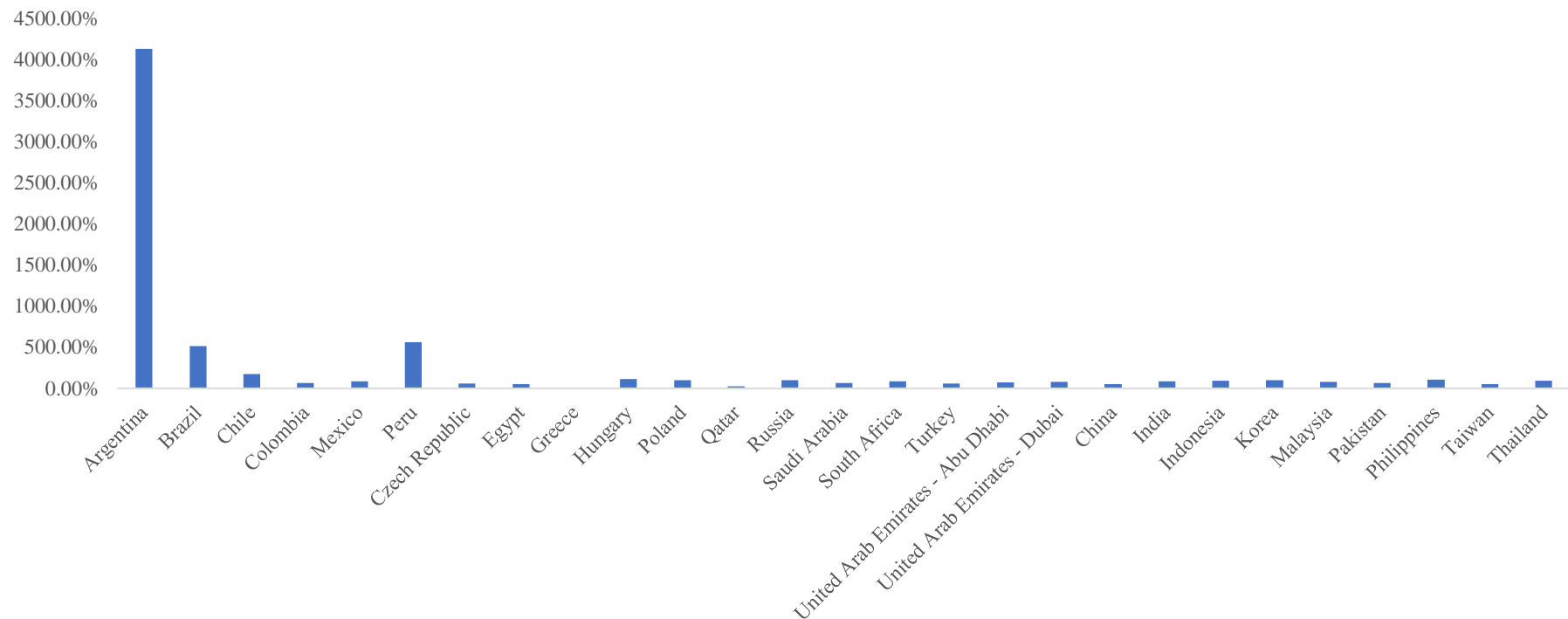


Figure 4.6.2.1B below illustrates the maximum increase in P/E ratios among emerging markets during the pandemic, the highest increase was in Argentina, Peru, and Brazilian capital markets, noting that only Argentinian capital market was one of the top three indices in positive performance, and Argentinian index outperformed all other indices in positive returns as per shown earlier. Therefore, indices earning should be examined in the following section. In addition, the lowest increase in P/E ratios was in the following capital markets, Qatar, Egypt, and China.

Figure 4.6.2.1B: Emerging markets maximum P/E ratio to minimum P/E ratio for the period March 11, 2020 - August 31, 2020



4.6.2.2 Emerging markets earning for the period March 11, 2020 - August 31, 2020

The same strong hit has affected companies earning in emerging markets during the pandemic, and almost the same sharp and few declines impacted the indices earning. The table below contains the summary statistics of markets' earnings along with the percentage of markets earnings prior to pandemic announcement and the minimum earnings during the pandemic.

Table 4.6.2.2: Summary statistics: Emerging markets earning for the period March 11, 2020 - August 31, 2020

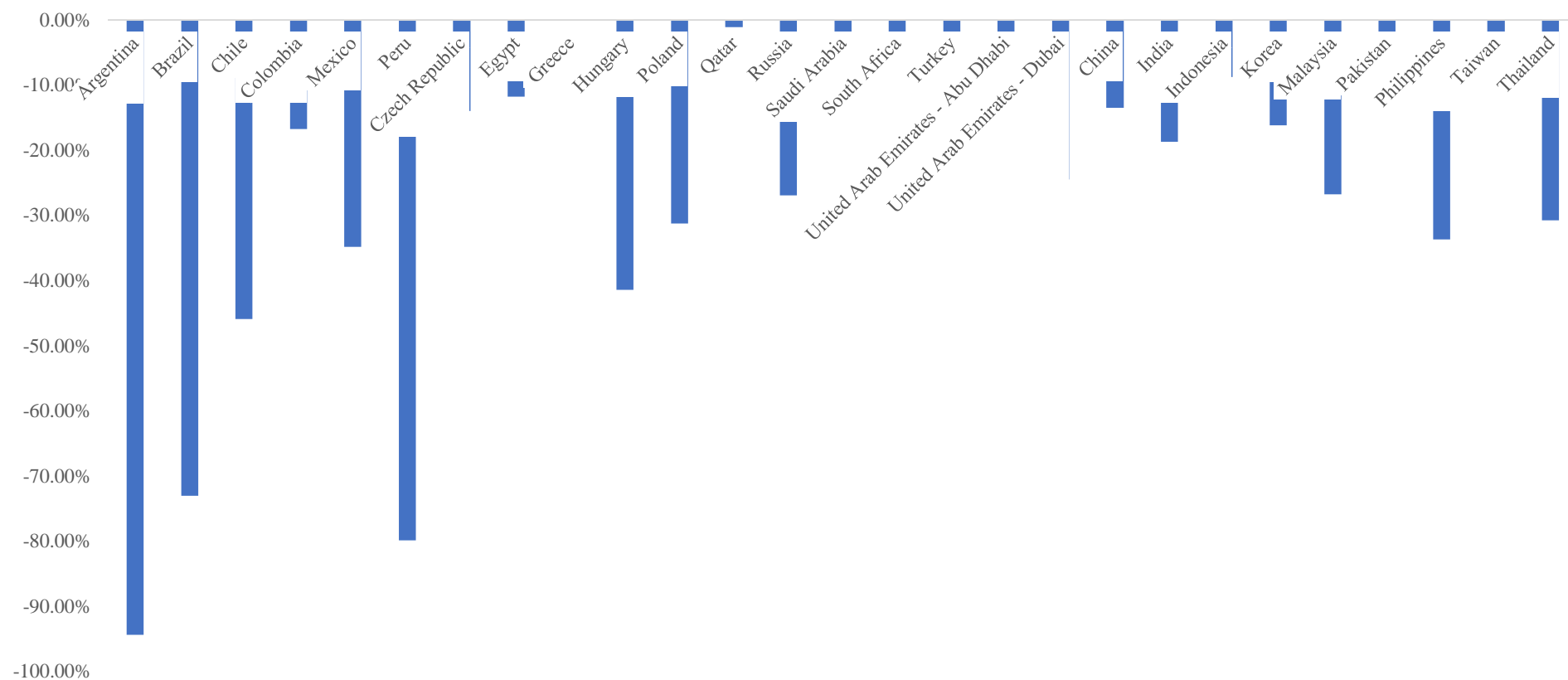
Emerging markets									
Region	Country	Market name	Average markets earning between 11.03.2020 and 31.08.2020	Median	Market earnings on the day prior to Pandemic announcement 10.03.2020	Minimum earnings	Maximum markets earning during the pandemic	Standard deviation	Difference between markets earning prior to pandemic announcement and minimum earnings during the pandemic
Americas	Argentina	MERVAL Index	2733.40	4125.36	4827.42	271.23	4827.42	1921.02	-94.38%
	Brazil	IBOV Index	2547.97	2645.91	5454.12	1471.59	5461.61	1197.09	-73.02%
	Chile	IPSA Index	186.52	164.30	279.52	151.25	279.52	47.22	-45.89%
	Colombia	COLCAP Index	102.06	97.86	114.40	95.30	115.03	8.32	-16.70%
	Mexico	MEXBOL Index	1992.44	2069.84	2608.70	1700.94	2608.70	277.77	-34.80%
	Peru	SPBPLPGPT Index	457.34	527.78	965.99	194.17	965.99	243.41	-79.90%
Europe, Middle East & Africa	Czech Republic	PX Index	82.57	87.00	87.00	74.90	87.10	5.90	-13.92%
	Egypt	EGX30 Index	1013.96	1019.90	1093.86	965.46	1093.84	36.21	-11.74%
	Greece	ASE Index	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hungary	BUX Index	3093.41	3440.97	3935.18	2306.73	4046.84	621.70	-41.38%
	Poland	WIG Index	2628.43	2496.37	3476.52	2392.02	3510.40	327.03	-31.20%
	Qatar	DSM Index	624.63	632.46	620.98	614.49	632.46	8.40	-1.05%
	Russia	IMOEX Index	371.64	399.07	428.71	313.38	440.58	46.16	-26.90%
	Saudi Arabia	SASEIDX Index	307.71	322.06	340.61	273.95	346.67	25.22	-19.57%

	South Africa	TOP40 Index	2973.53	3053.19	3241.60	2758.31	3253.97	177.08	-14.91%
	Turkey	XU100 Index	122.02	126.10	128.51	113.12	128.52	6.58	-11.98%
	United Arab Emirates - Abu Dhabi	ADSMI Index	294.69	294.39	348.31	273.99	348.31	22.40	-21.34%
	United Arab Emirates - Dubai	DFMGI Index	301.31	315.21	350.13	264.48	350.13	29.56	-24.46%
Asia	China	SHCOMP Index	193.79	194.91	211.79	183.36	211.55	8.25	-13.42%
	India	SENSEX Index	1455.18	1472.20	1644.85	1337.91	1644.85	102.14	-18.66%
	Indonesia	JCI Index	489.22	503.77	327.55	298.94	540.67	79.34	-8.74%
	Korea	KOSPI Index	84.47	82.70	97.73	81.93	97.89	4.90	-16.16%
	Malaysia	FBMKLCI Index	75.41	79.01	89.61	65.64	90.03	8.17	-26.74%
	Pakistan	KSE100 Index	3844.52	3846.12	4078.13	3709.23	4078.76	106.68	-9.05%
	Philippines	PCOMP Index	382.62	422.97	451.52	299.62	451.54	59.97	-33.64%
	Taiwan	TWSE Index	598.77	589.12	614.97	588.04	614.97	10.57	-4.38%
	Thailand	SET Index	68.38	69.28	87.16	60.36	87.18	8.11	-30.74%

Figure 4.6.2.2 below shows the maximum negative earnings of all emerging markets during the pandemic. All emerging markets had negative earnings, and the most affected markets were Argentina 94.38%, Peru 79.90%, and Brazil 73.02%. Those are the markets who had the highest P/E ratios as discussed in previously.

On the other hand, the lowest earning reductions were in Indonesia 8.74%, Taiwan 4.38%, and Qatar 1.05%, and this is the reason of the low increase in P/E ratios. Below chart illustrates the percentages of the decline in developed markets earning.

Figure 4.6.2.2: Emerging markets minimum earnings for the period March 11, 2020 - August 31, 2020



4.7 EGARCH for the period March 11, 2020 - August 31, 2020

Following Ali, Alam & Rizvi (2020), the present study employed the exponential generalized autoregressive conditional heteroskedastic (EGARCH) model to examine the volatility of financial markets like previous studies, who found that EGARCH model does better fit than GARCH model, because the EGARCH model has more stability in optimizing routines and does not have constraints on parameters. Therefore, EGARCH presides over other models and can be described as (Ali et al., 2020, p. 4):

$$\ln \sigma_{j,t}^2 = \omega_t + \beta_j \ln(\sigma_{j,t-1})^2 + \gamma \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|\varepsilon_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \quad (1)$$

$\sigma_{j,t}^2$: Since the estimation is ahead one-period for the variance calculated on any previous applicable data, $\sigma_{j,t}^2$ indicates the conditional variance.

ω_t : A conditional density function.

α : reflects the symmetrical effect of the model, for example, the GARCH effect.

β : Calculates the persistence of conditional volatility independent of market fluctuations.

γ : Measures the leverage impact.

Markets volatility during the pandemic is high, and the high volatility is due to the drop of indices prices and their recovery afterwards, the EGARCH percentages in Table 4.7 below presents the daily volatility of both developed and emerging markets.

The results in shown in Table 4.7 is different from those reported by Ali, Alam & Rizvi (2020) study, because the our study period is two months longer, and after markets recovery. Markets

bounce back have resulted higher volatility and therefore higher EGARCH. The numbers in the table implies that the risk scale of developed and emerging markets, and indicates which markets suits passive and active investors. The markets with higher EGARCH suites active investor as they can benefit from high volatility of markets movement, and markets with lower EGARCH suites passive investors as those markets have lower risk.

Table 4.7 presents daily volatility of all developed and emerging markets.

Table 4.7: Developed and Emerging markets EGARCH

Developed Markets				Emerging Markets			
Region	Country	Market name	EGARCH daily volatility	Region	Country	Market name	EGARCH daily volatility
Americas	Canada	SPTSX60 Index	0.21%	Americas	Argentina	MERVAL Index	3.95%
	United States	SPX Index	8.13%		Brazil	IBOV Index	1.83%
Europe & Middle East	Austria	ATX Index	1.22%		Chile	IPSA Index	2.83%
	Belgium	BEL20 Index	2.50%		Colombia	COLCAP Index	12.88%
	Denmark	KFX Index	5.66%		Mexico	MEXBOL Index	1.82%
	Finland	HEX Index	5.31%		Peru	SPBLPGPT Index	1.71%
	France	CAC Index	2.55%	Europe, Middle East & Africa	Czech Republic	PX Index	0.84%
	Germany	DAX Index	2.39%		Egypt	EGX30 Index	14.32%
	Ireland	ISEQ Index	2.31%		Greece	ASE Index	9.82%
	Israel	TA-35 Index	2.50%		Hungary	BUX Index	1.73%
	Italy	FTSEMIB Index	4.60%		Poland	WIG Index	1.73%
	Netherlands	AEX Index	2.13%		Qatar	DSM Index	0.03%
	Norway	OBX Index	3.58%		Russia	IMOEX Index	5.17%
	Portugal	PSI20 Index	8.18%		Saudi Arabia	SASEIDX Index	0.52%
	Spain	IBEX Index	9.72%		South Africa	TOP40 Index	6.11%
	Sweden	OMX Index	3.04%		Turkey	XU100 Index	1.80%
	Switzerland	SMI Index	5.78%		United Arab Emirates - Abu Dhabi	ADSMI Index	7.13%
	United Kingdom	UKX Index	2.26%		United Arab Emirates - Dubai	DFMGI Index	5.64%
Pacific	Australia	AS51 Index	6.93%	Asia	China	SHCOMP Index	0.57%
	Hong Kong	HSI Index	1.57%		India	SENSEX Index	2.44%
	Japan	NKY Index	1.73%		Indonesia	JCI Index	1.94%
	New Zealand	NZSE50FG Index	5.82%		Korea	KOSPI Index	1.97%
	Singapore	STI Index	4.55%		Malaysia	FBMKLCI Index	1.29%
					Pakistan	KSE100 Index	1.64%
					Philippines	PCOMP Index	7.83%
					Taiwan	TWSE Index	1.37%
					Thailand	SET Index	10.91%

Chapter 5: Conclusion

5.1 Summary of the thesis

This study examined the impact of COVID-19 on developed and emerging markets movements during the period March 11, 2020 - August 31, 2020. Several variables were analyzed in this study. The first variable is markets' indices, which represent the sum value of traded securities belong to the market index. The second variable is index turnover, which is the value of traded shares in the index during a trading day. The third variable is index volume, and this is the number of traded shares in the index during a trading day. The fourth variable is P/E ratios, which represents the P/E ratio of the companies within the index. The fifth variable is markets earnings, which measures the earning of companies compose the index, who report their annual or quarterly earnings. In addition, the study employs EGARCH to examine the daily volatility of the markets during the period March 11, 2020 - August 31, 2020.

The results showed that developed and emerging capital markets response to COVID-19 pandemic from the day of announcing COVID-19 as a pandemic on March 11, 2020 until August 31, 2020 and comparing some outputs with the day prior to the pandemic. However, speedy recovery in capital markets occurred in a short period of time. This recovery of capital markets is not explained when the negative impact of COVID-19 hits all sectors, by resulting business slowness during the lockdowns, quarantine, travel bans and other several restrictions, and this fact led to examine markets earning to assess if the listed companies in financial markets are maintaining their earnings or not, and the result concluded that all markets earnings were declined.

The study starts with an introduction explaining COVID-19 situation, followed by previous studies discussing COVID-19 impact on several sectors, and how governments have given support packages to

subsidize economy and businesses as well as financial markets, followed by detailed trading activity analysis among developed and emerging markets.

5.2 Summary of the findings.

The study found that emerging and developed markets have responded in the same way in terms of closing prices; decline at the beginning of the pandemic, then markets have recovered in a short period of time. However, the decline and recovery percentages do vary among the markets. The same decline was applied for trading turnover and volume, while their levels have not recovered up to the level prior to the pandemic, just few high hits in turnover and volume levels in few days during the pandemic. The study proved that trading turnover and volume were lowered during the tested period. Moreover, markets' P/E ratios were increasing, not only because of markets positive performance, also markets' negative earnings have contributed significantly to the P/E ratio bullish. Hence, the evidence showed that P/E ratios and markets earnings levels can be used as an indicator of markets situation, the findings reveal that indices P/E ratios were improved. because of positive performance of market indices during the pandemic. However, indices price increase is not justified, when the circumstances were not in favor of making positive returns especially when companies and businesses had negative performance during the lock down and quarantine. Accordingly, markets earnings were tested and found at sharp drops. During COVID-19 pandemic, both components of P/E ratio formula, have made double effect, most of markets prices have increased, and all markets earning have declined, and this cause the P/E ratios to increase.

In general, and as of August 31, 2020 most of developed and emerging markets have had positive returns due to government support packages towards, economy, people, and financial markets. The UAE was not an exception to this. Nevertheless, we cannot say that COVID-19 had a positive impact

on capital markets, because the circumstances do not support the economy and therefore financial markets. Even though, market indices show positive returns.

Finally, markets volatility for the period between March 11, 2020 and August 31, 2020 was high due to the substantial plunge of indices closing prices at the beginning of the pandemic, then the sharp recovery in a truly short period of time. Although volatility differs between markets, the levels were abnormal.

5.3. Implications and recommendations

During crisis, markets drop sharply, and investors panic and start shorting their positions. However, this study shows that markets decline does not continue forever, and investors should wait for the recovery and do not do distress sell and book losses, as markets recover to be fairly priced in the future. In addition, long term and passive investors should look at the P/E ratio of the financial markets and markets earnings to open their positions at decent levels, and investors who would like to buy indices during financial crises, they should not fear from low levels to enter the market, because this is the correct time to open their positions.

Moreover, governments should focus on developing the economy to create sustainable markets growth at later stage, pumping money in capital markets at the beginning of any crisis can create a short-term growth, and good to be a first resolution to take. However, continuing to pump money in capital markets without giving the same support to businesses and factories, will worsen the situation in the future and make it difficult to be rectified.

5.4. Limitations

Although the study provides detailed analysis of the impact of COVID-19 on developed and emerging markets, the study is not free from limitations. The first limitation is study period, the data is limited to the period March 11, 2020 - August 31, 2020. Secondly, other markets such as frontier and standalone are not considered in the present study.

Thirdly, the methodology used is based on descriptive analysis only where summary statistics of several variables are reported without finding the correlation between those variables. More advanced methodology could make the results more reliable such as regression analysis. Obviously, several occasions are not detected during the pandemic, for example the occasions of the few high increases in markets turnover and volume are not discussed in this study.

5.5 Future research

This study focuses on COVID-19 impact on developed and emerging markets, later research can be conducted when the pandemic is over. In addition, similar research can be performed to find the impact of COVID-19 on frontier and standalone markets.

In addition, historical financial crisis or pandemics can be tested by finding markets average P/E ratio prior to, during, and post the crisis, to support or disagree that markets P/E ratio can be used as a trading indicator, and if markets P/E ratio can be used to forecast markets future performance.

Furthermore, to examine which markets were better to invest in during the tested period, by using market variables. In addition to finding the correlation between markets turnover and trading volume.

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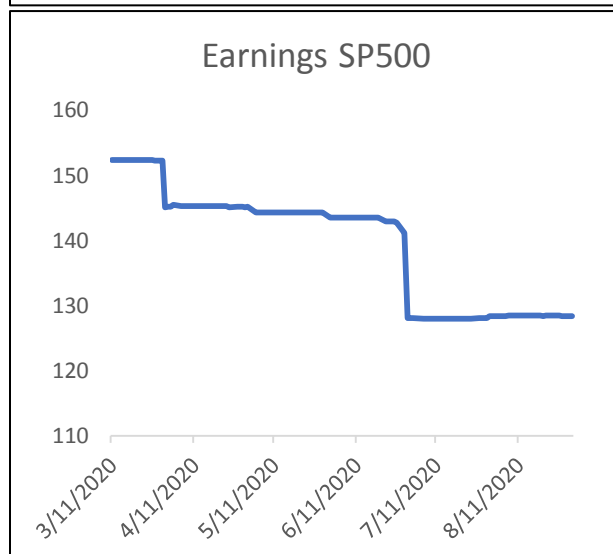
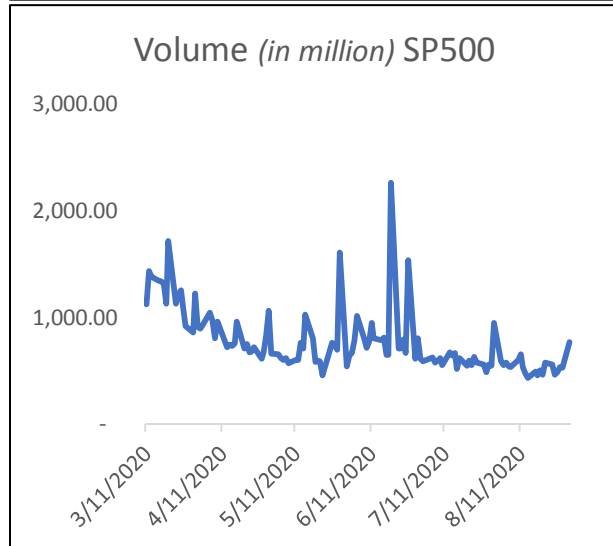
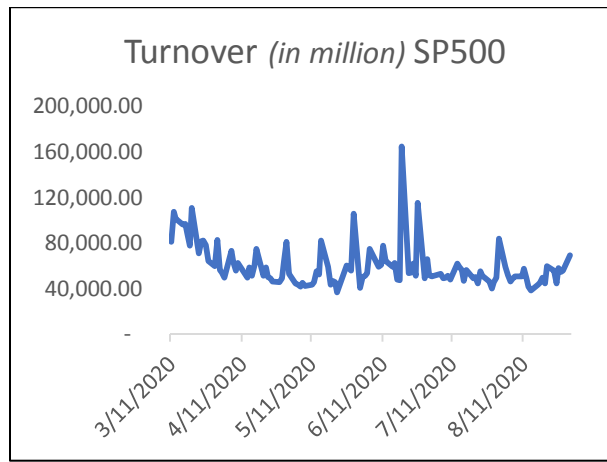
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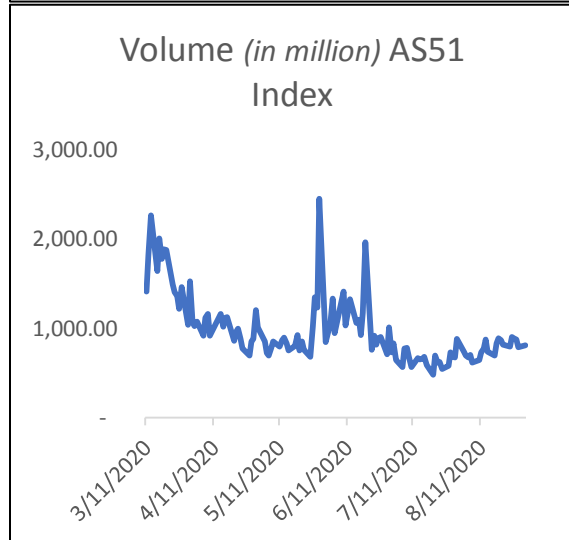
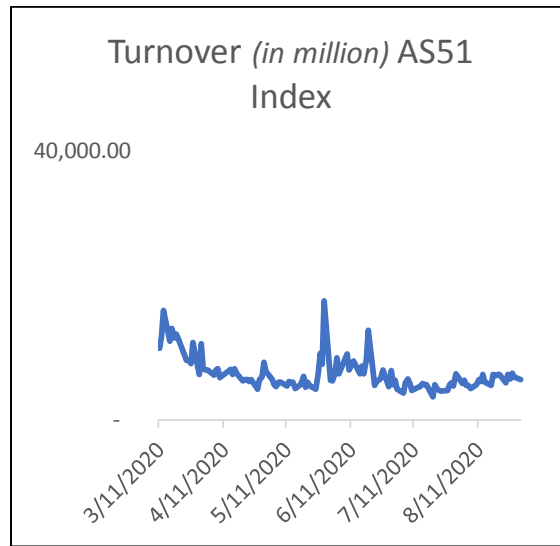
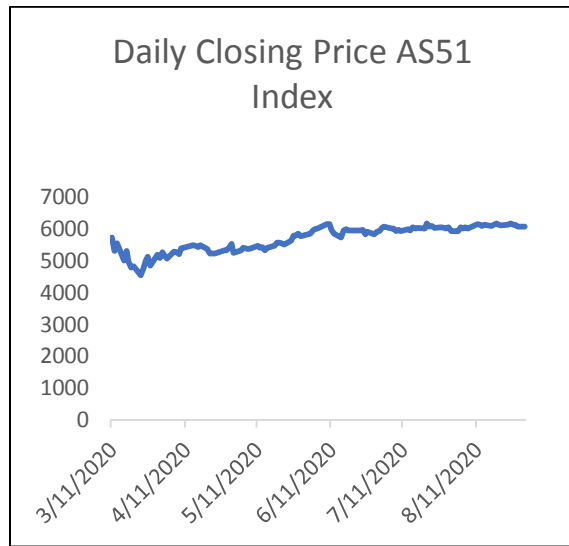
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Appendix

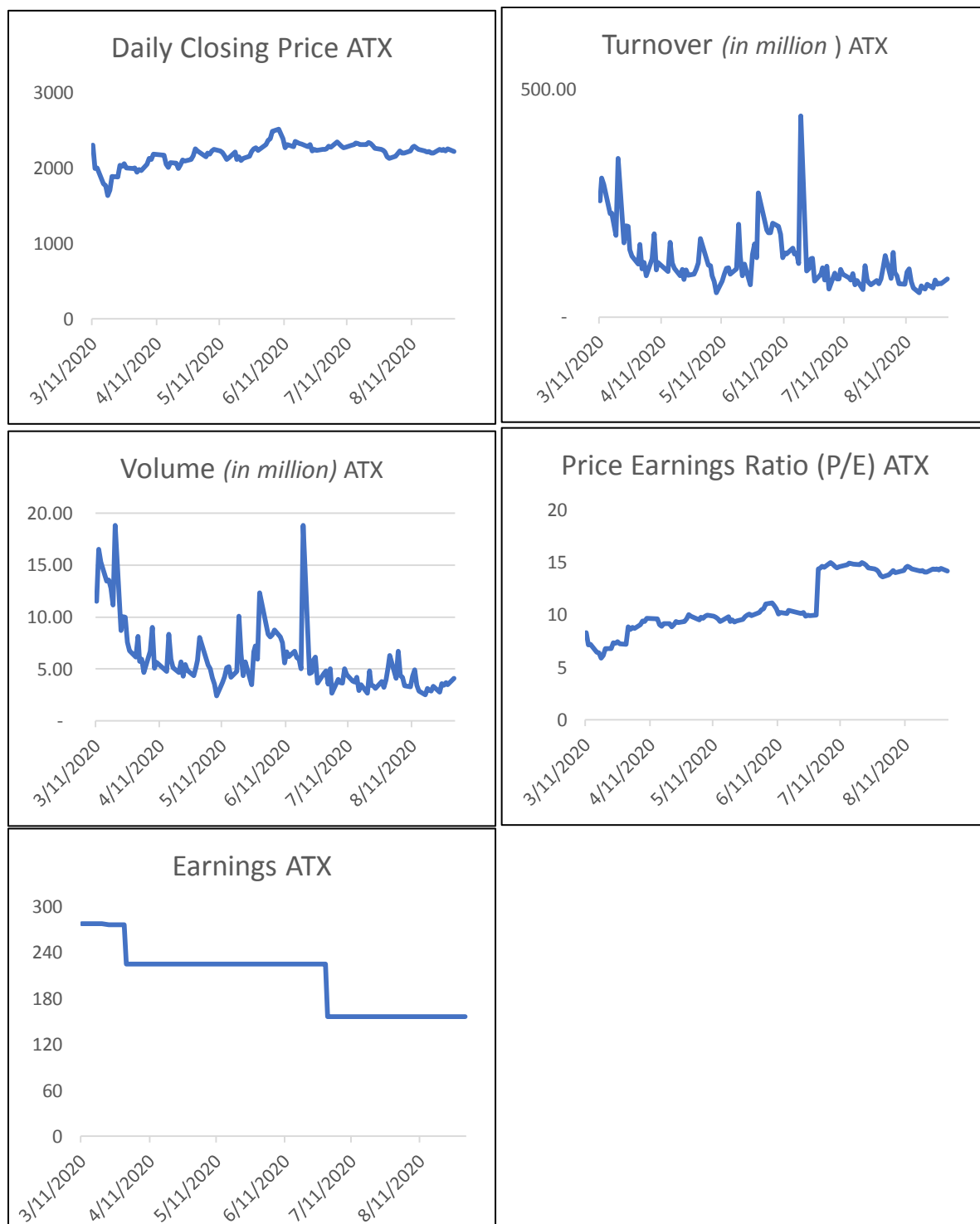
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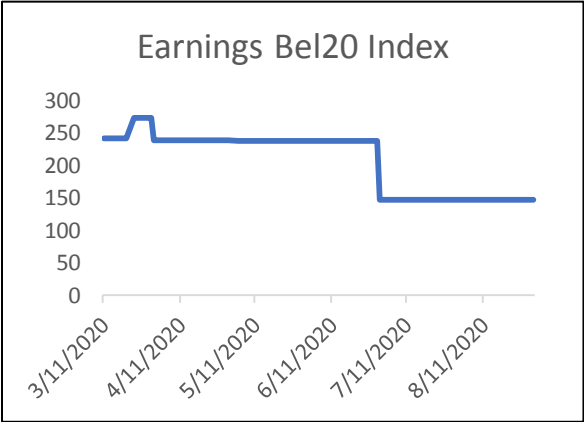
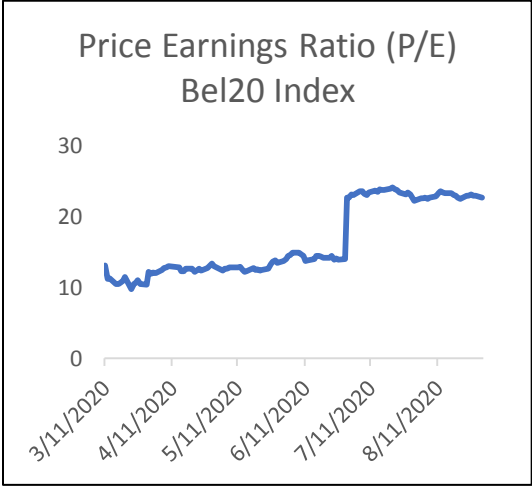
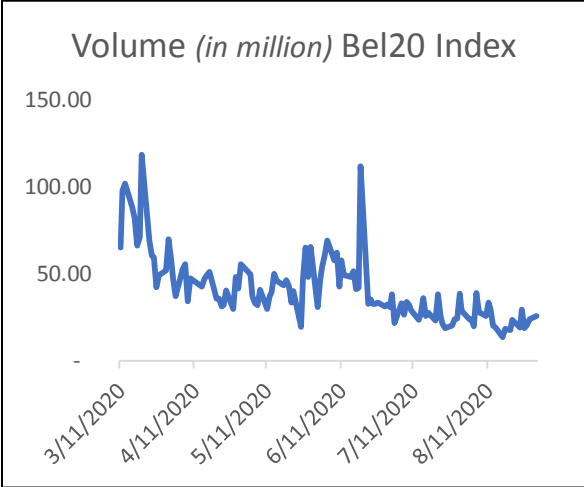
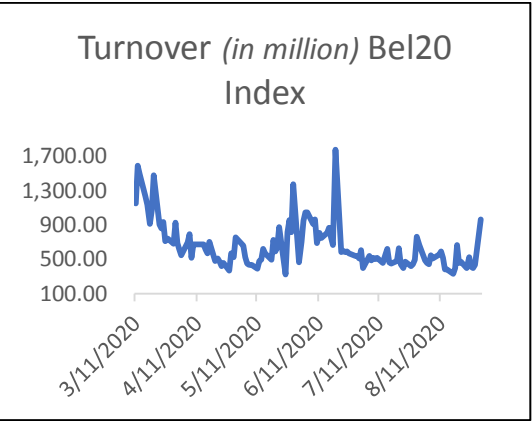
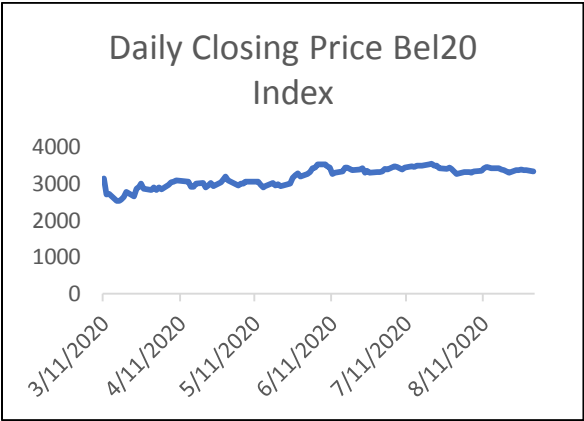
AS51 Index



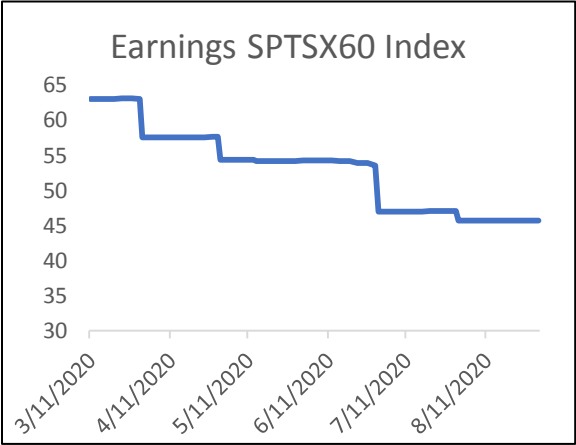
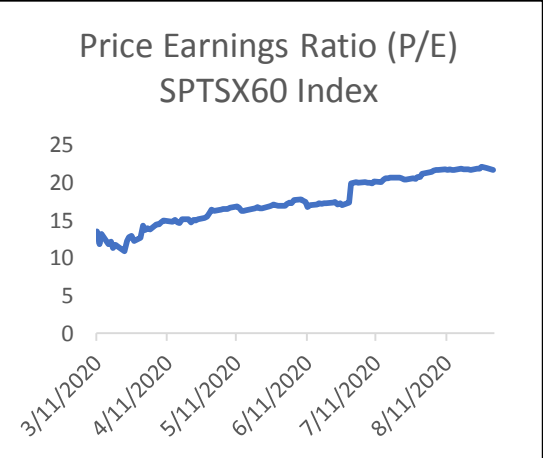
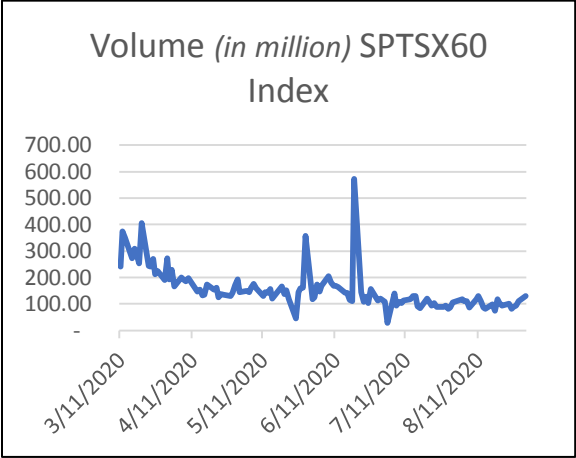
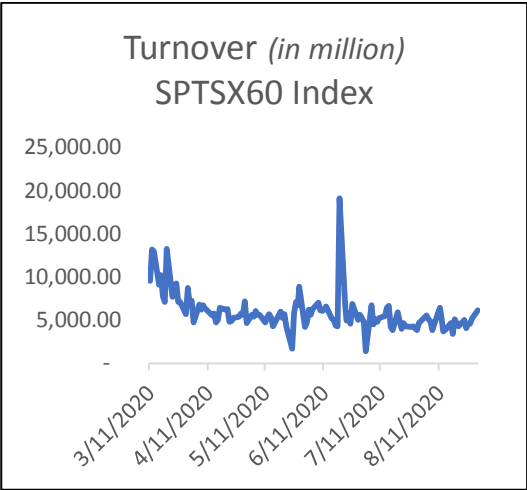
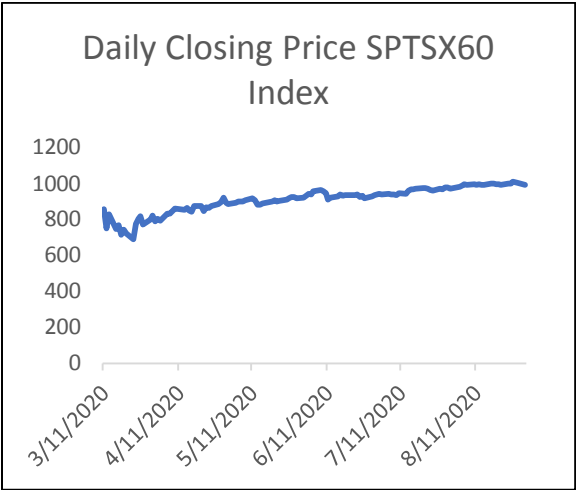
ATX Index



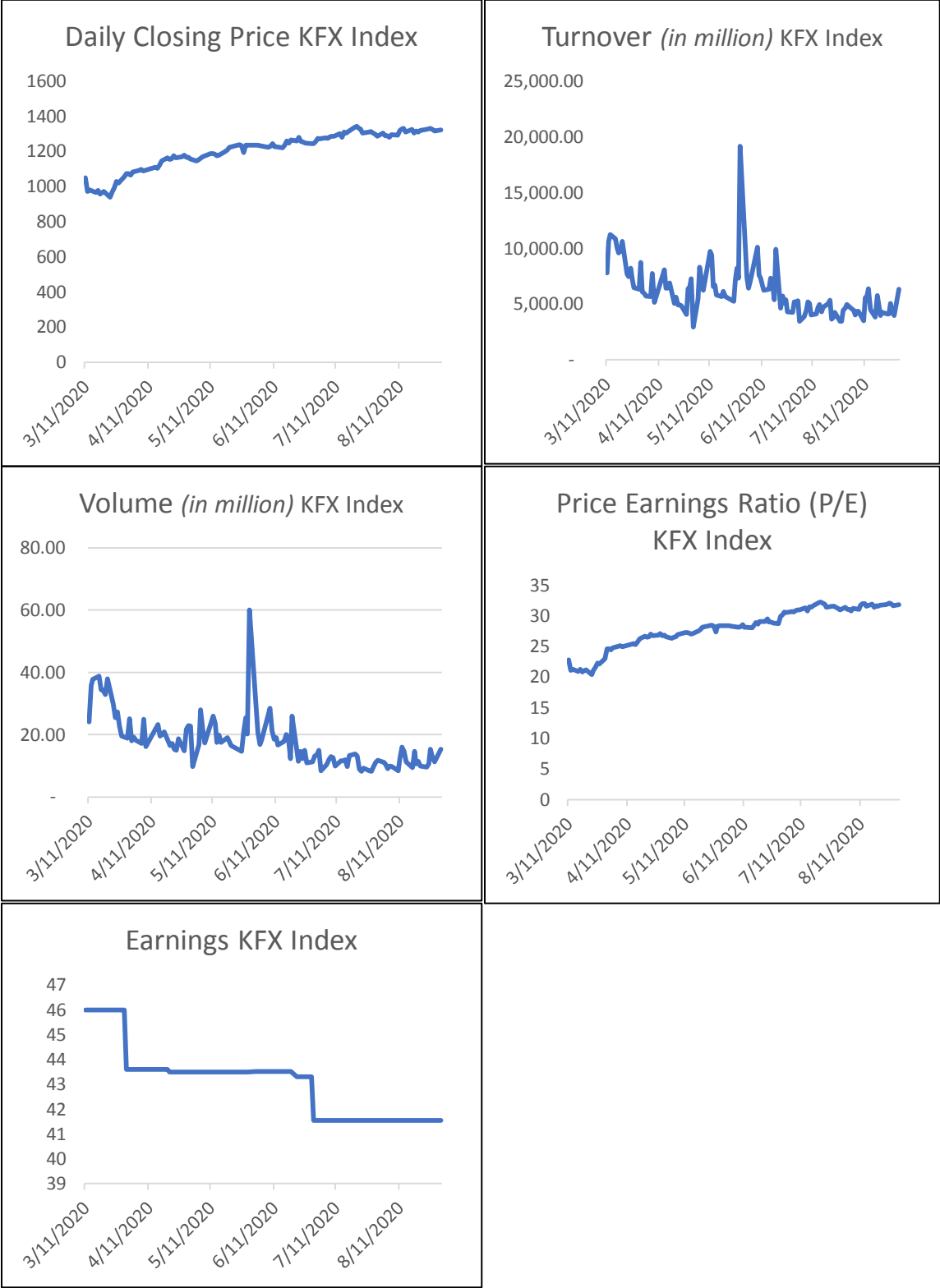
Bel20 Index



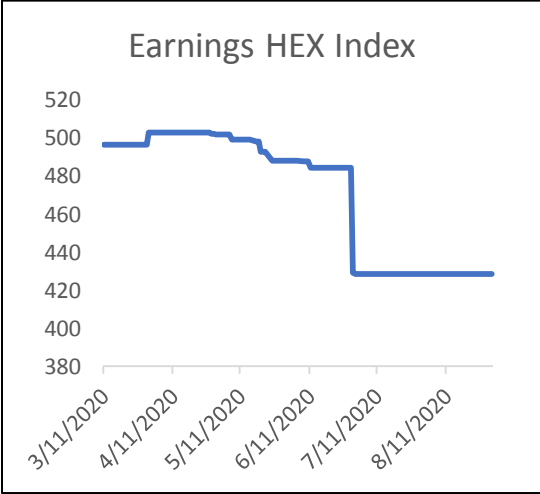
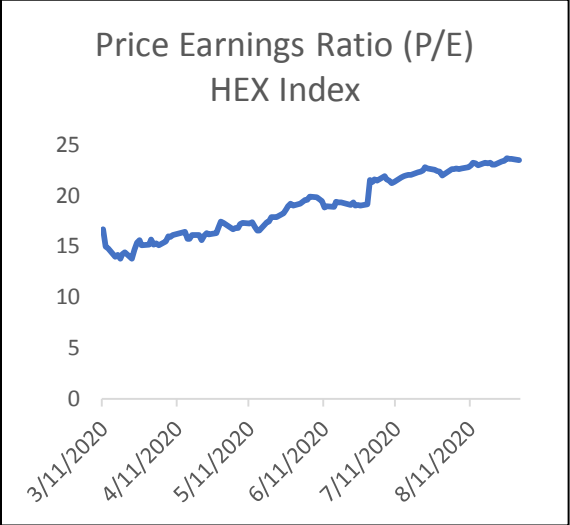
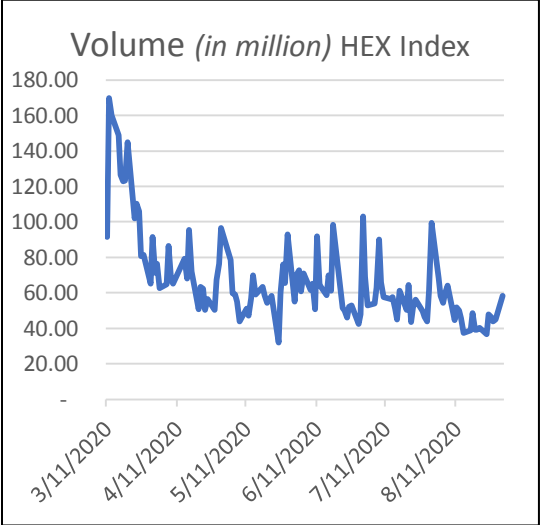
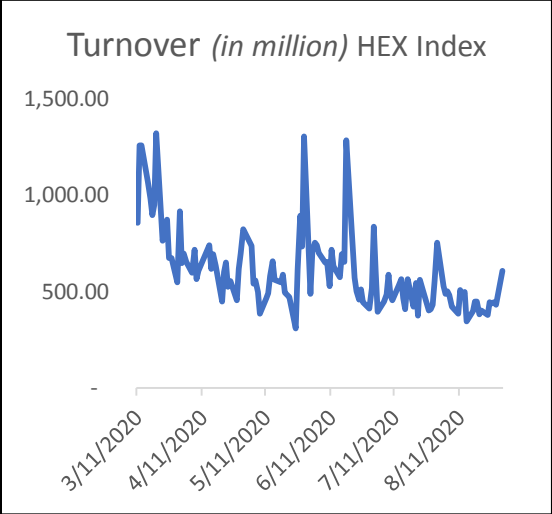
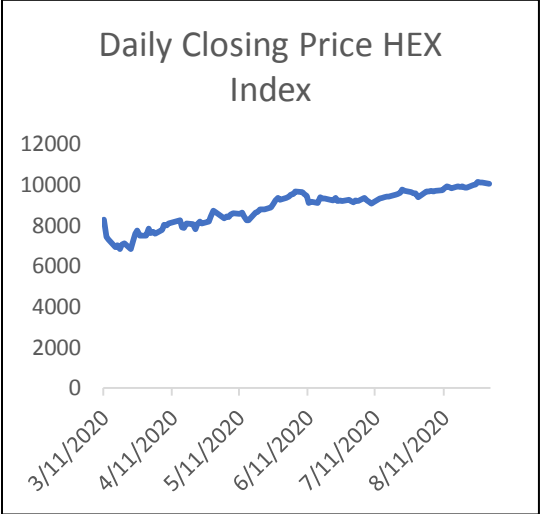
SPTSX60 Index



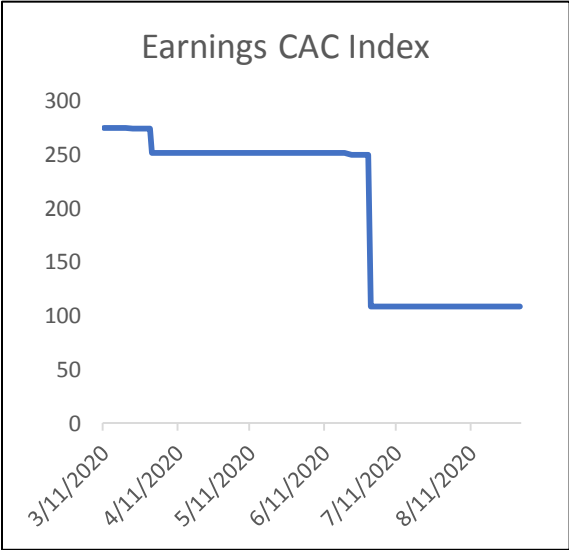
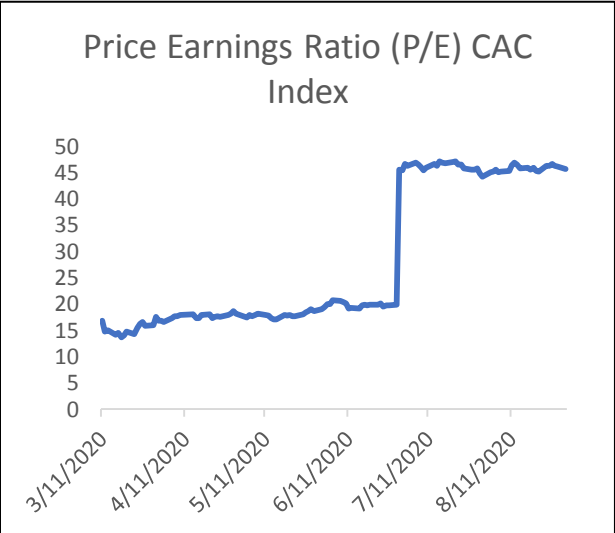
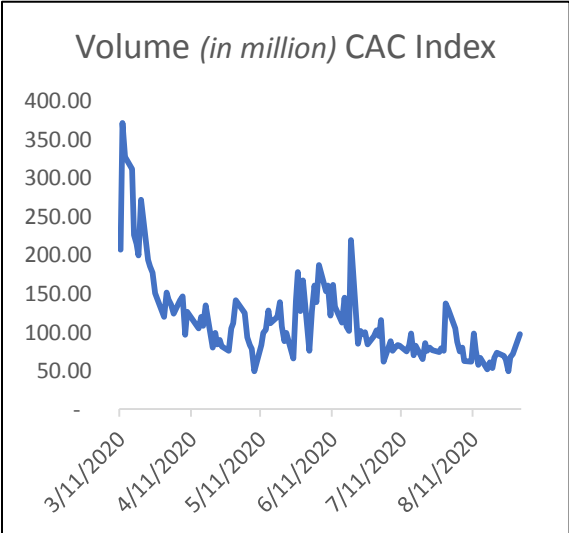
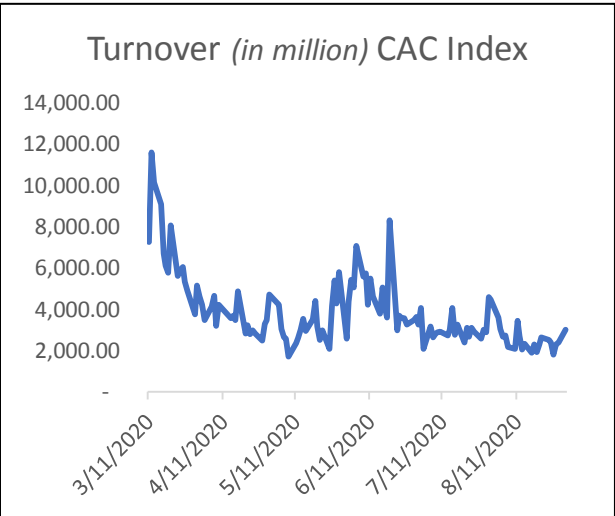
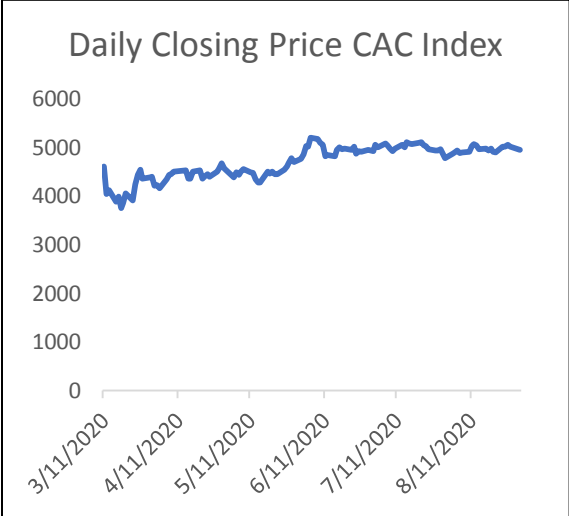
KFX Index



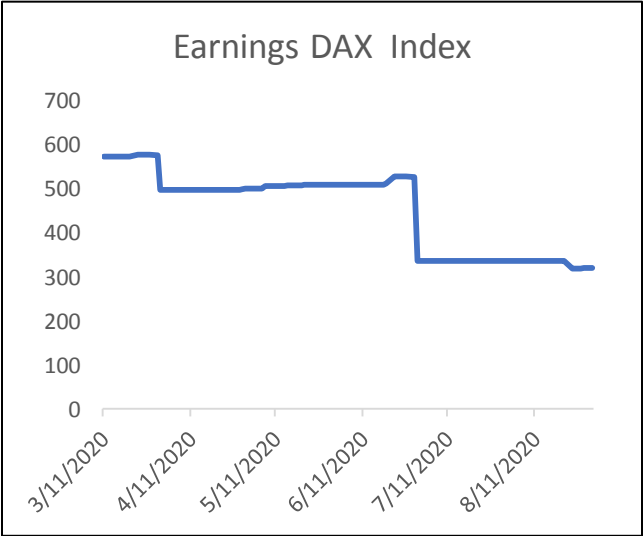
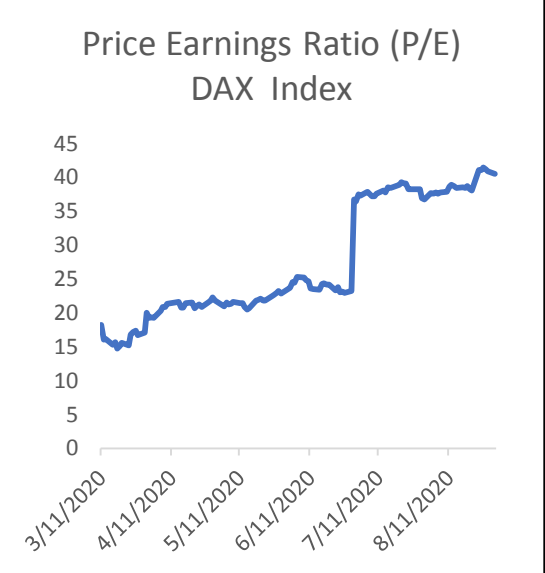
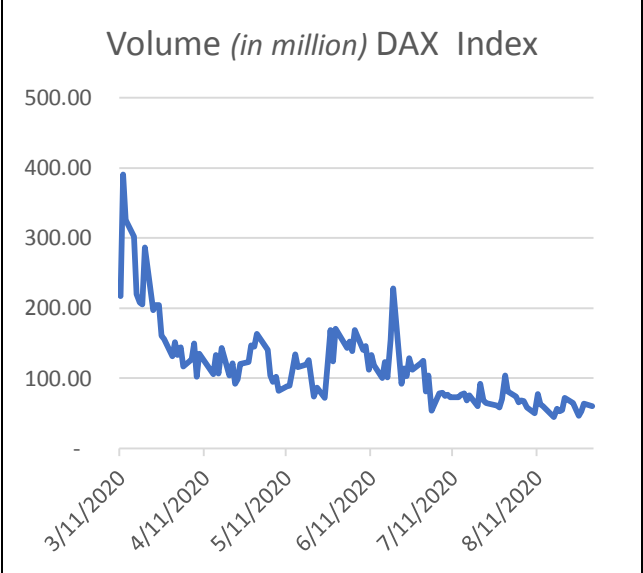
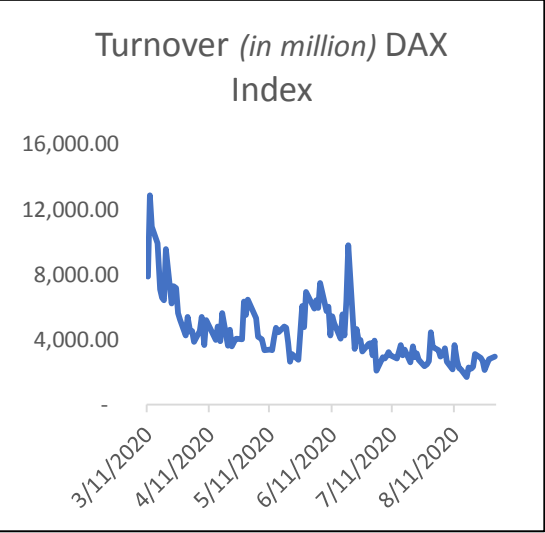
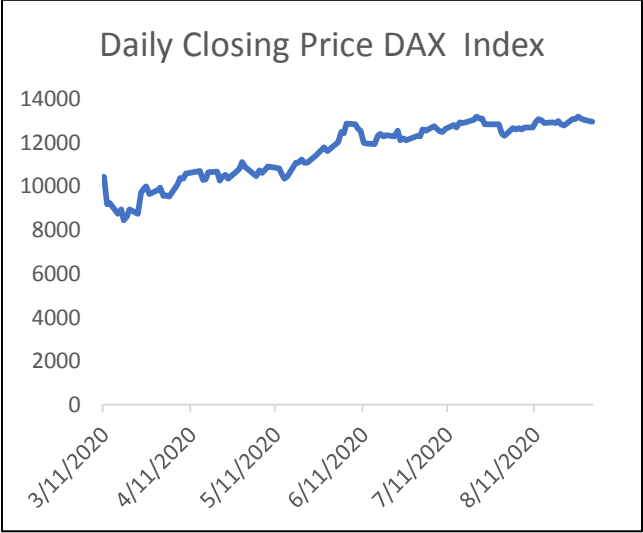
HEX Index



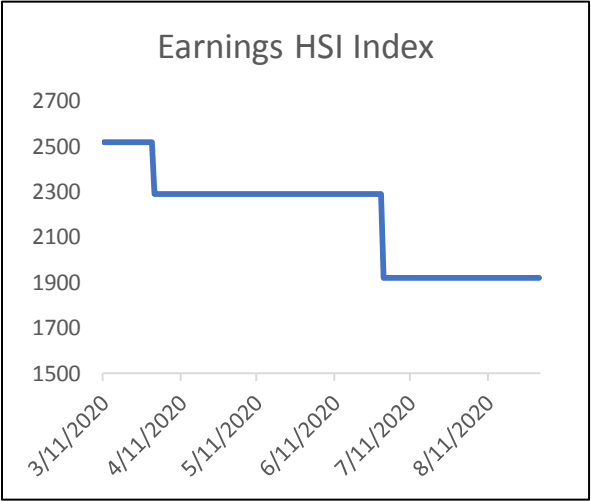
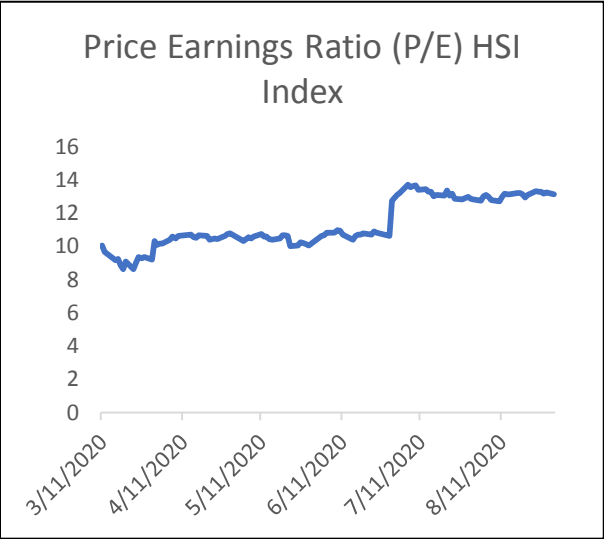
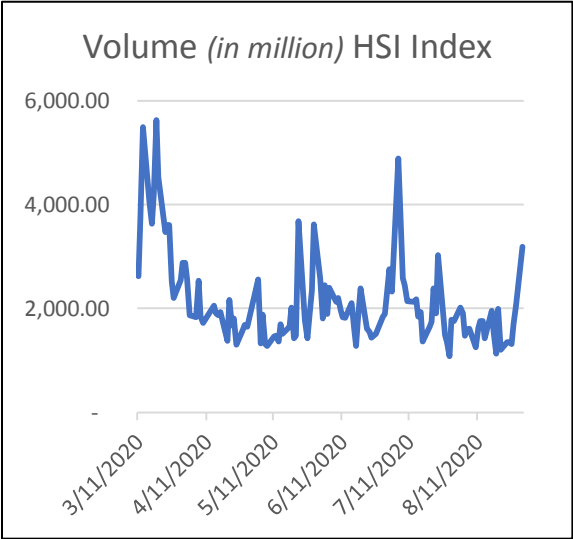
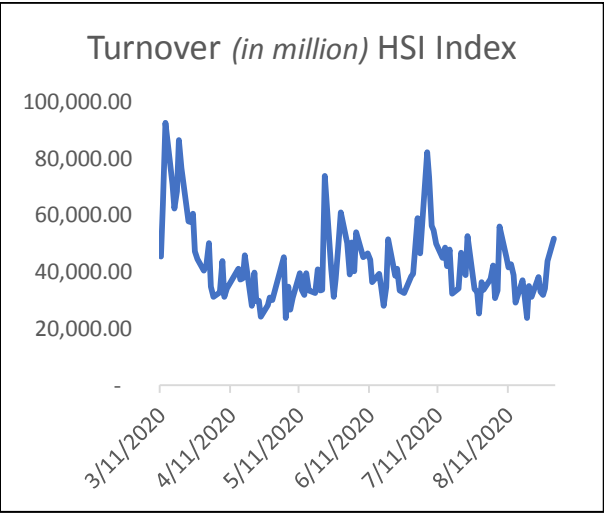
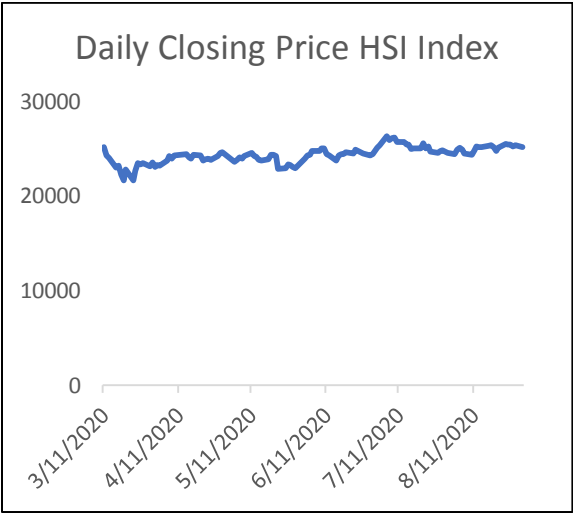
CAC Index



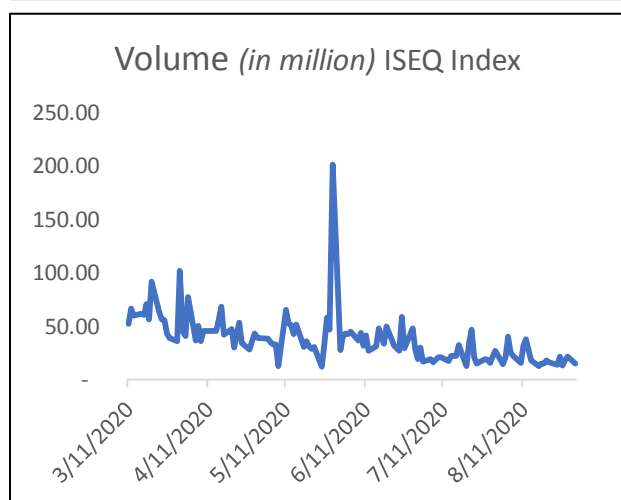
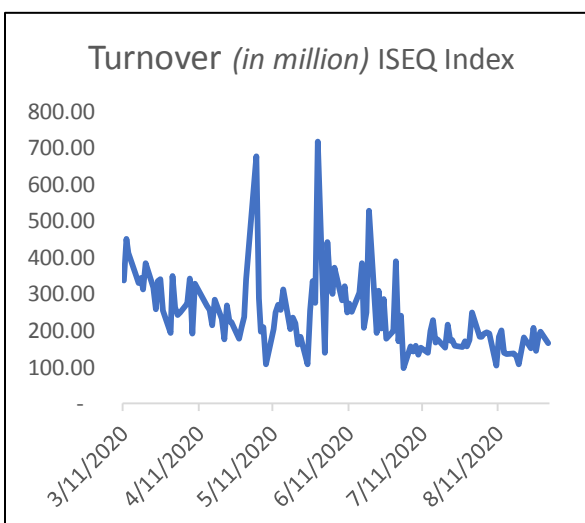
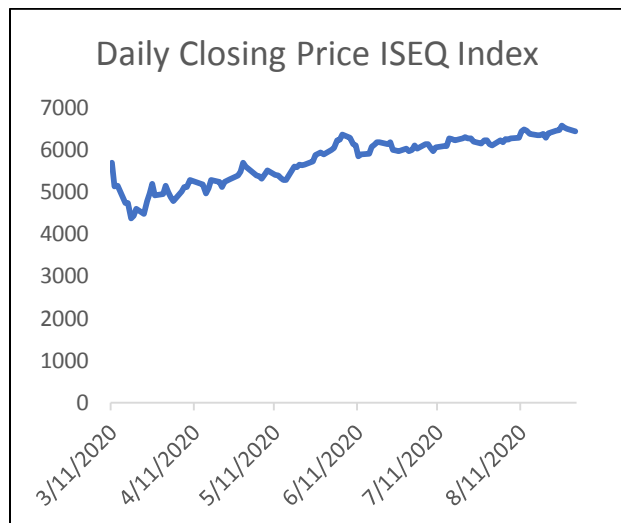
DAX Index



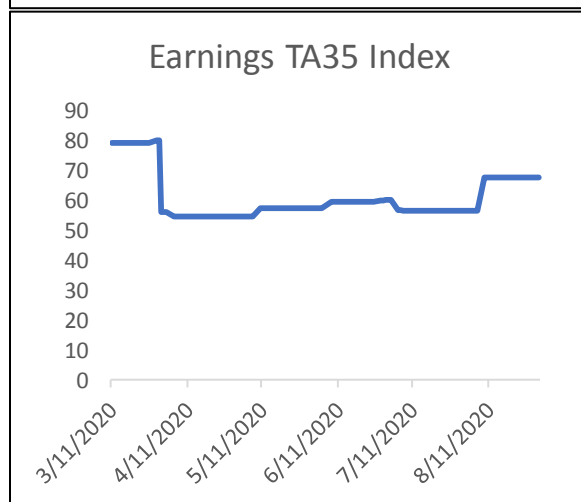
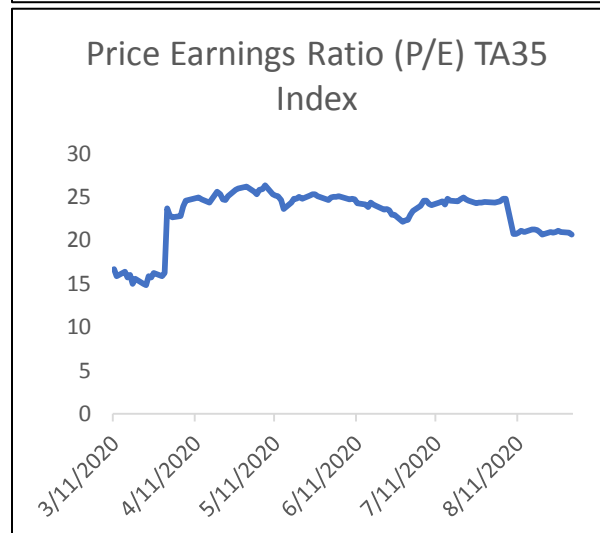
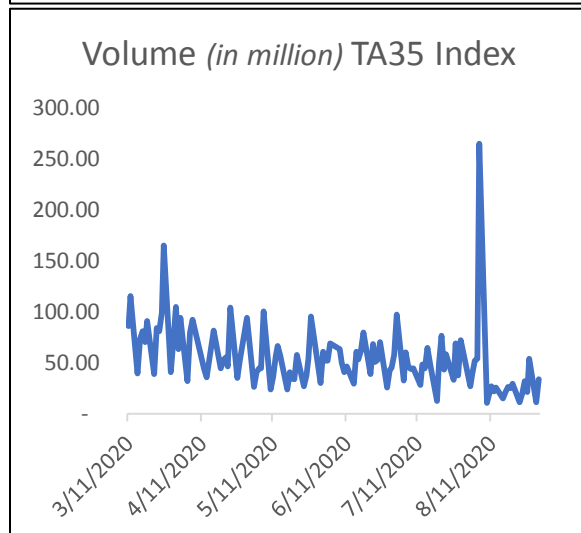
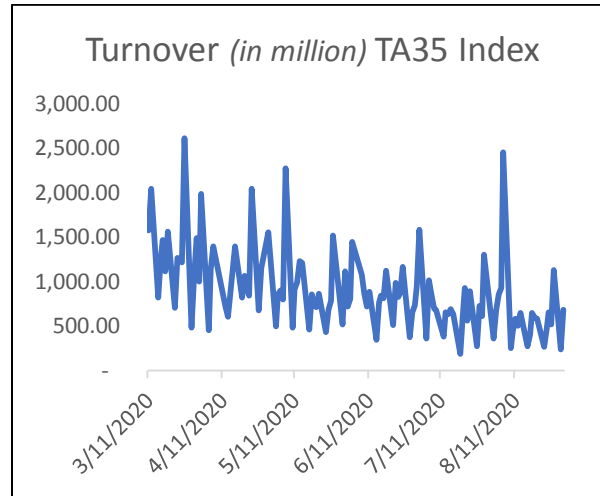
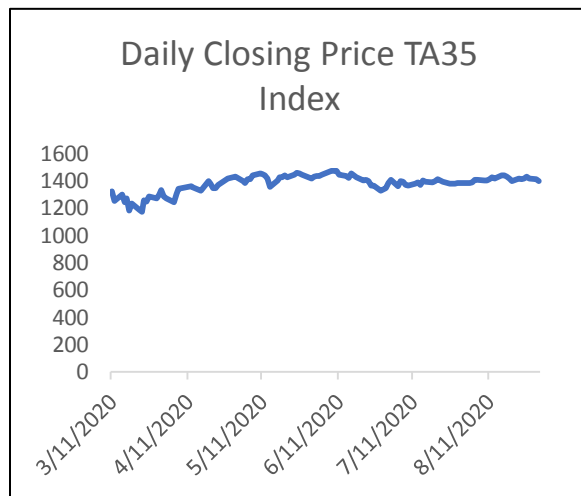
HSI Index



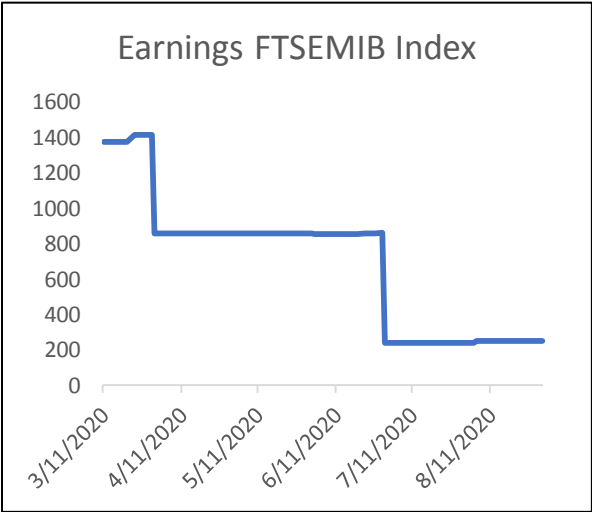
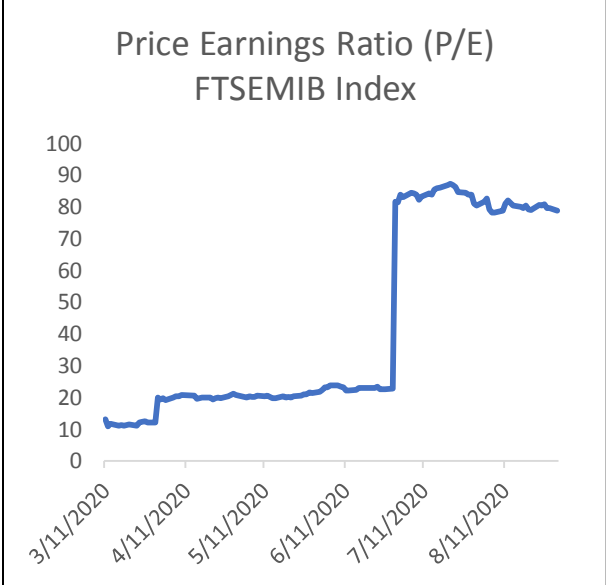
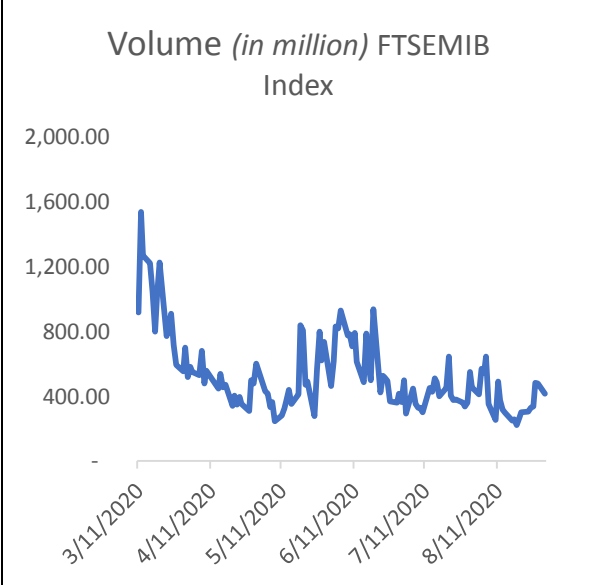
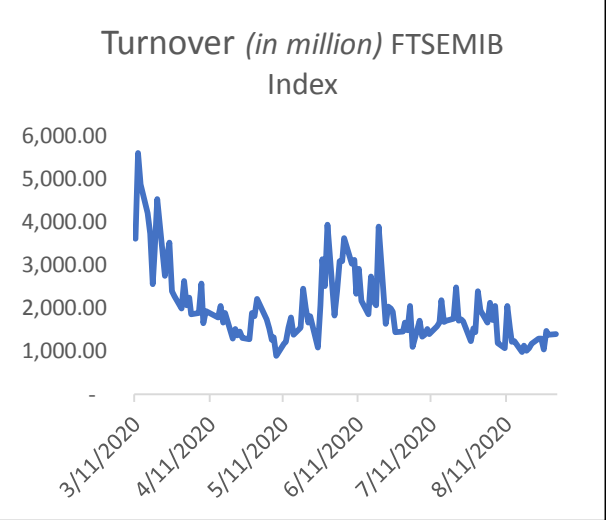
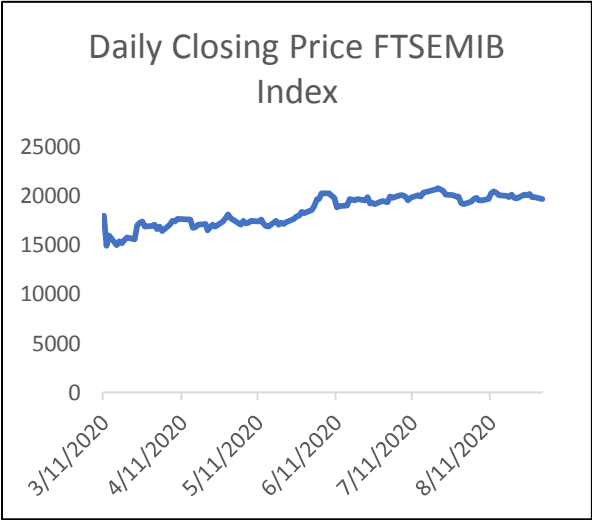
ISEQ Index



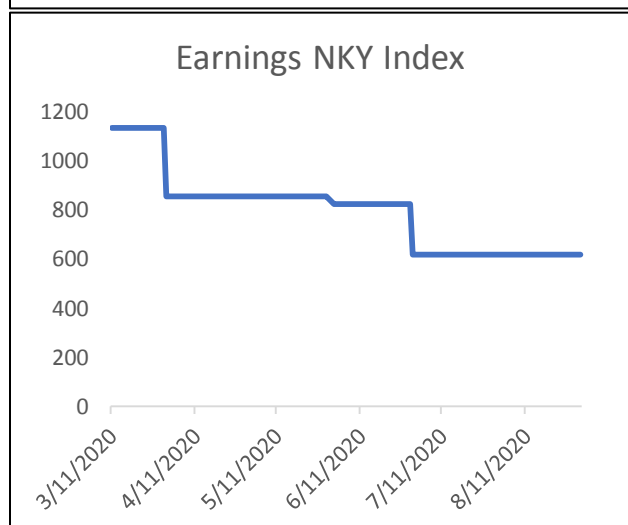
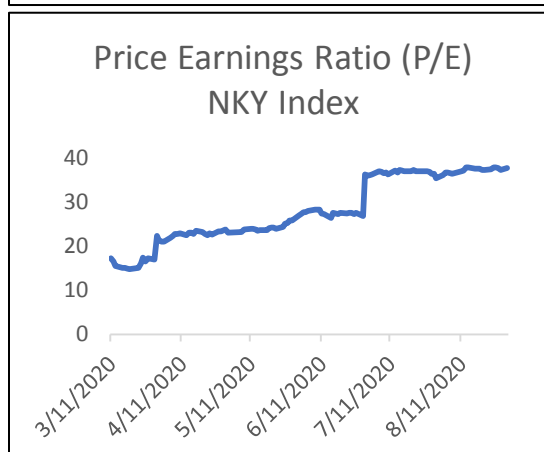
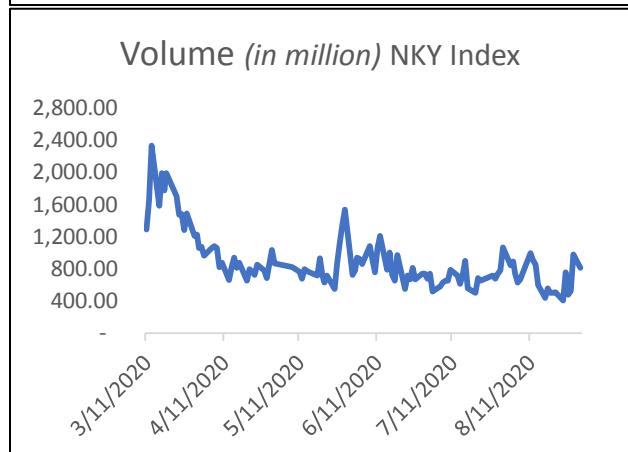
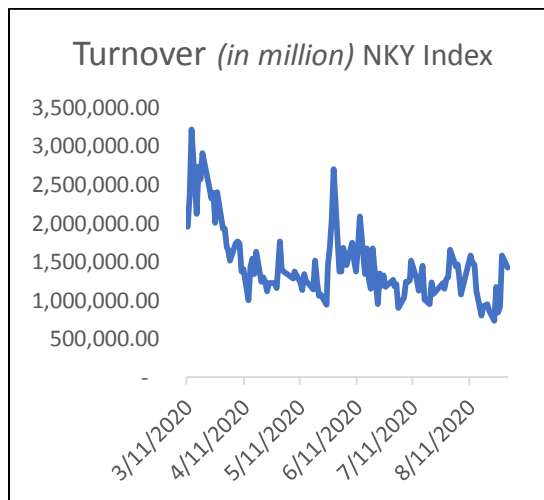
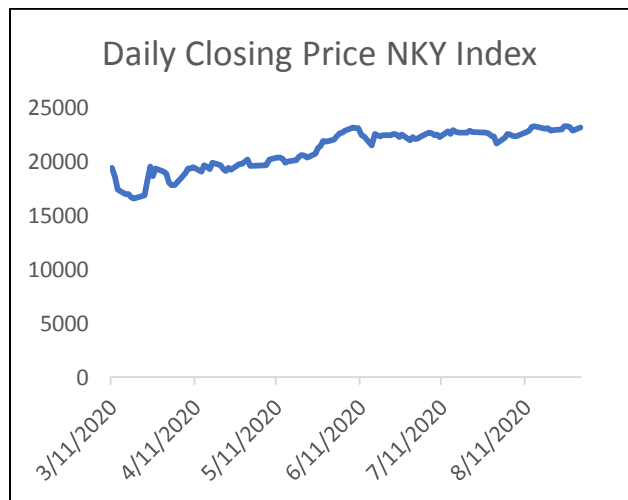
TA35 Index



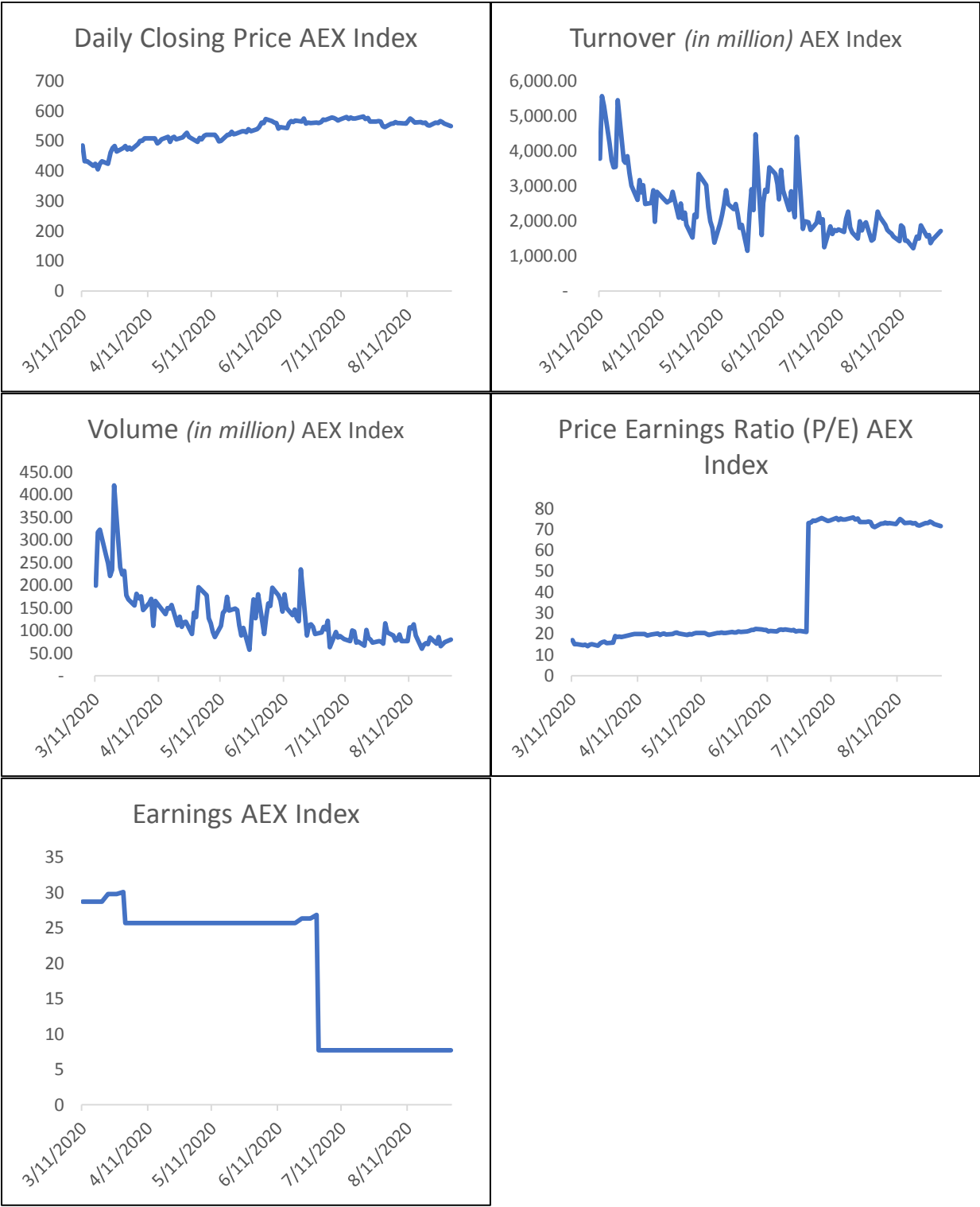
FTSEMIB Index



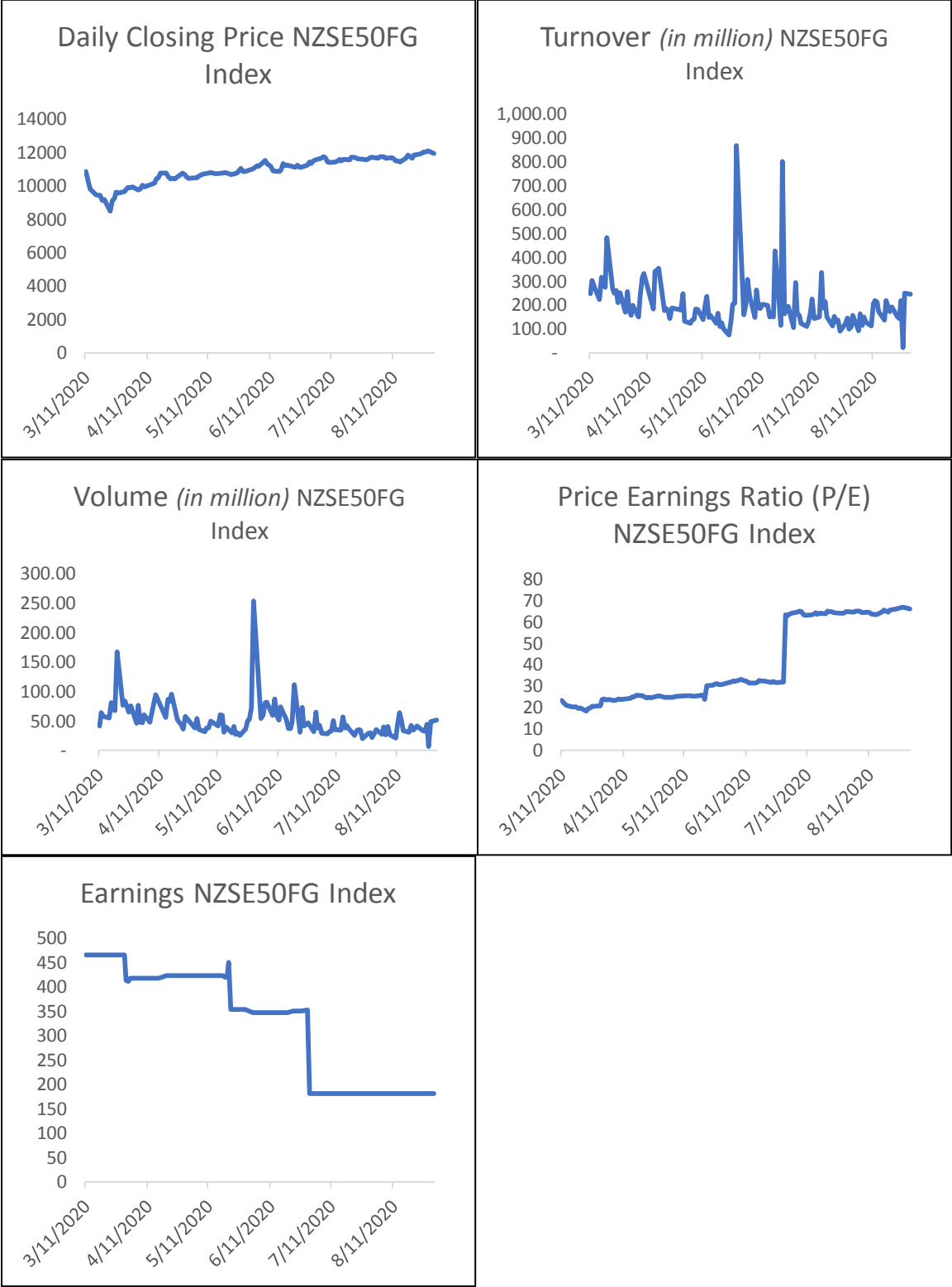
NKY Index



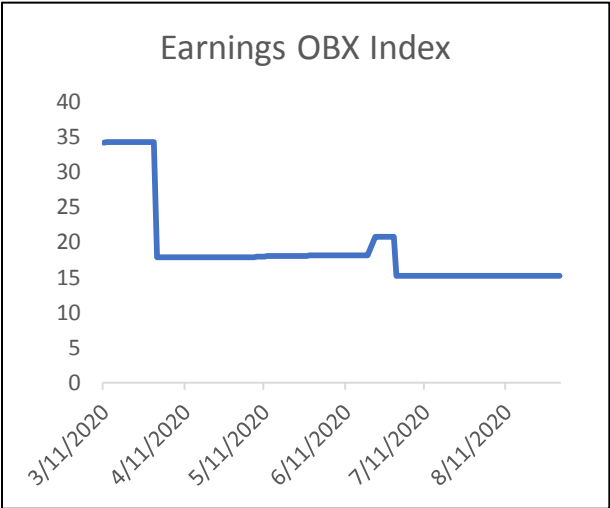
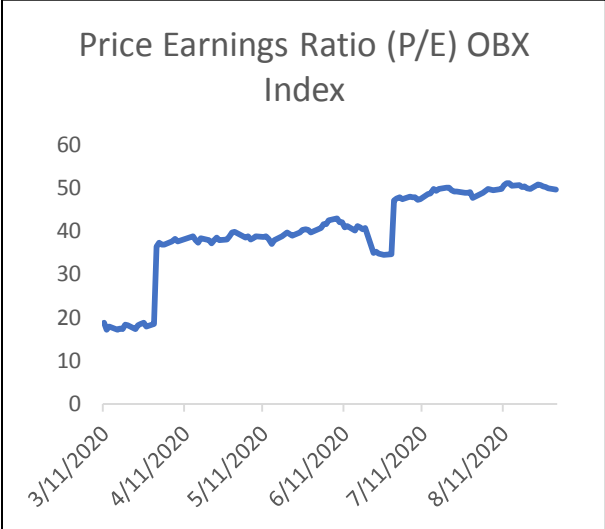
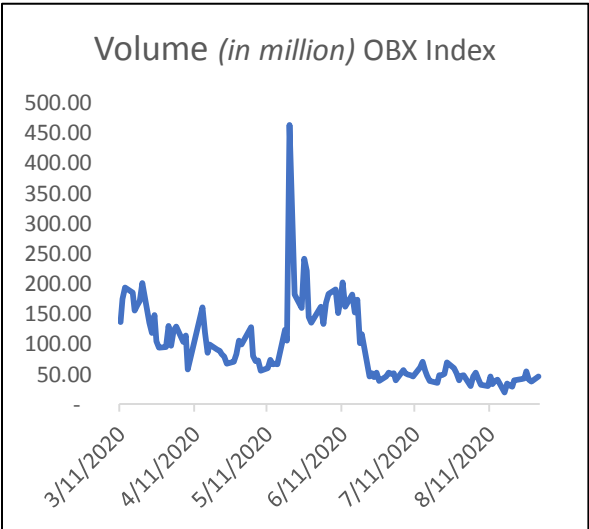
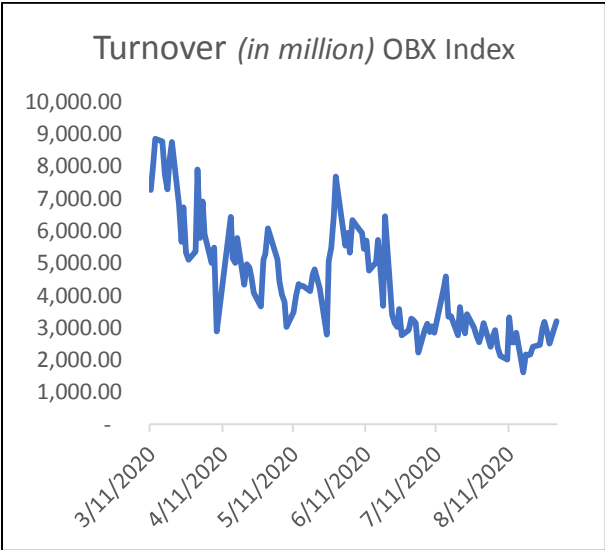
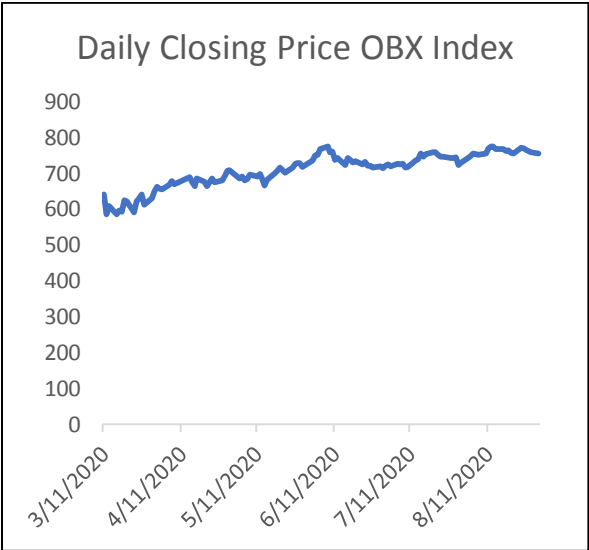
AEX Index



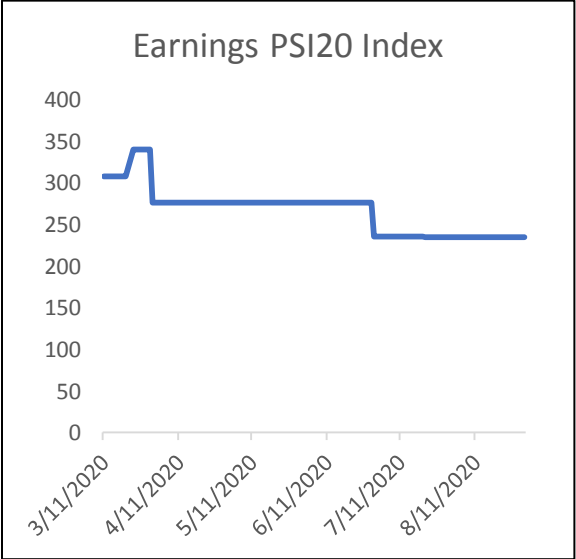
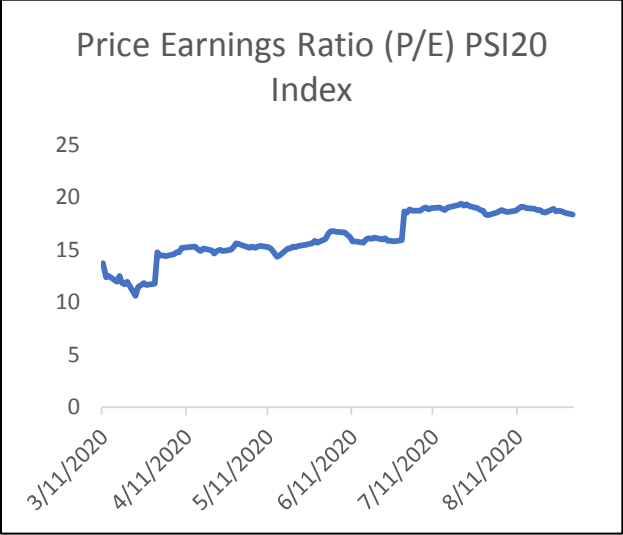
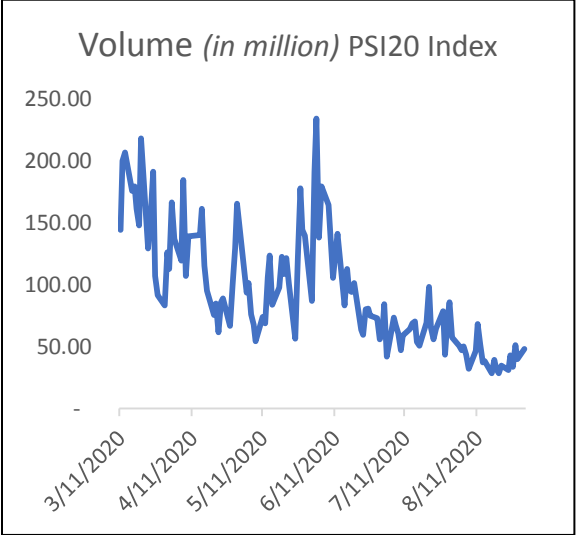
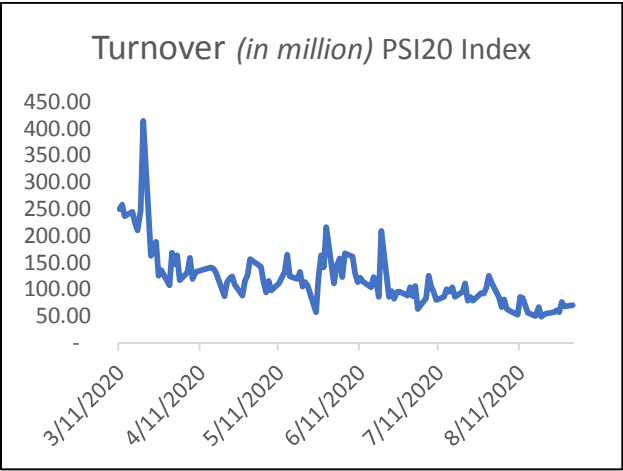
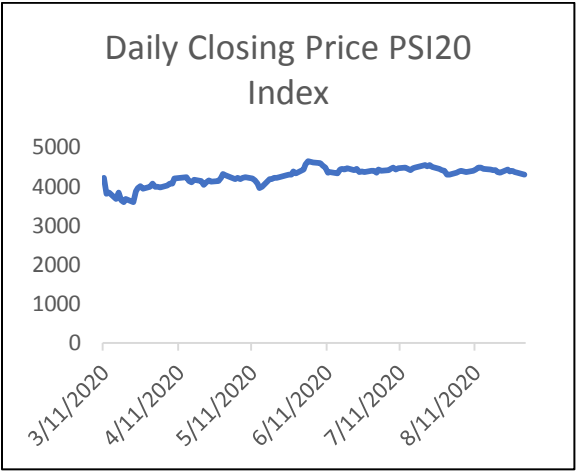
NZSE50FG Index



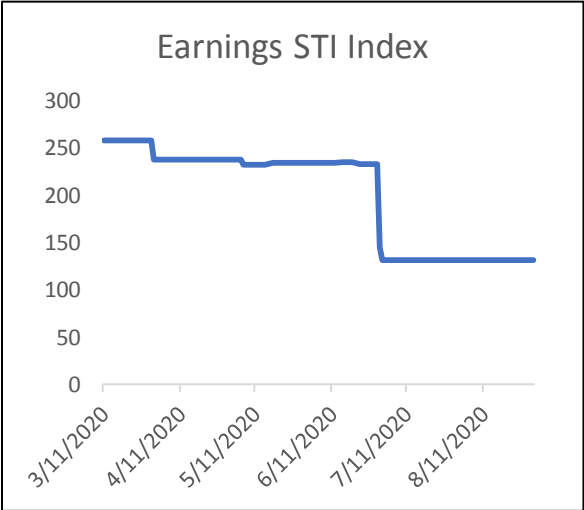
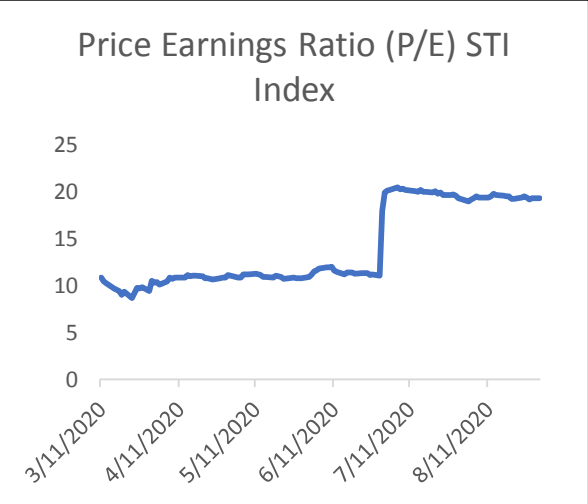
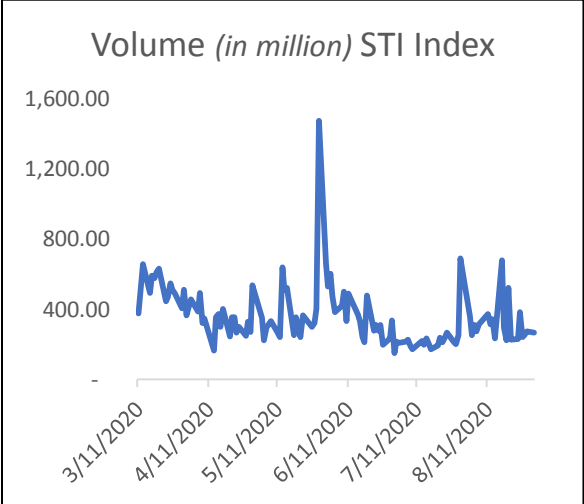
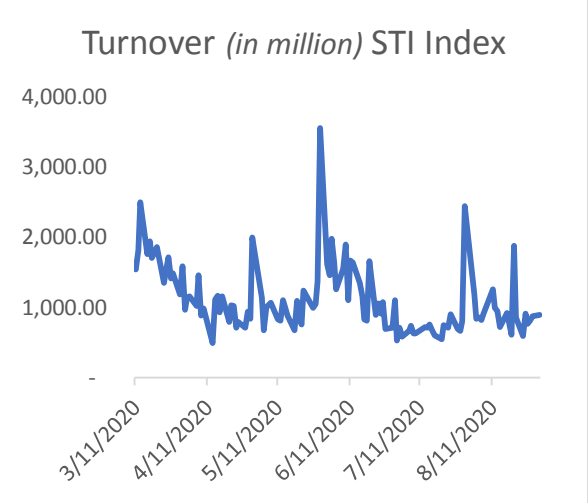
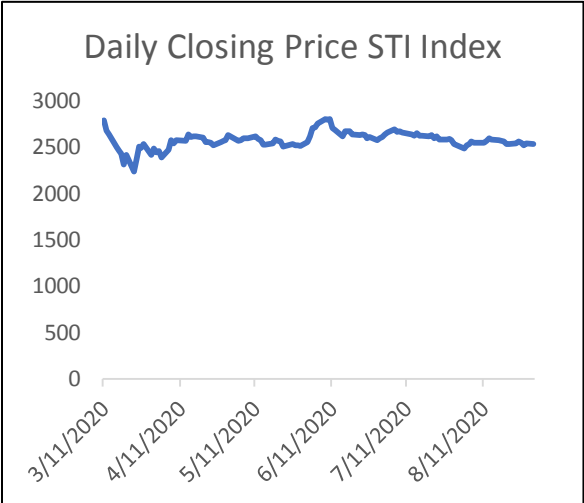
OBX Index



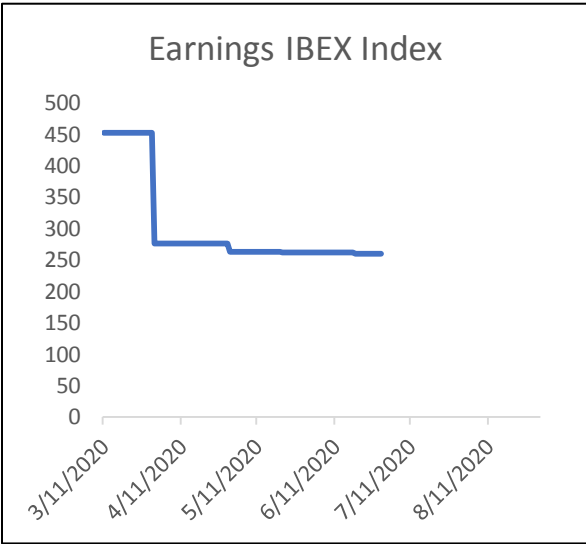
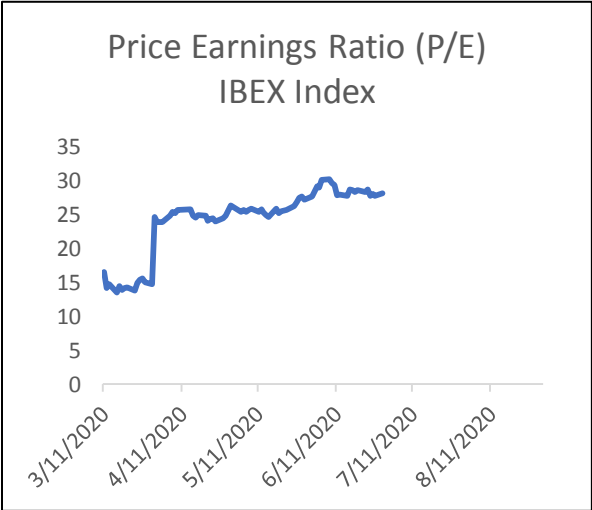
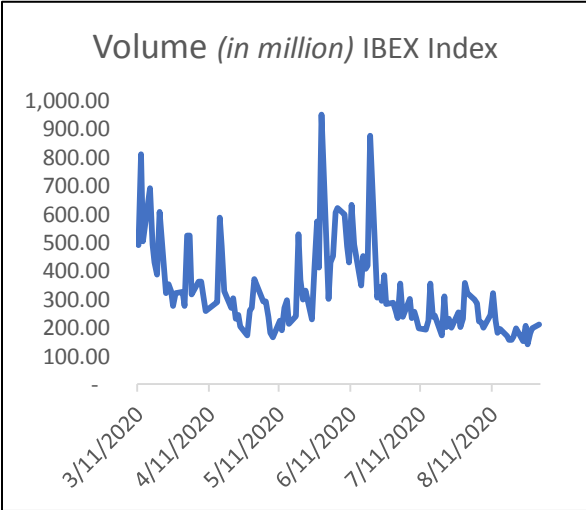
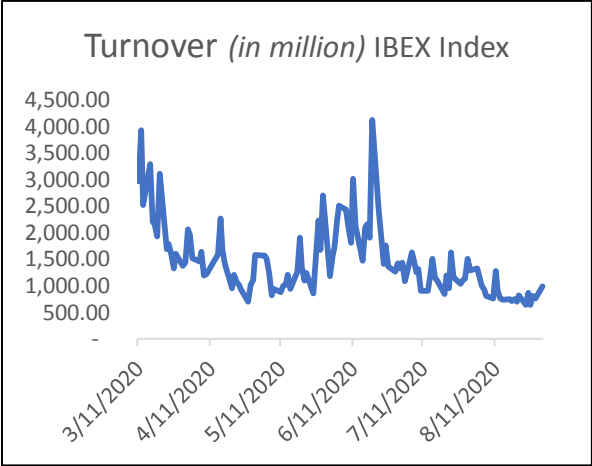
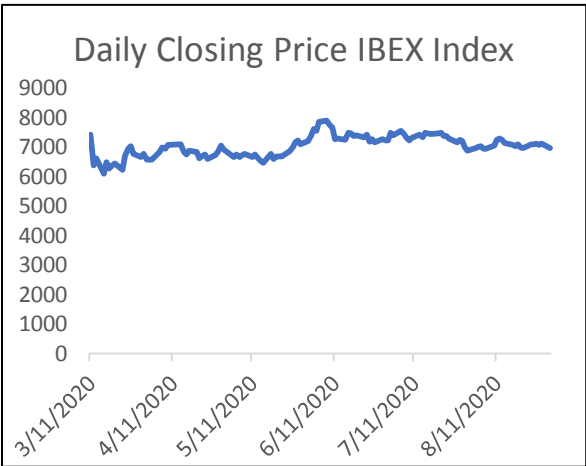
PSI20 Index



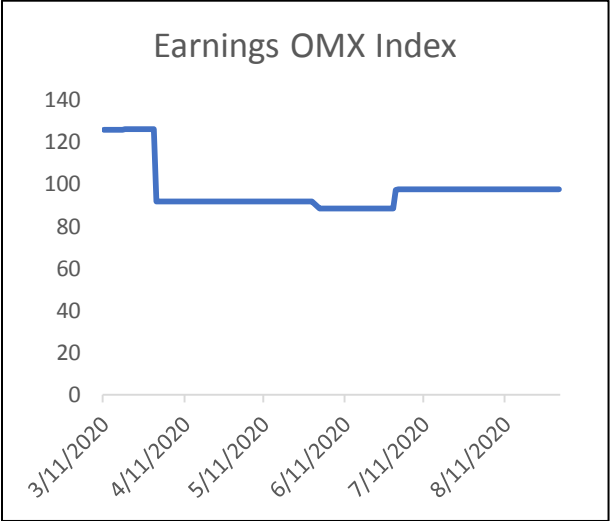
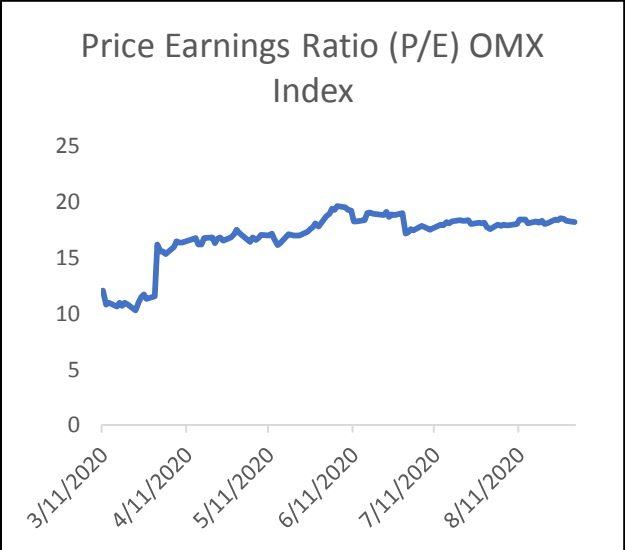
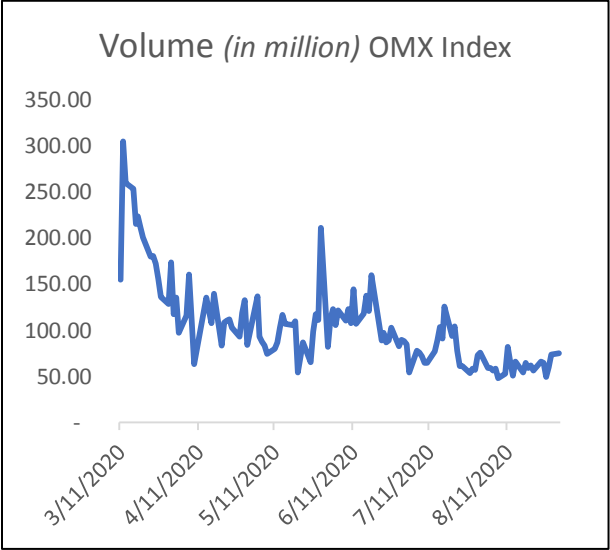
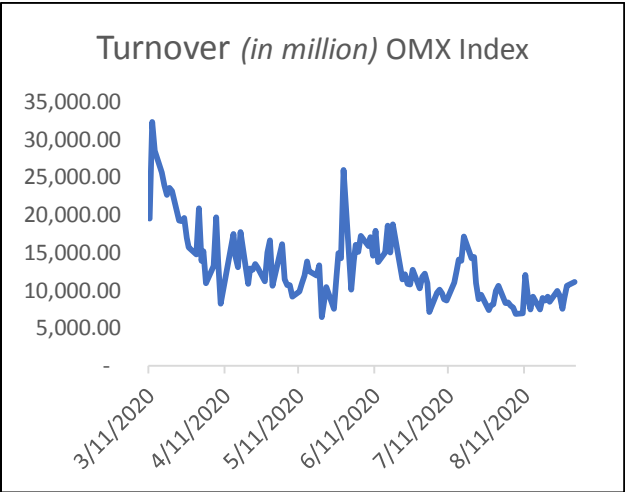
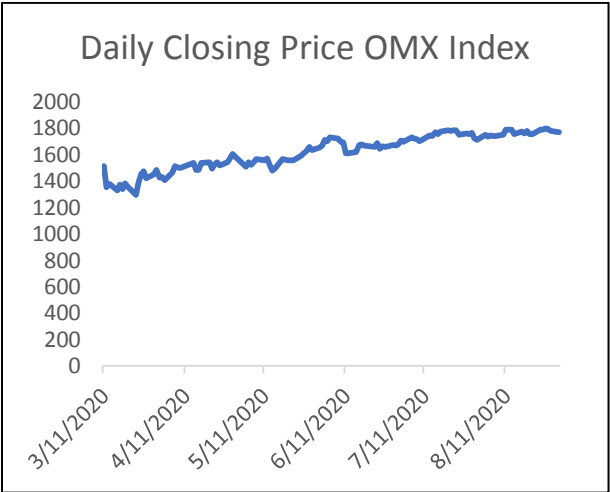
STI Index



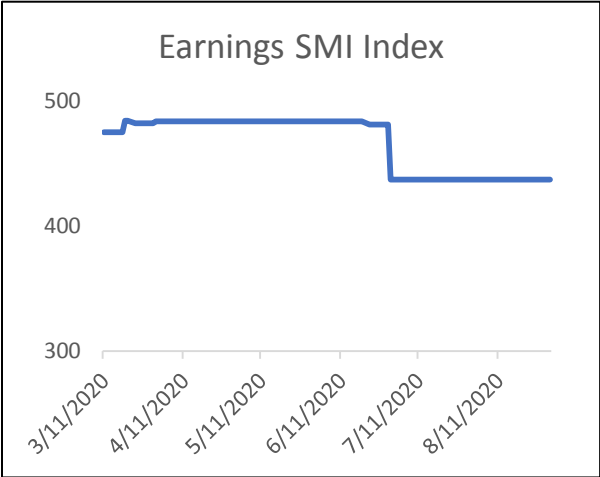
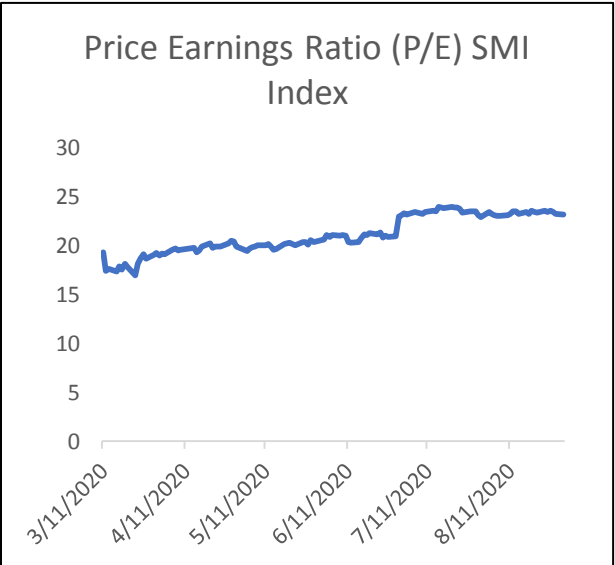
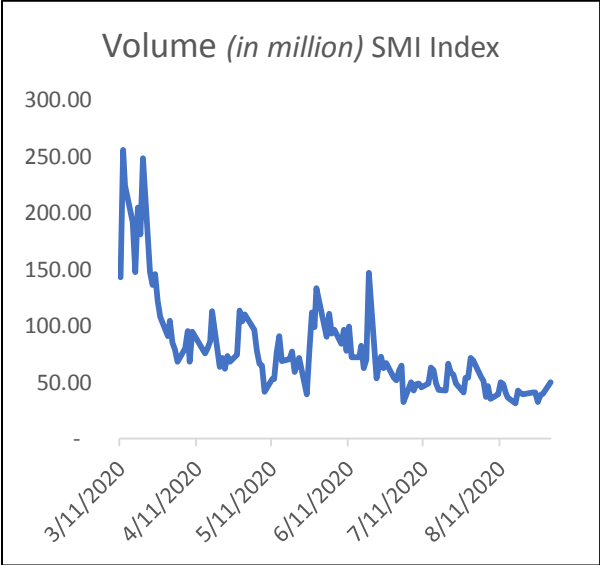
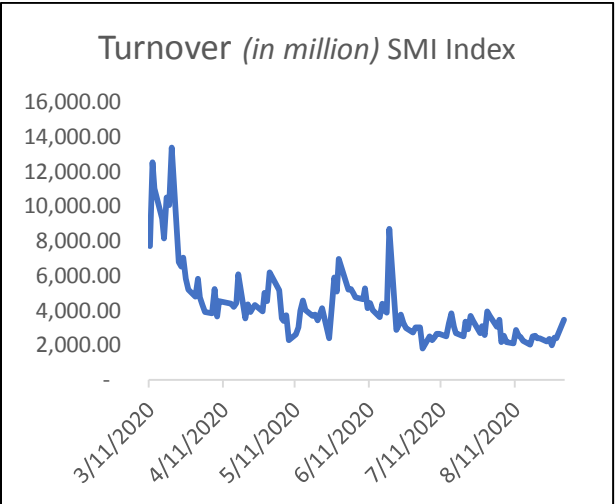
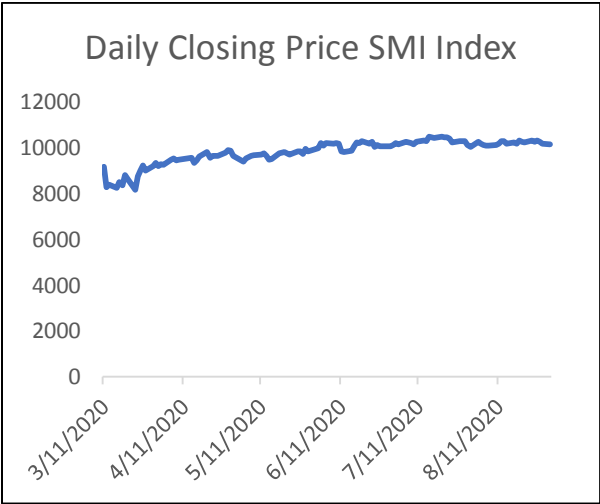
IBEX Index



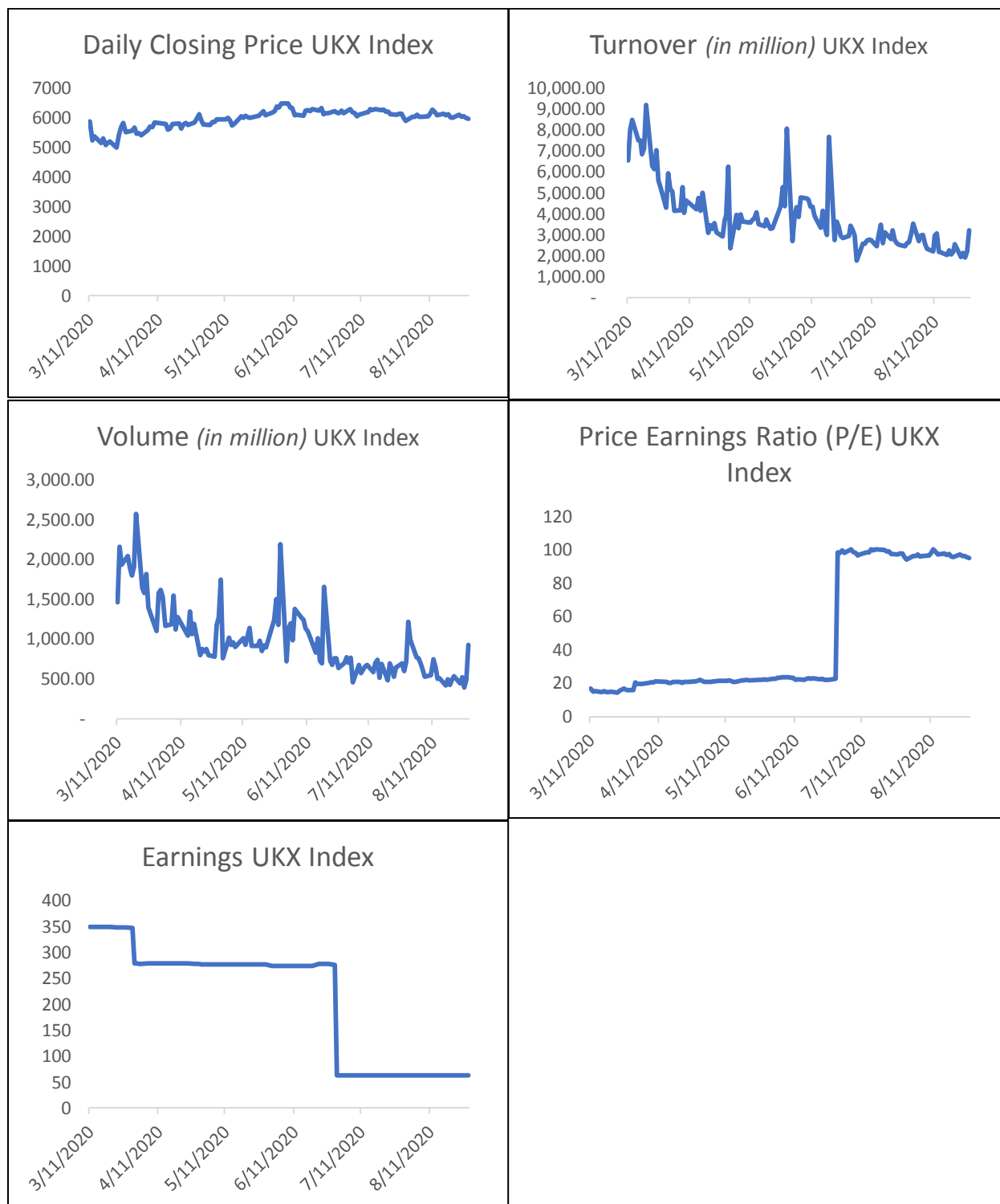
OMX Index



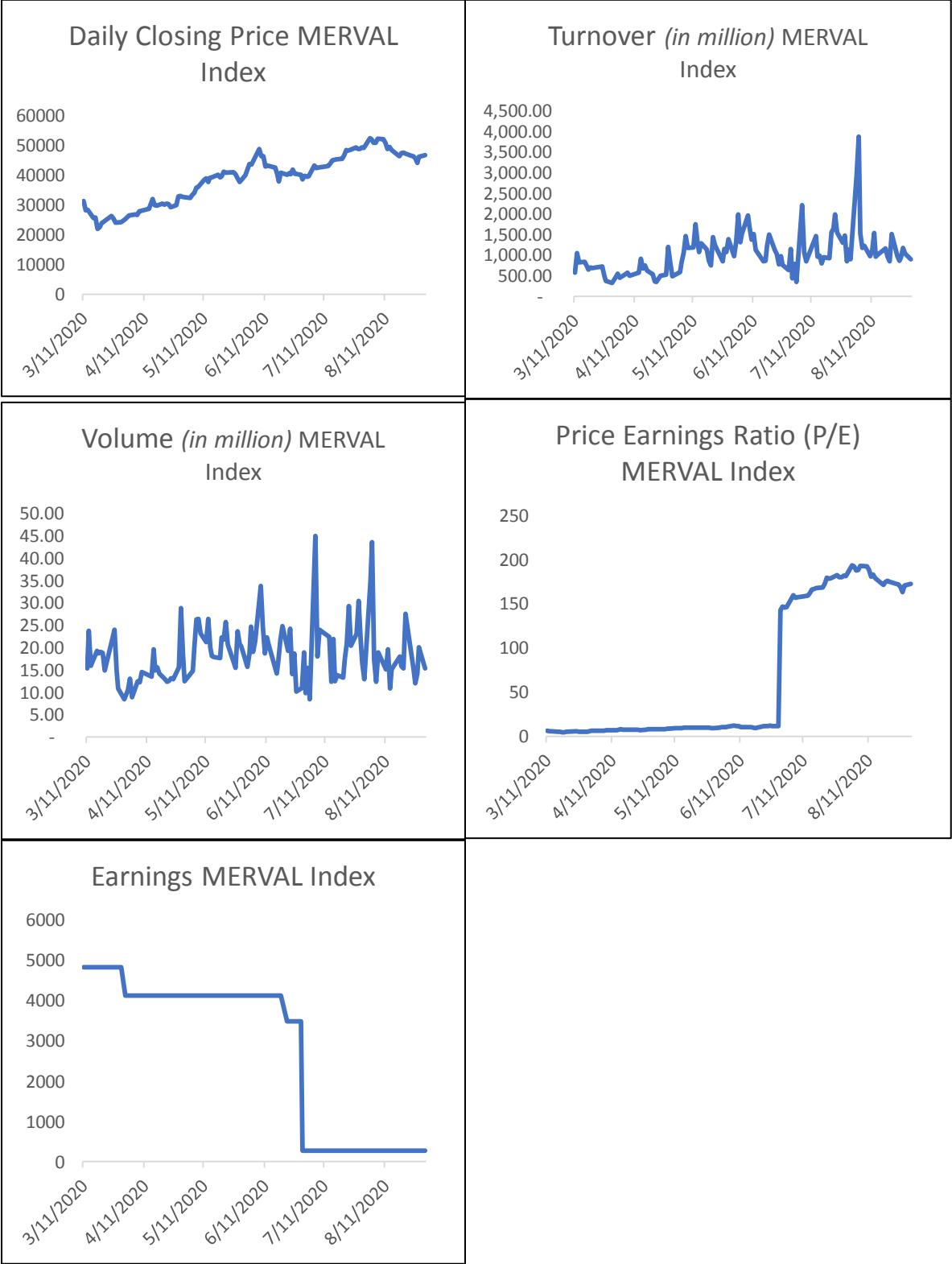
SMI Index



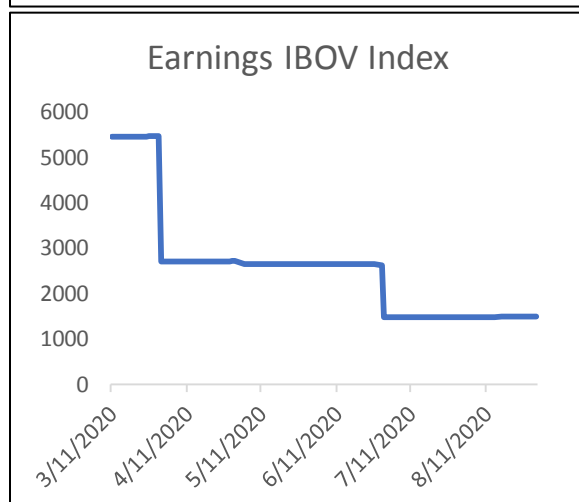
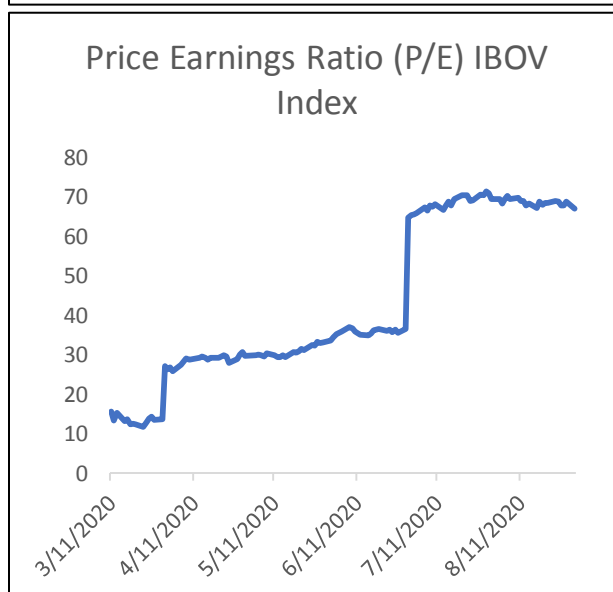
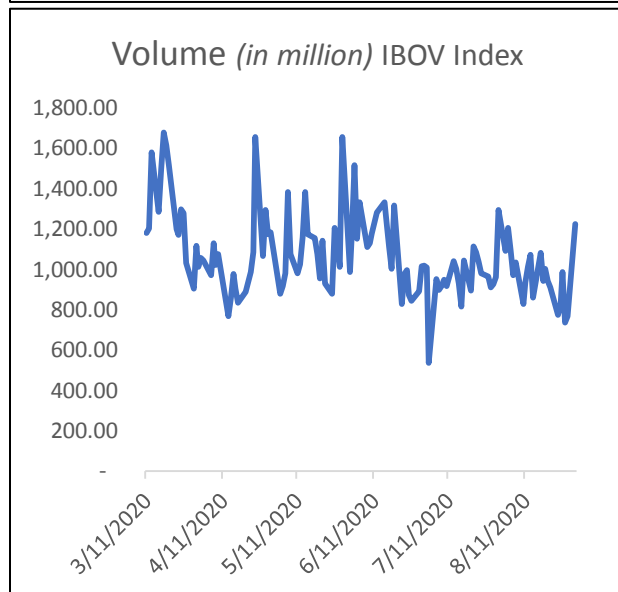
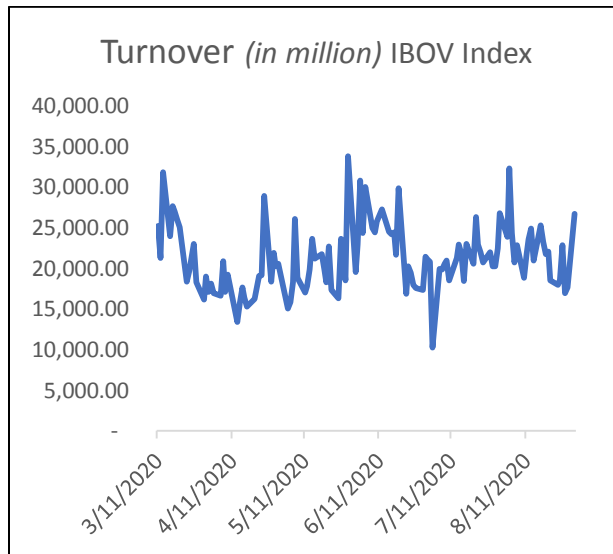
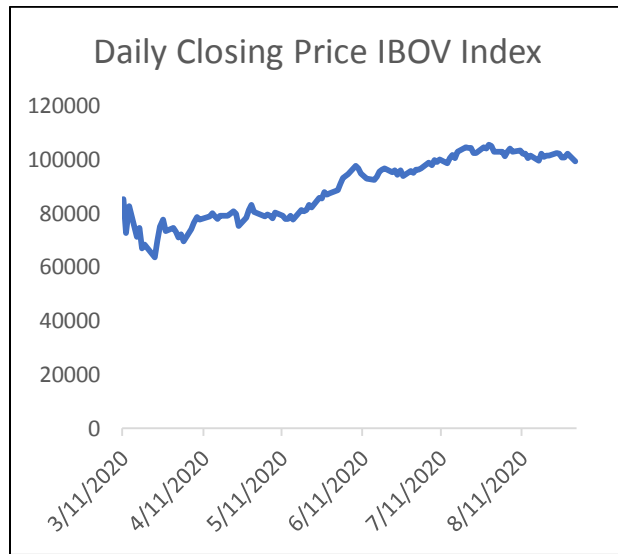
UKX Index



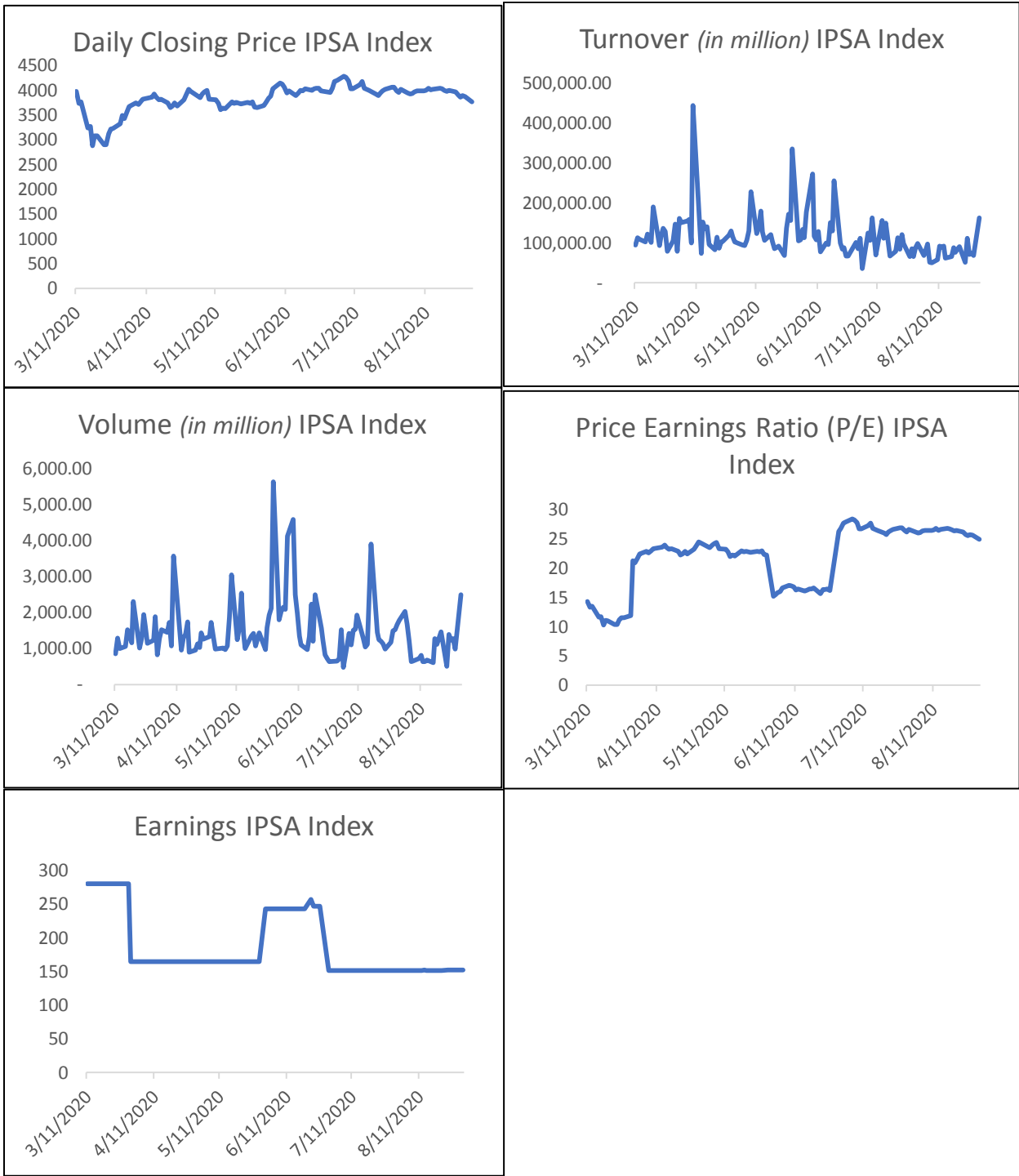
MERVAL Index



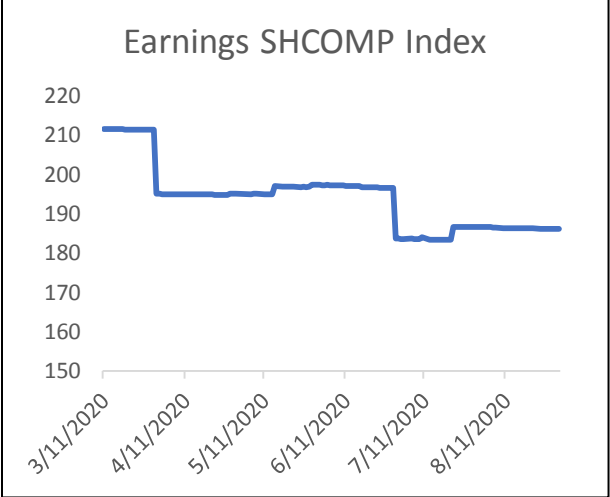
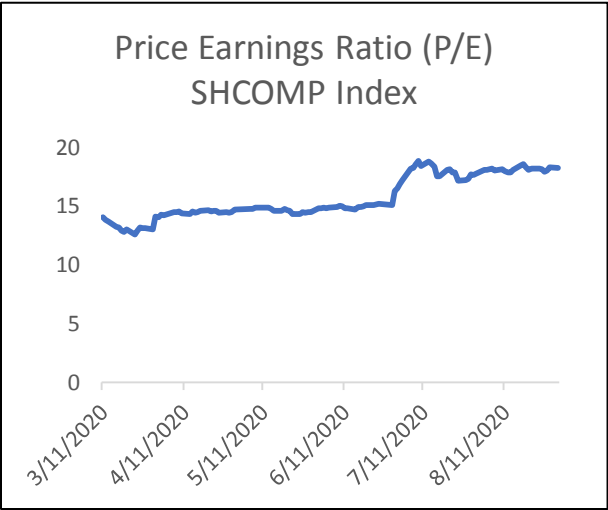
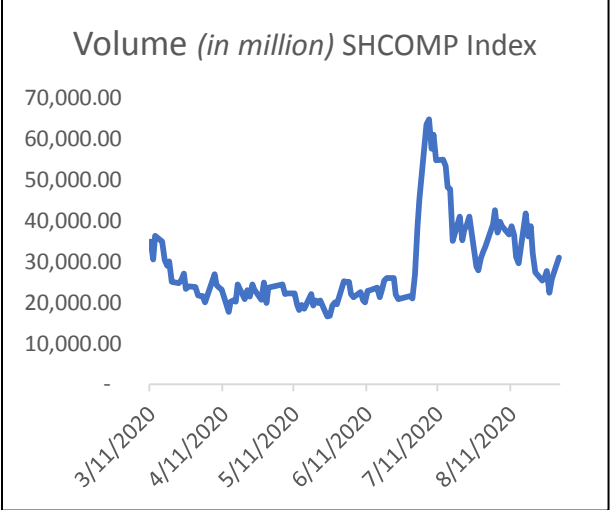
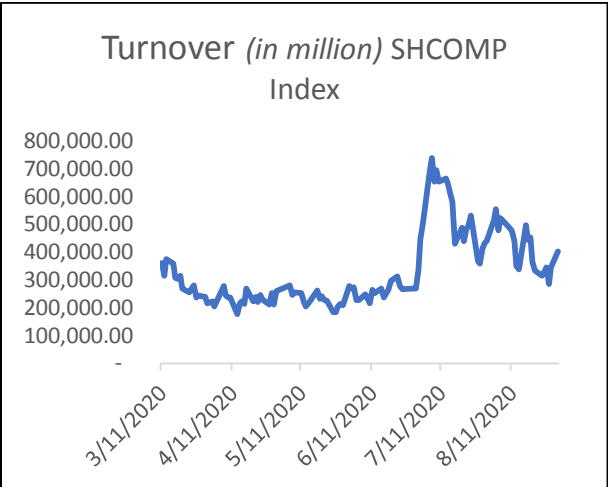
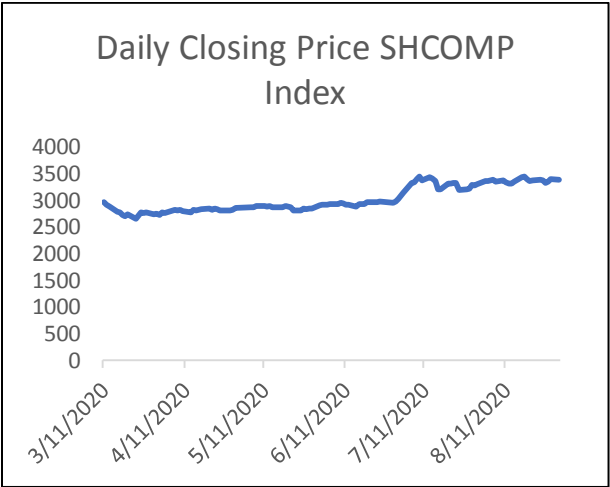
IBOV Index



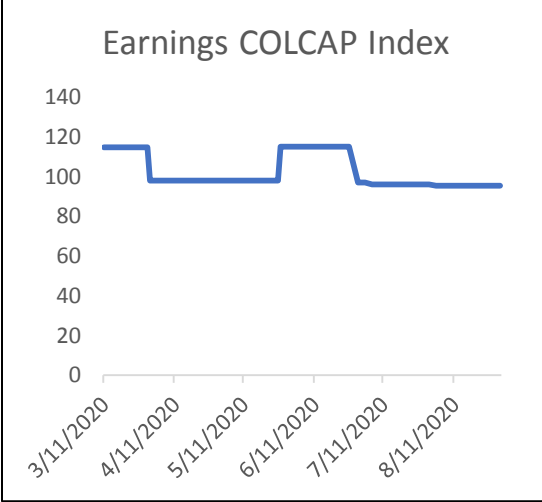
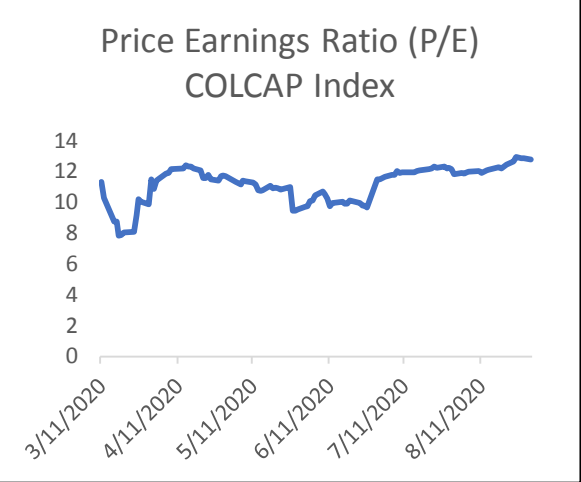
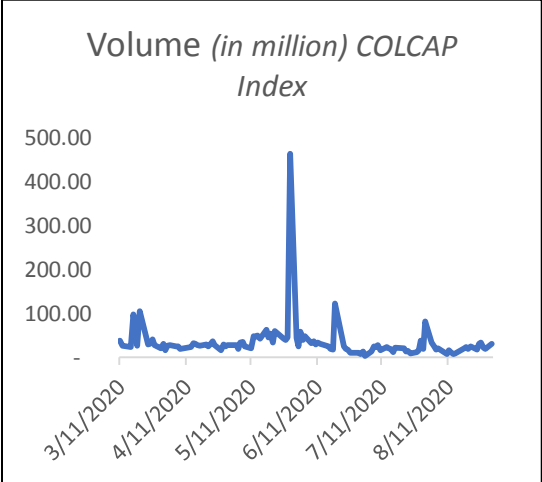
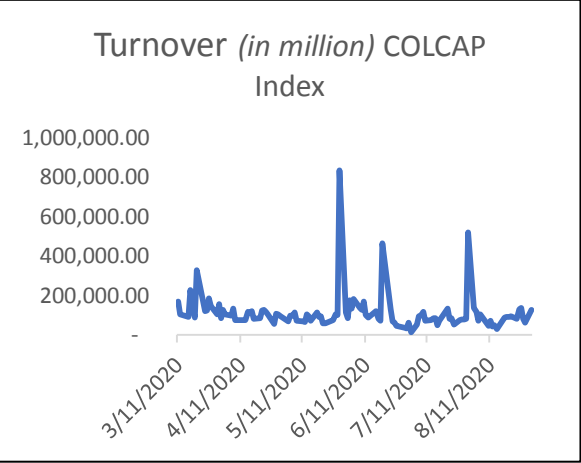
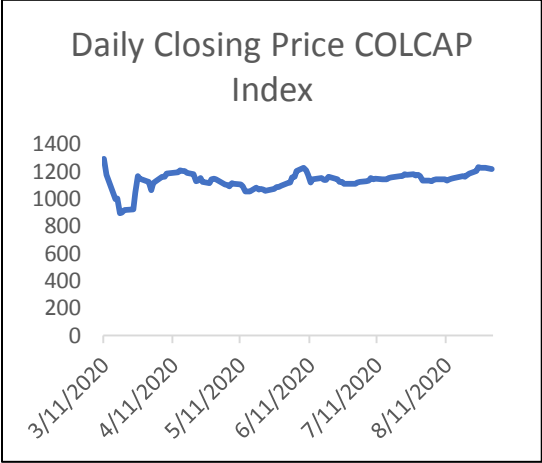
IPSA Index



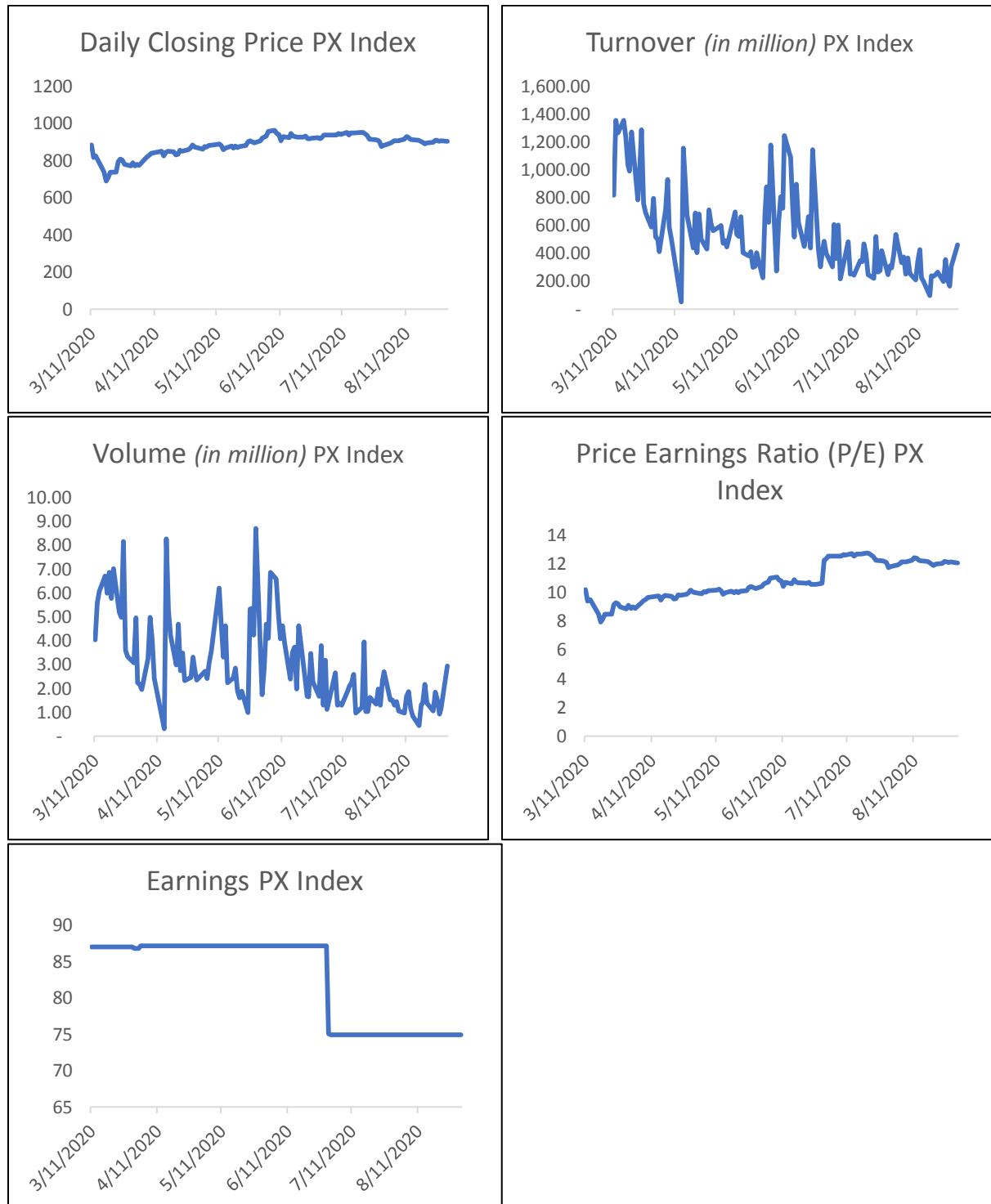
SHCOMP Index



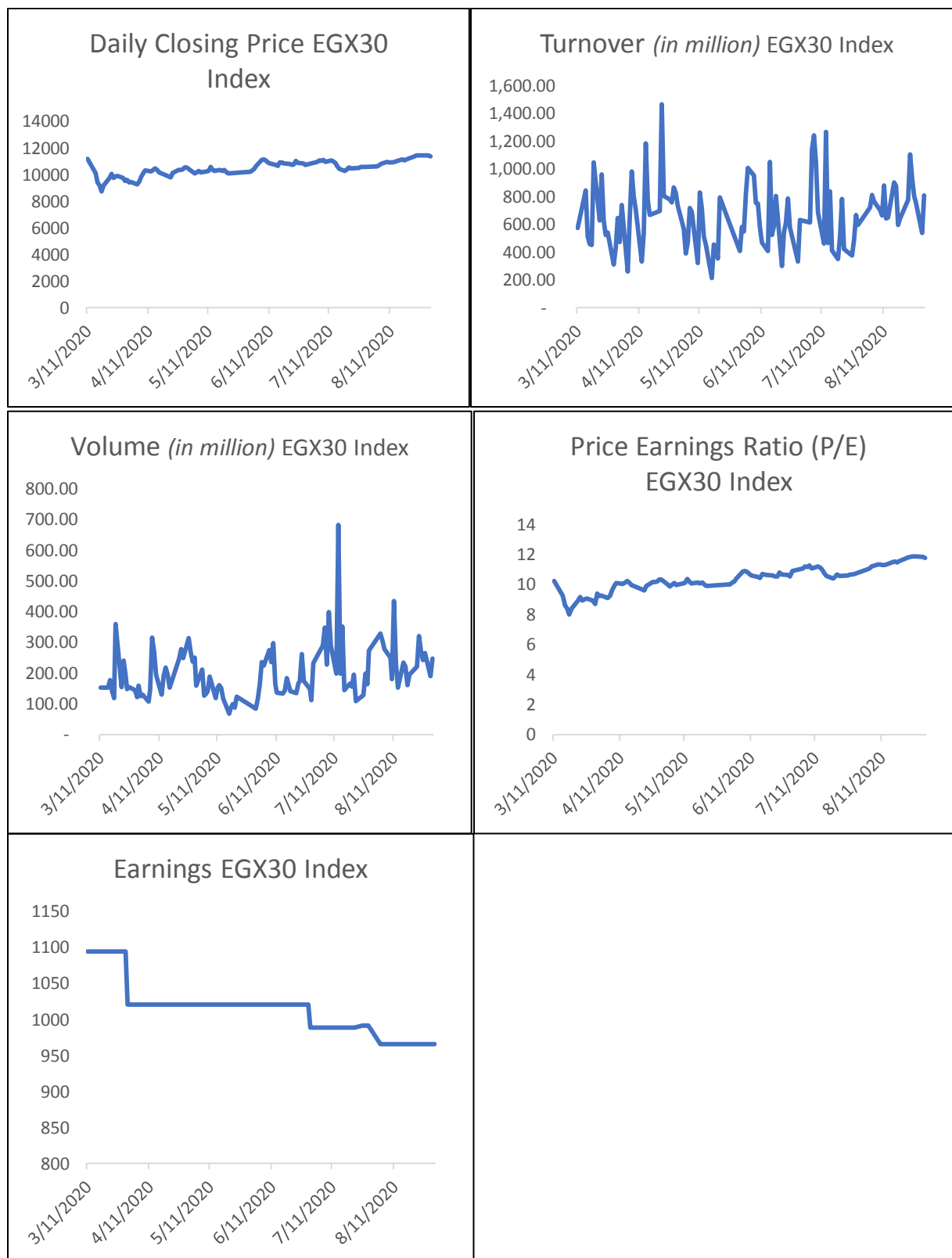
COLCAP Index



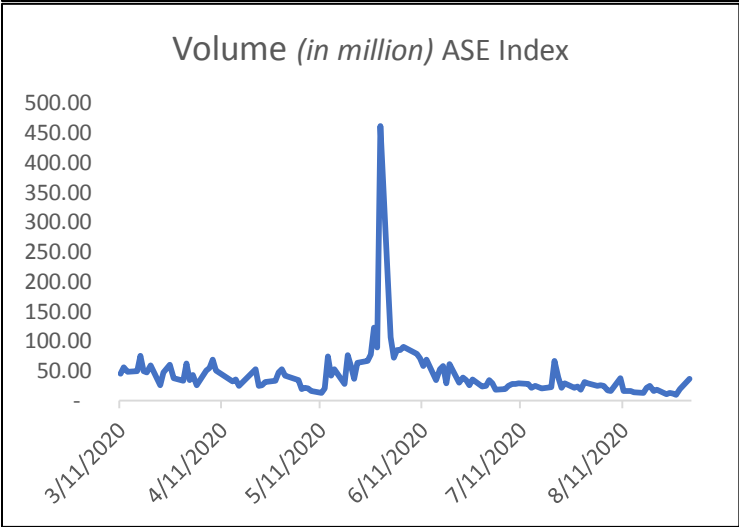
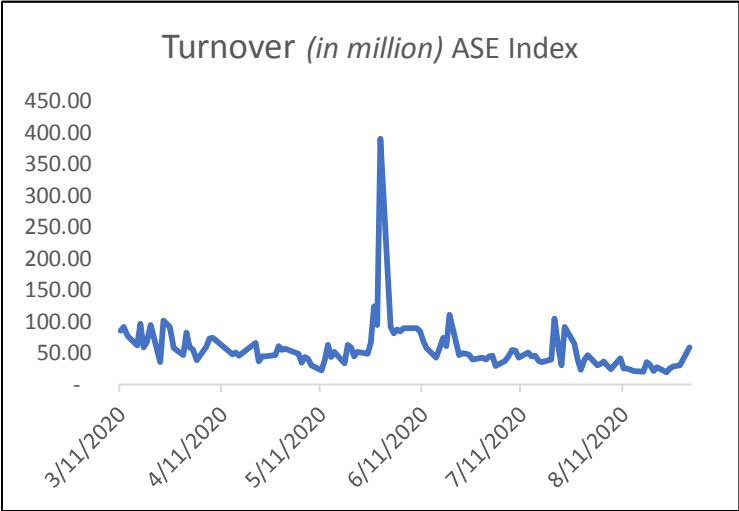
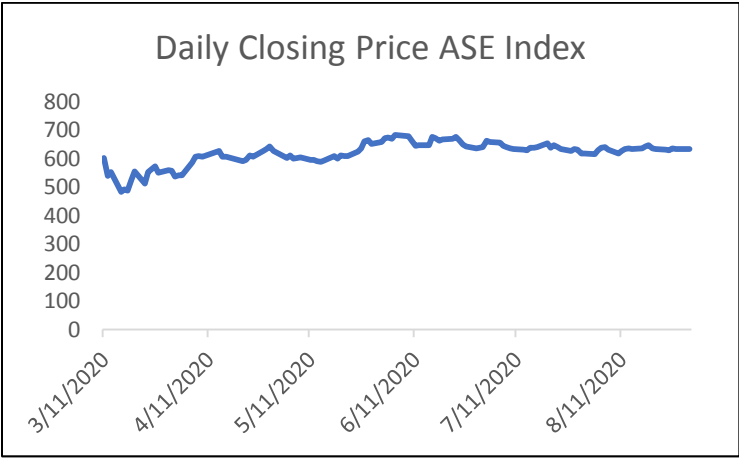
PX Index



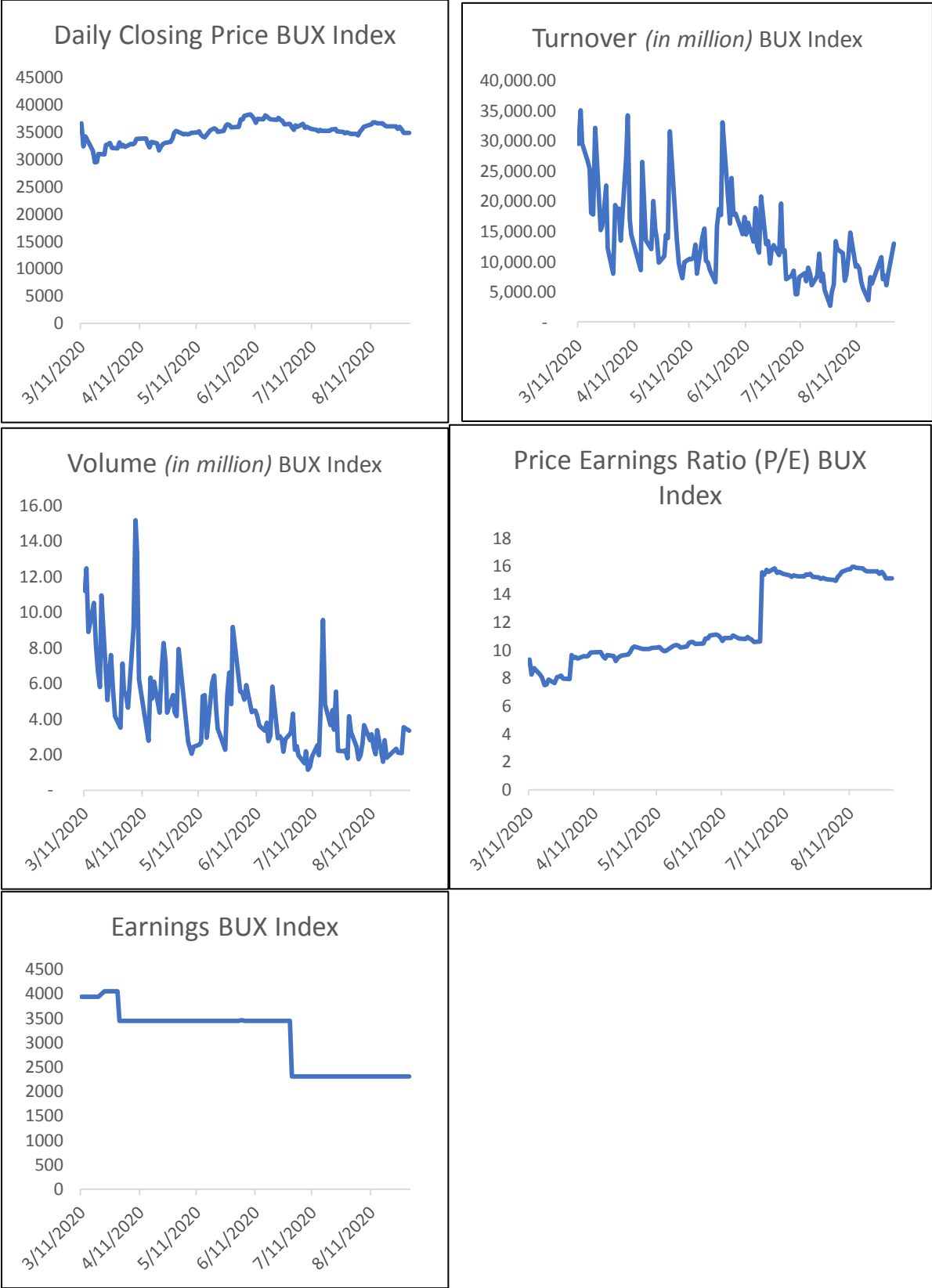
EGX30 Index



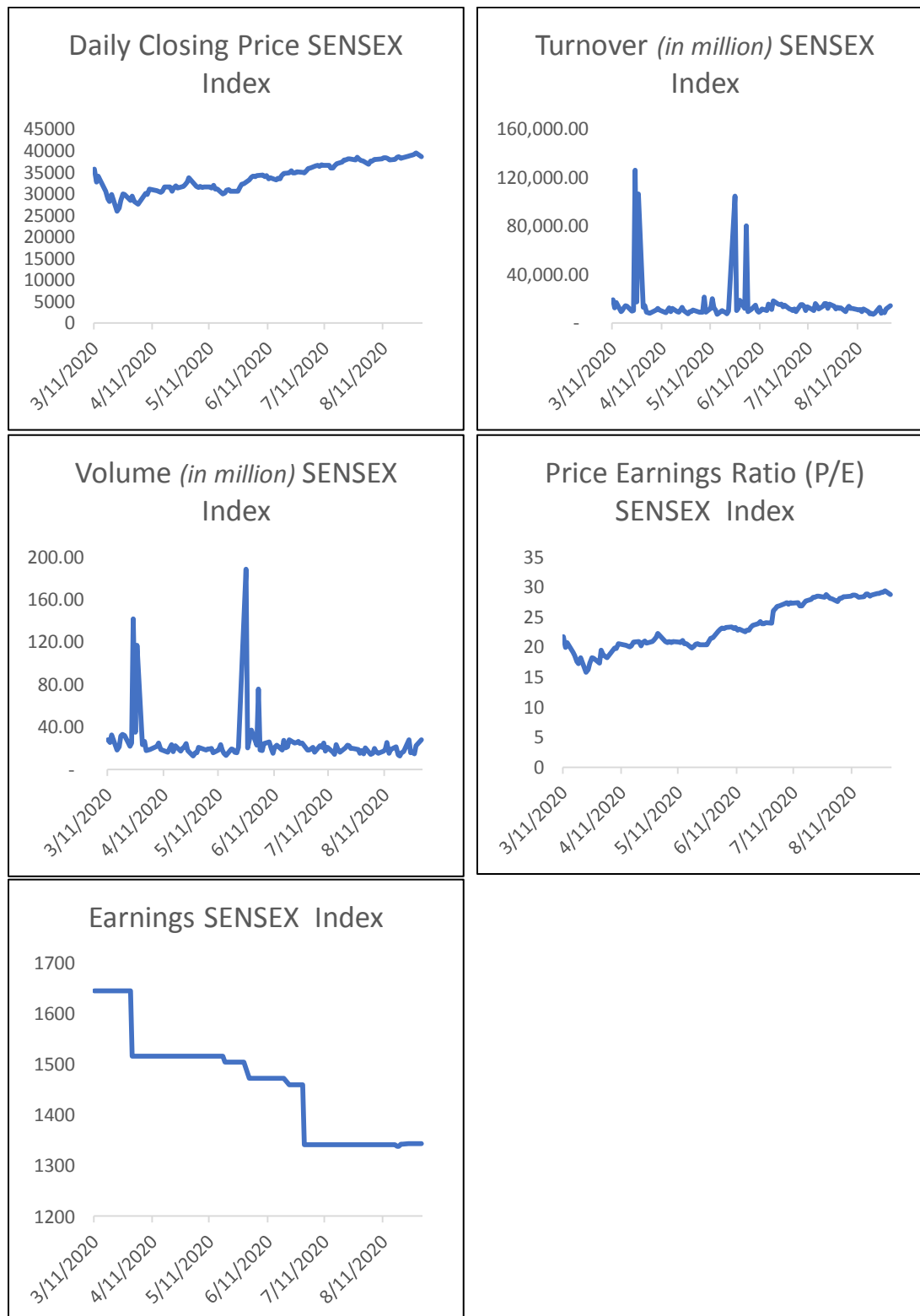
ASE Index



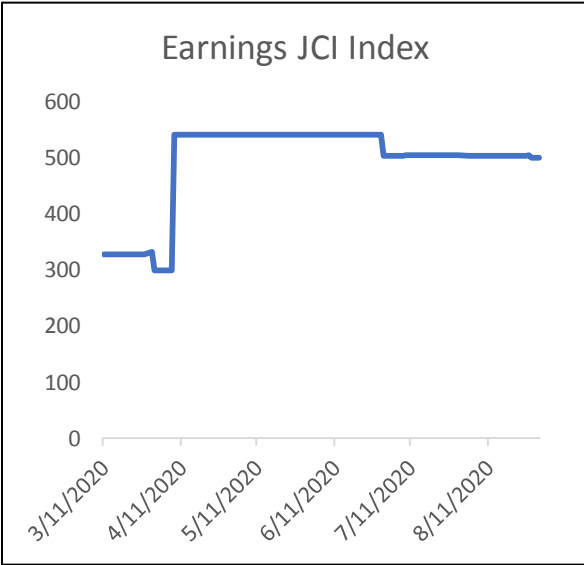
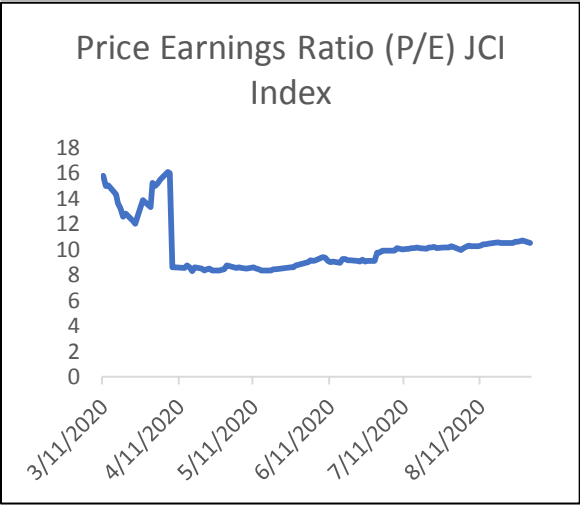
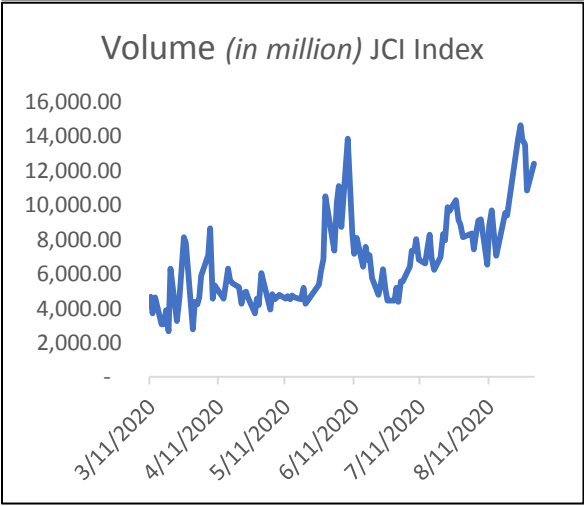
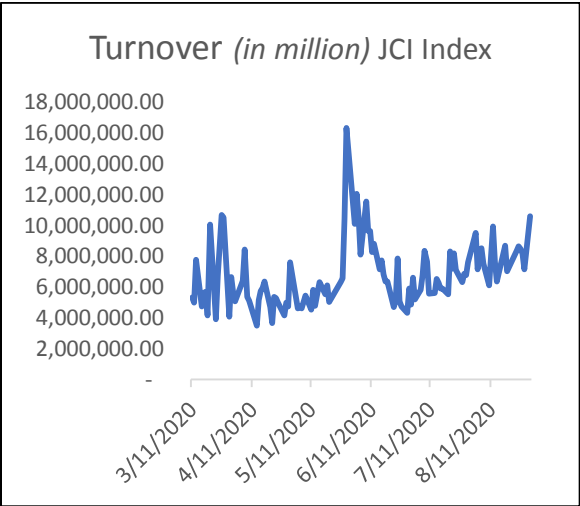
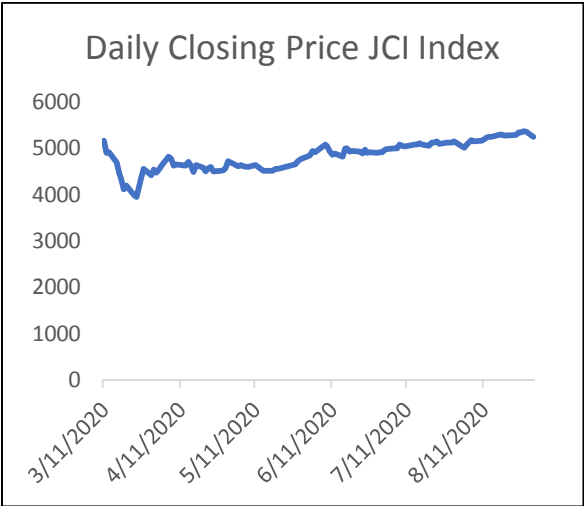
BUX Index



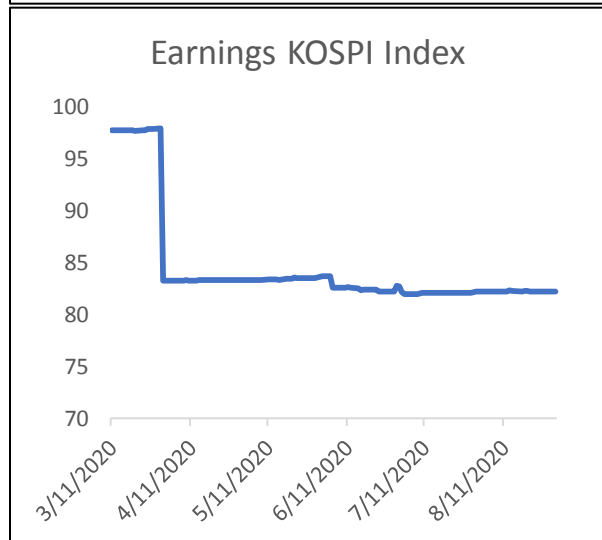
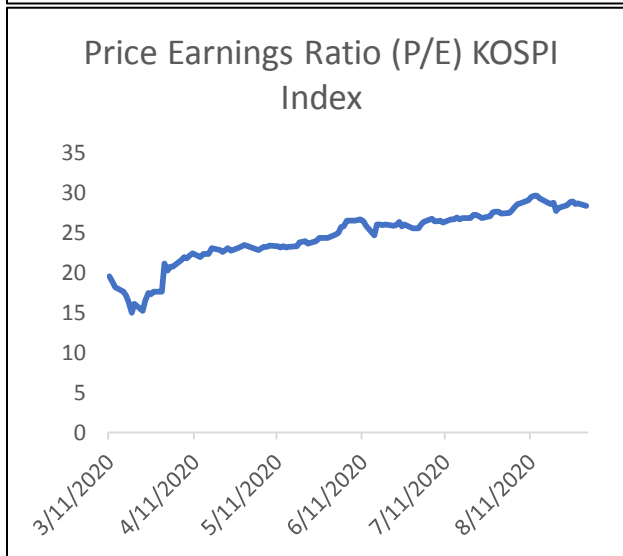
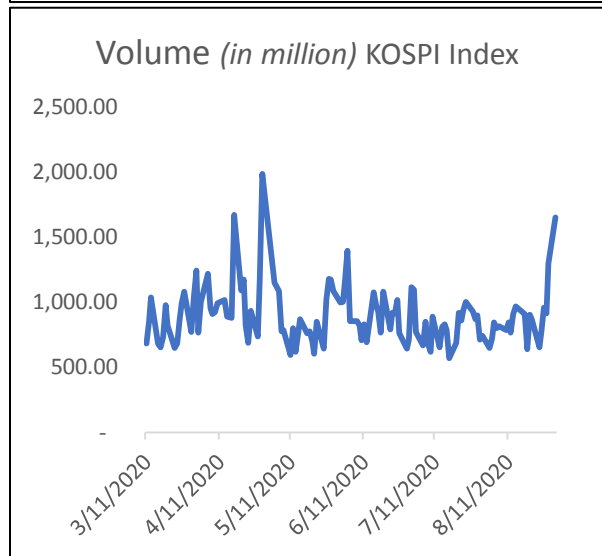
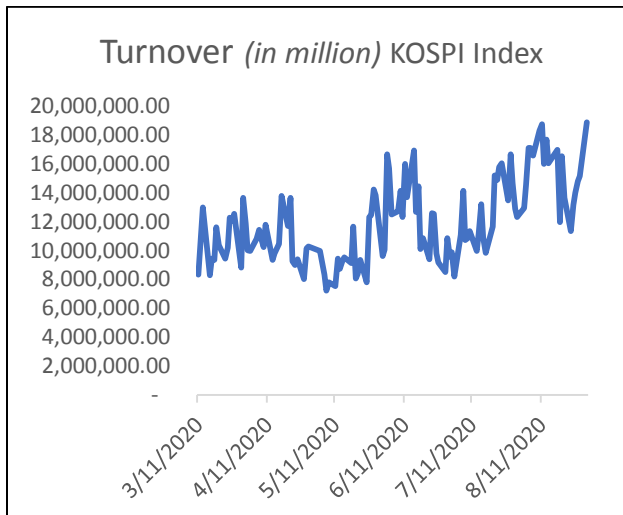
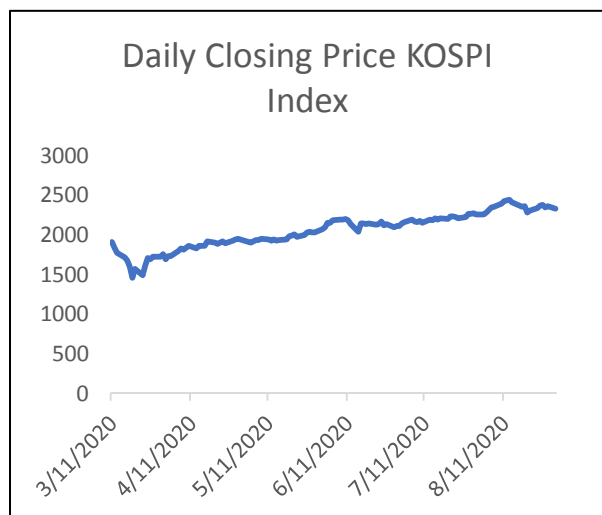
SENSEX Index



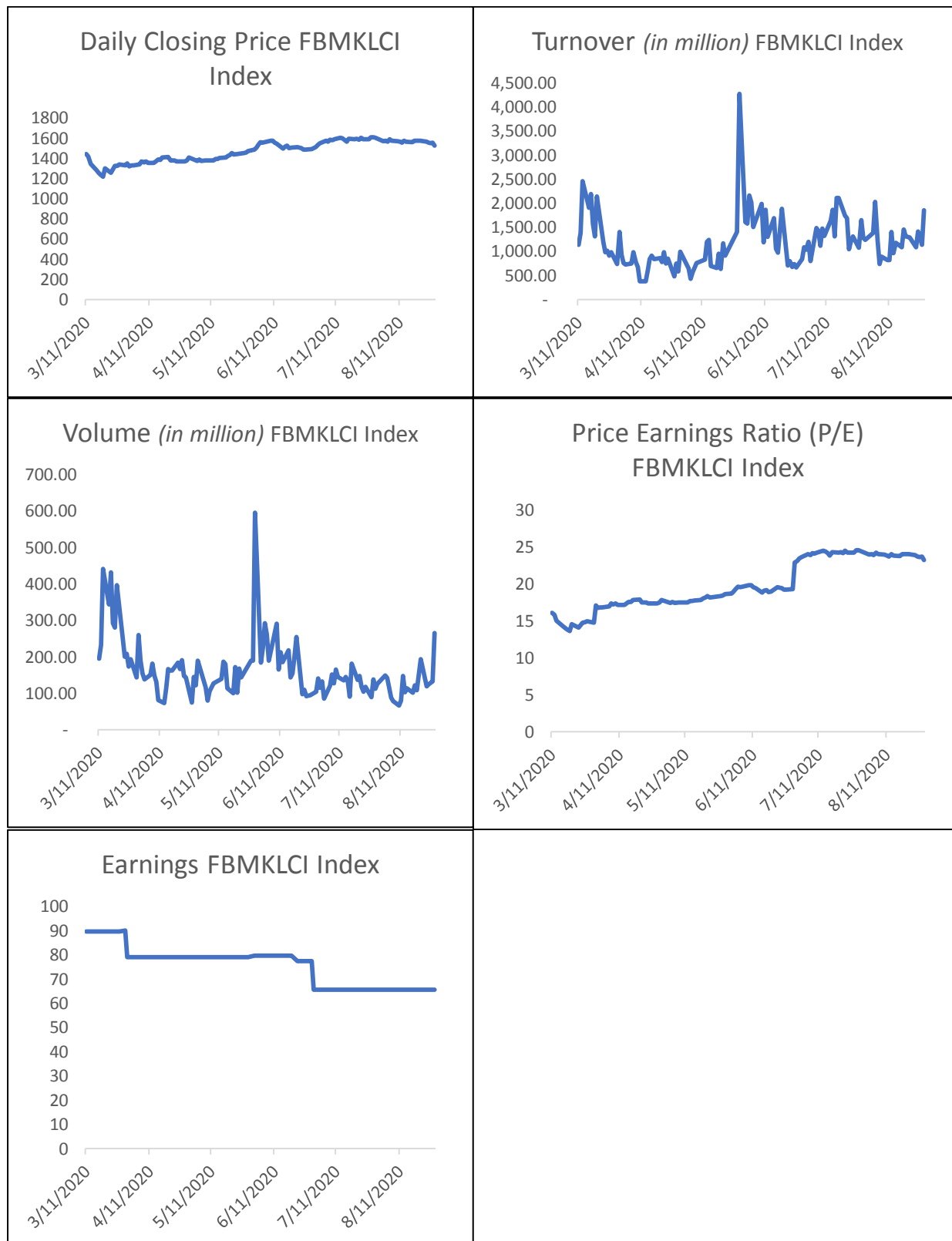
JCI Index



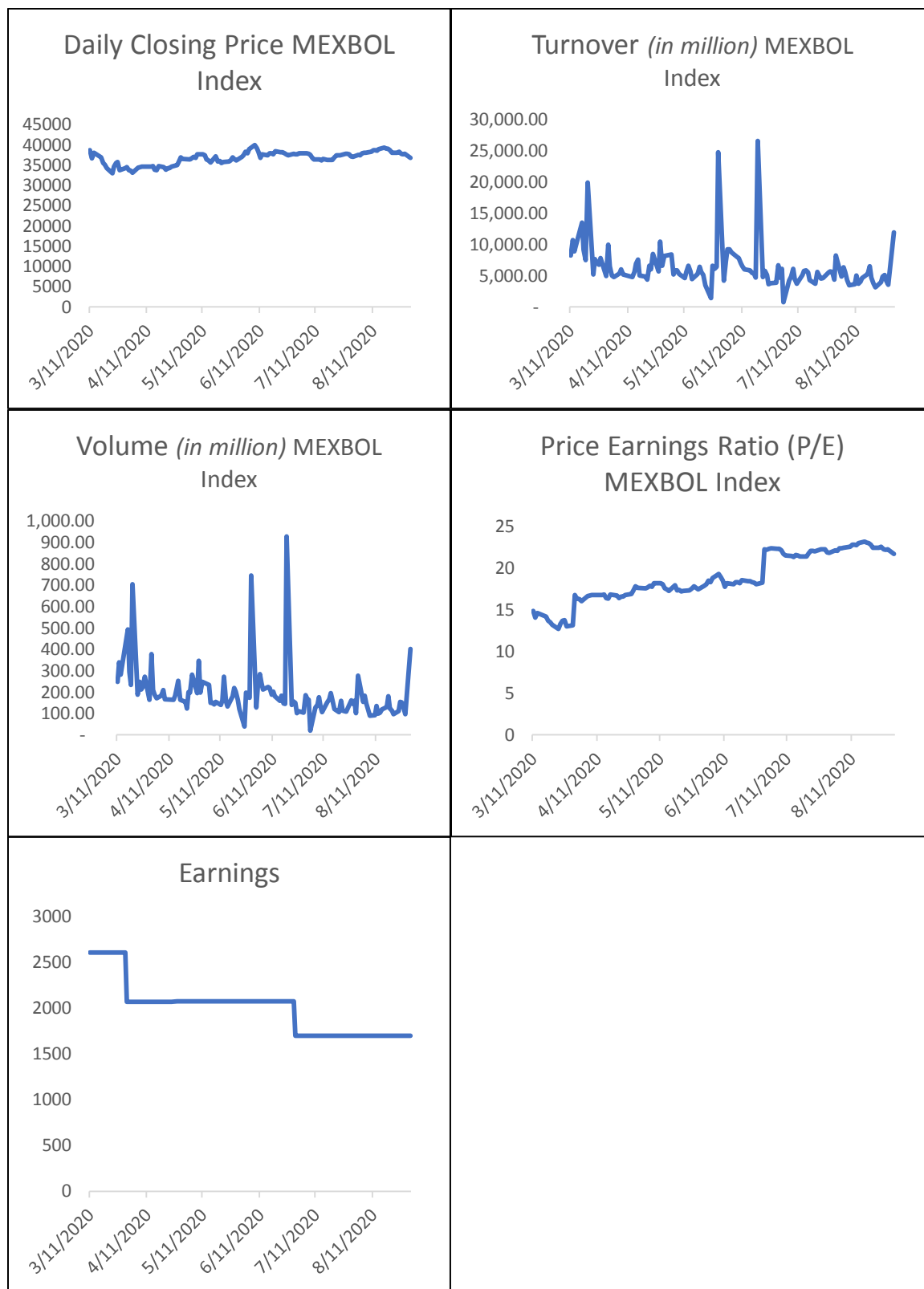
KOSPI Index



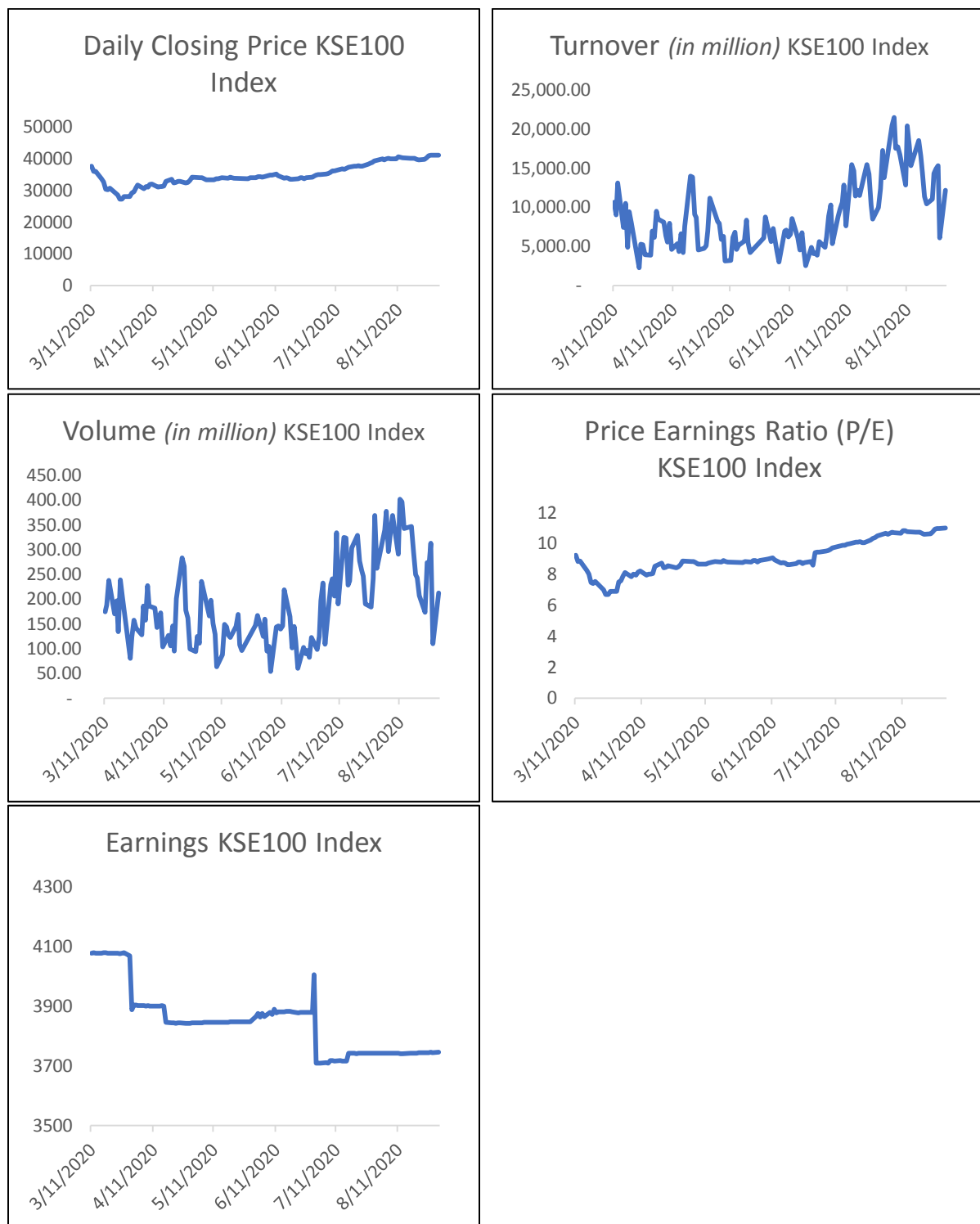
FBMKLCI Index



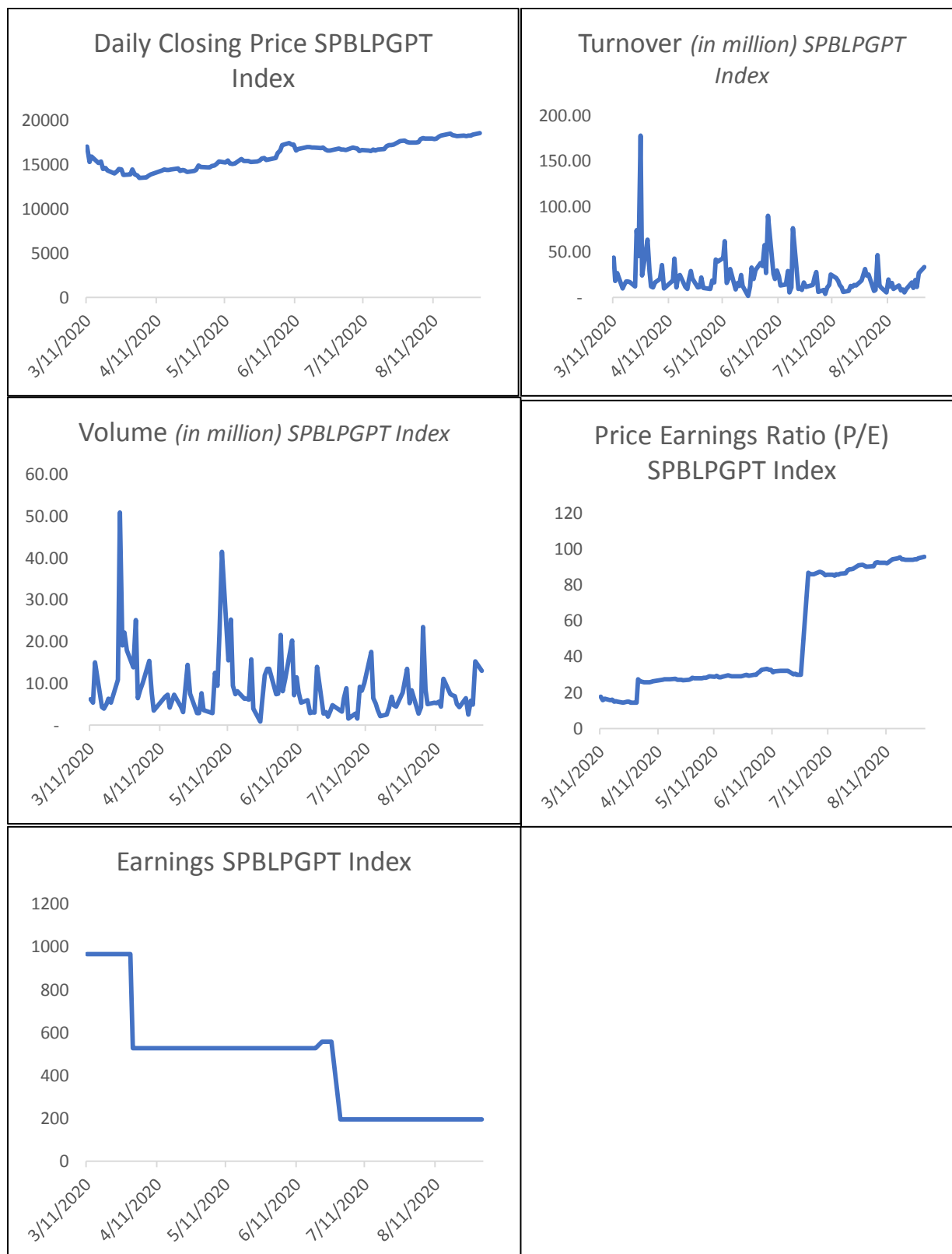
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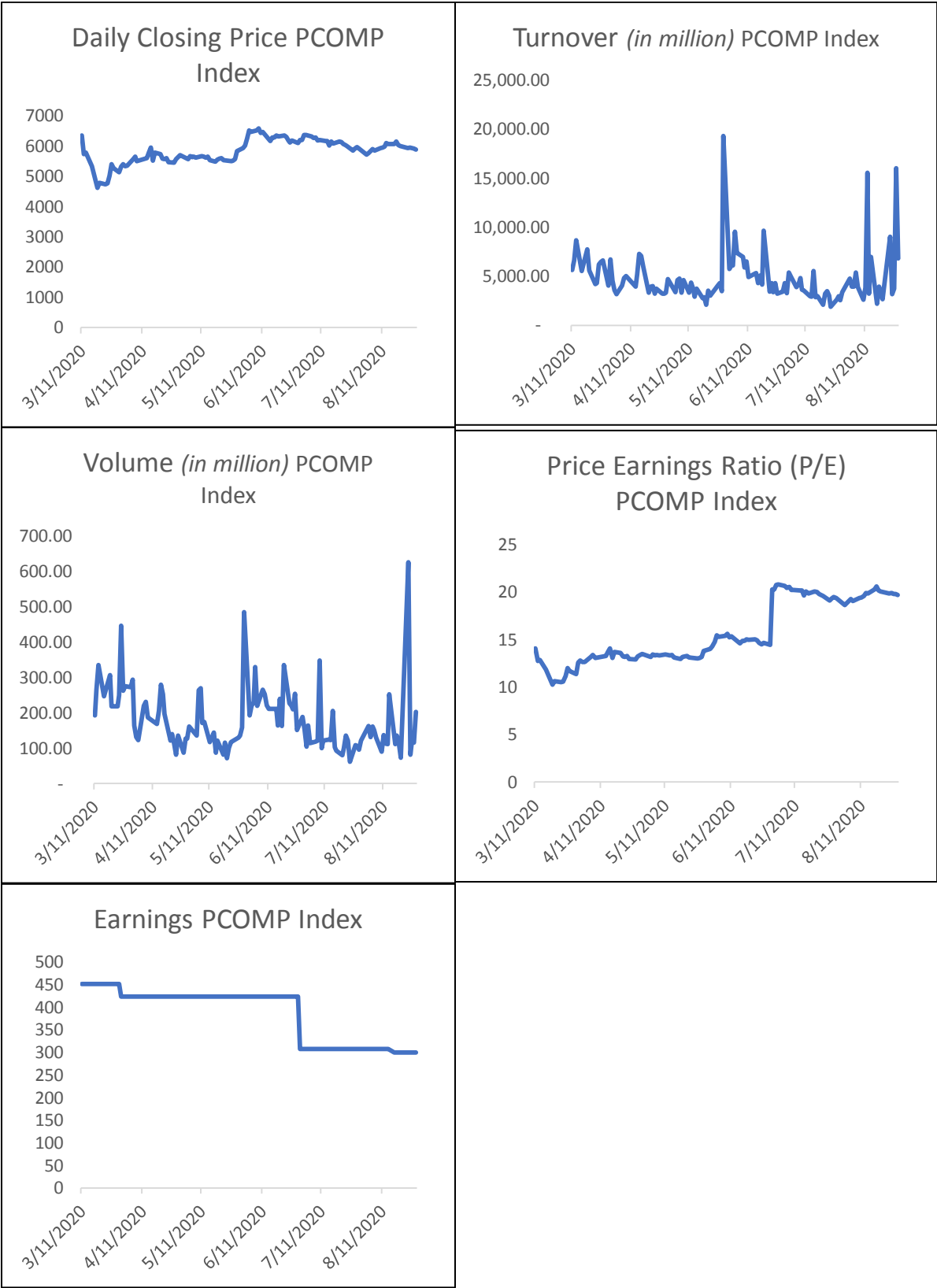
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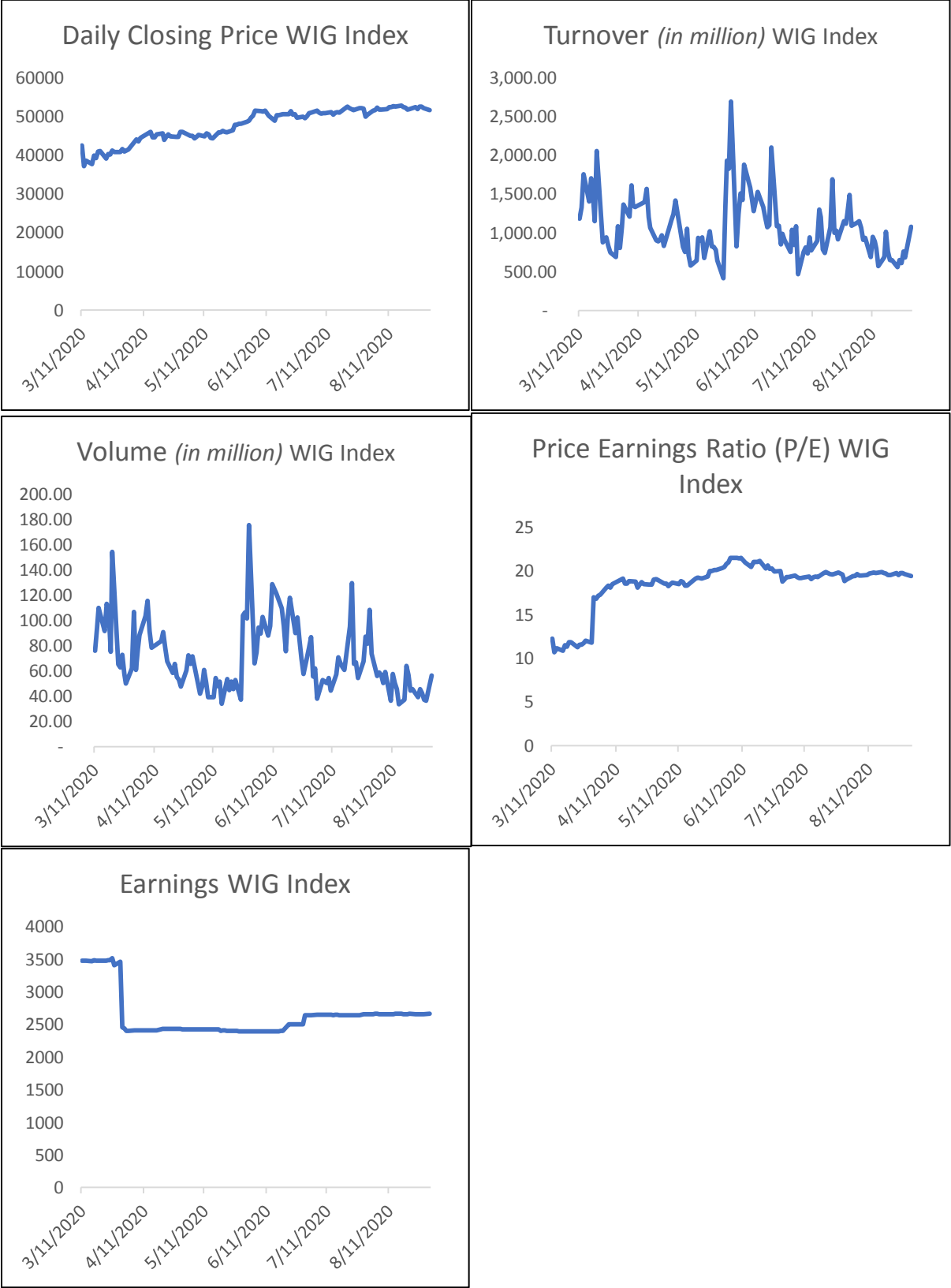
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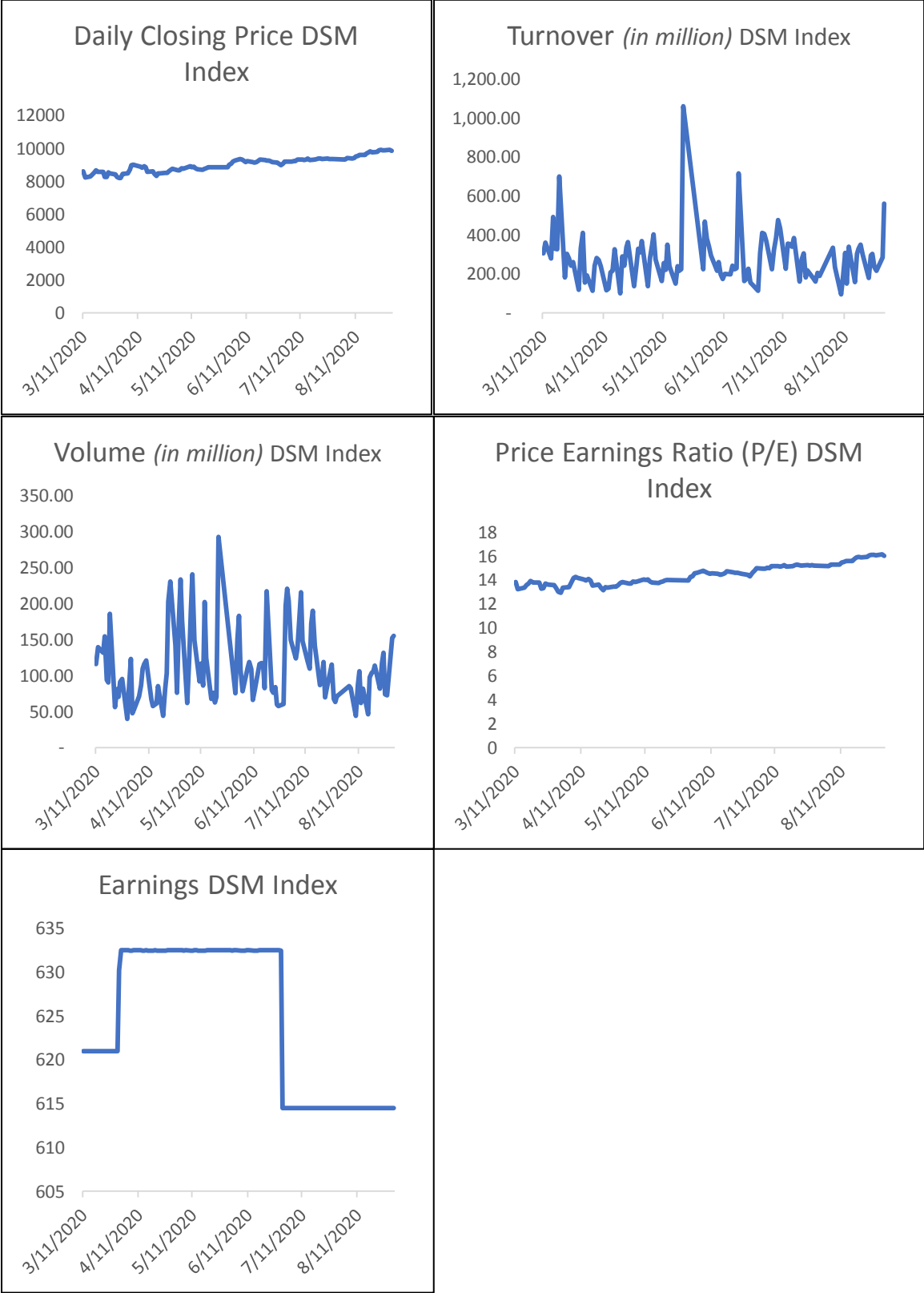
PCOMP Index



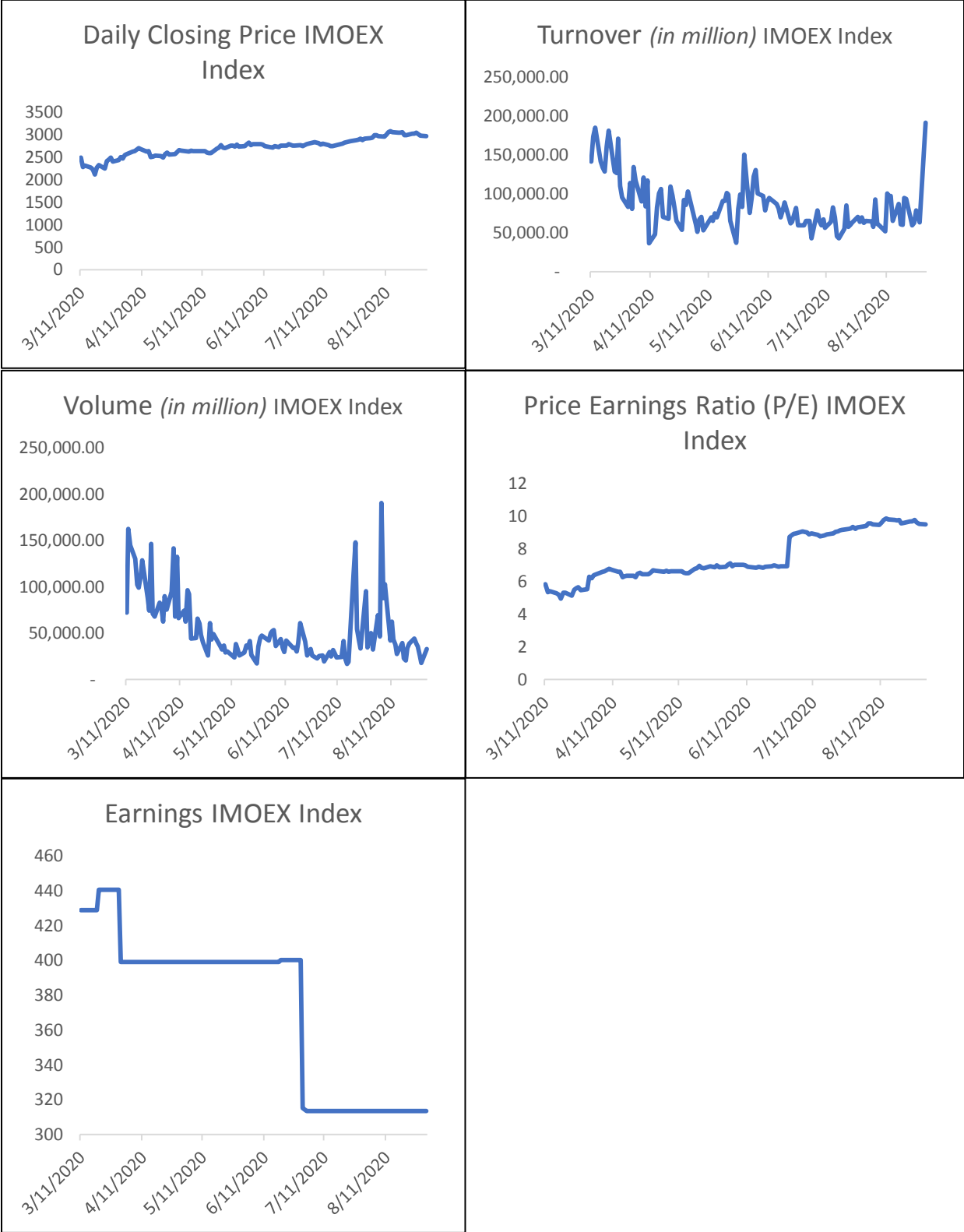
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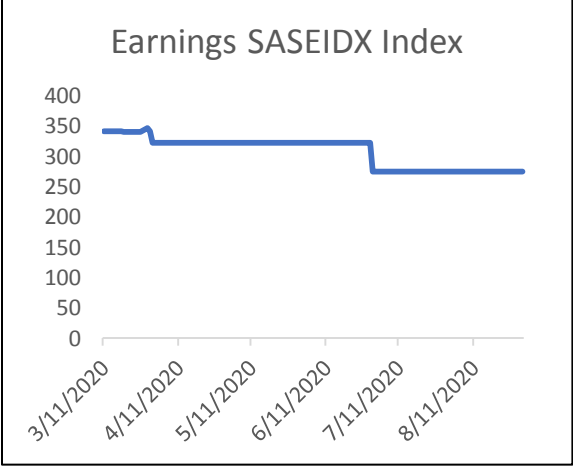
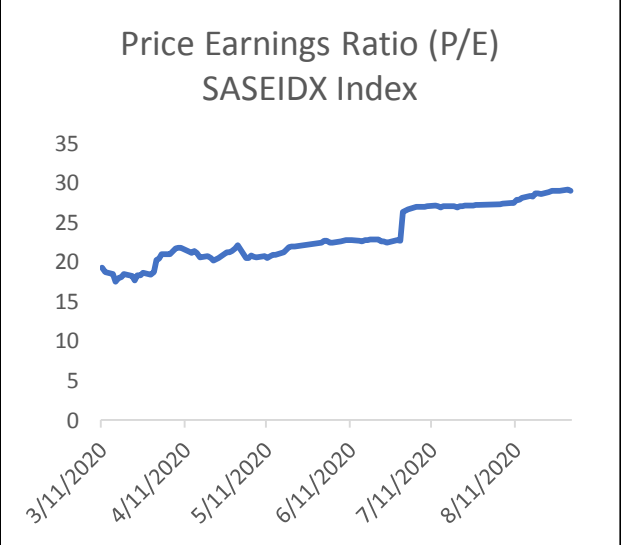
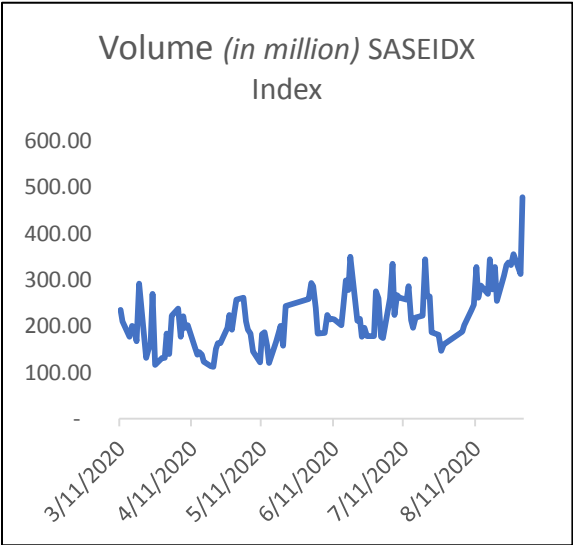
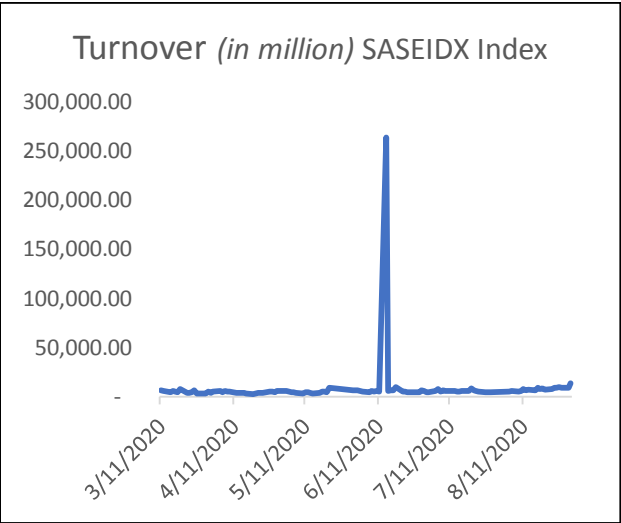
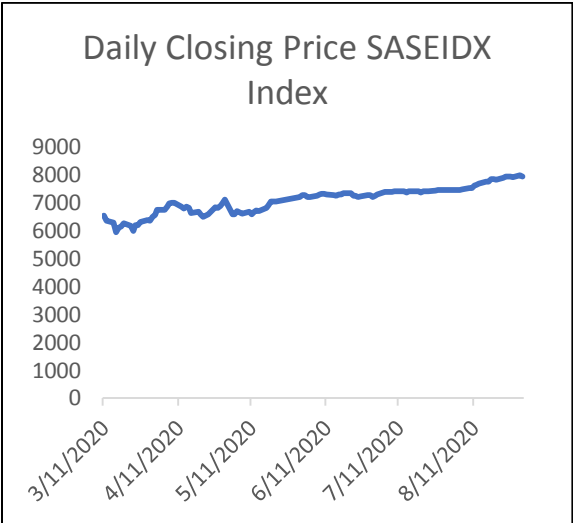
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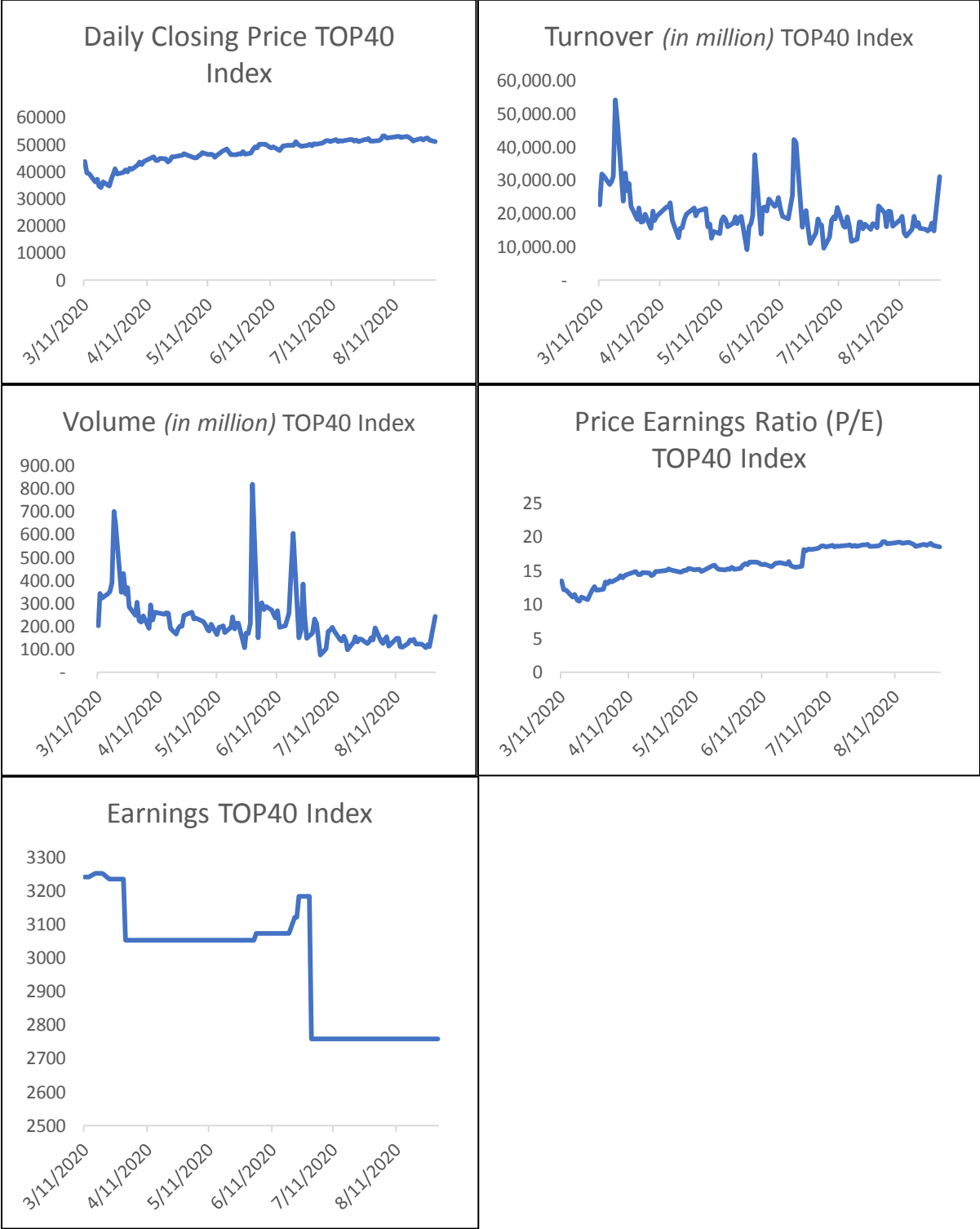
IMOEX Index



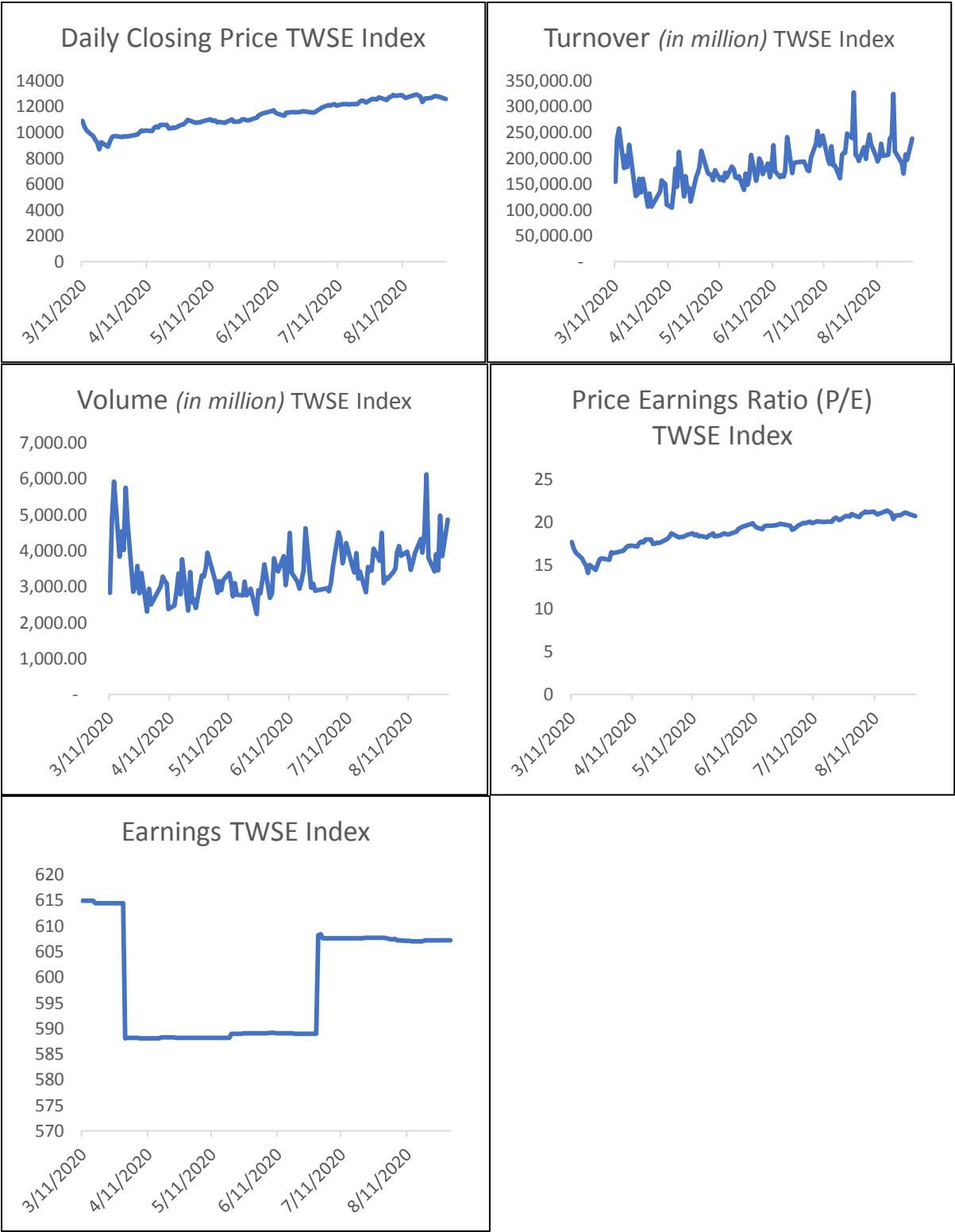
SASEIDX Index



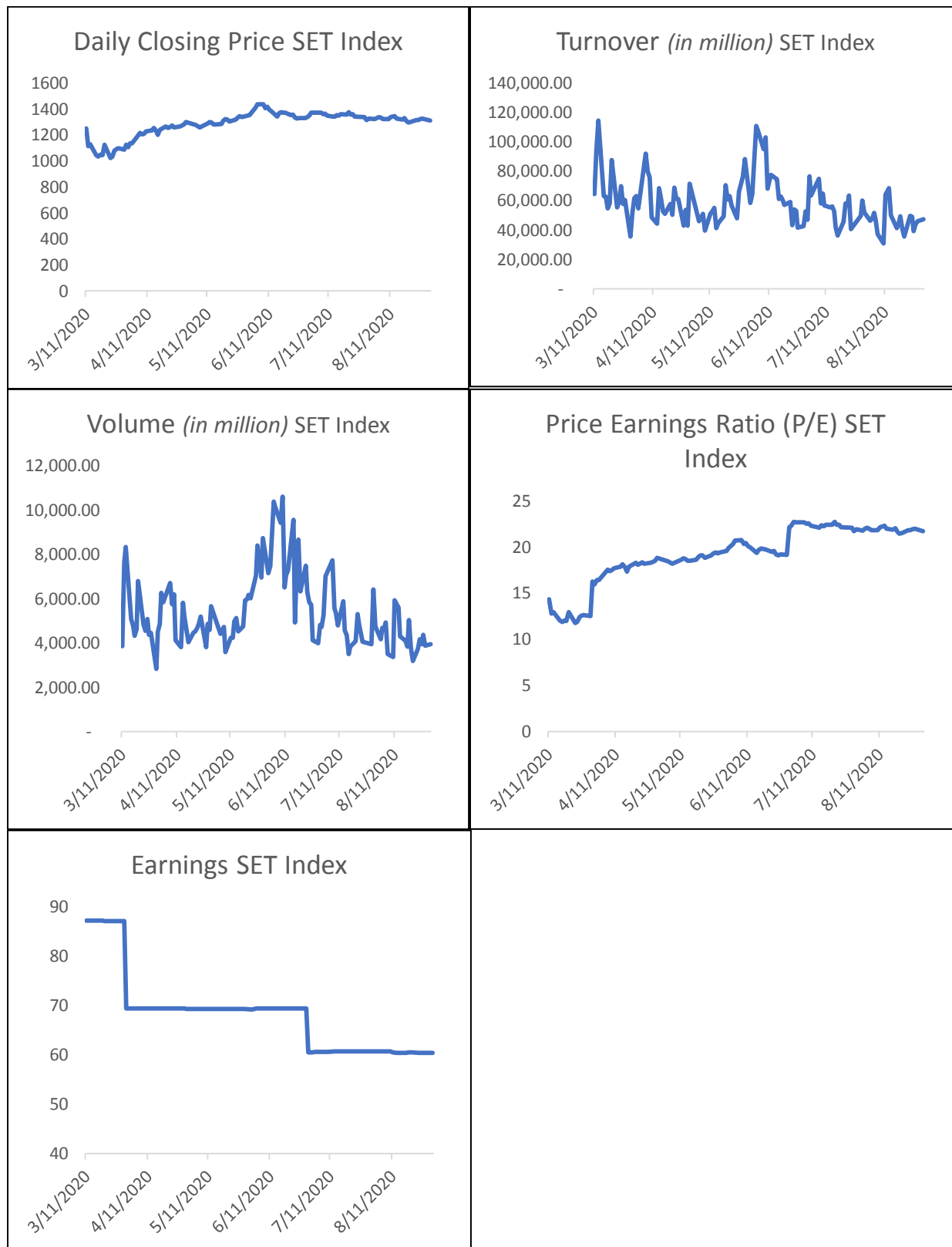
TOP40 Index



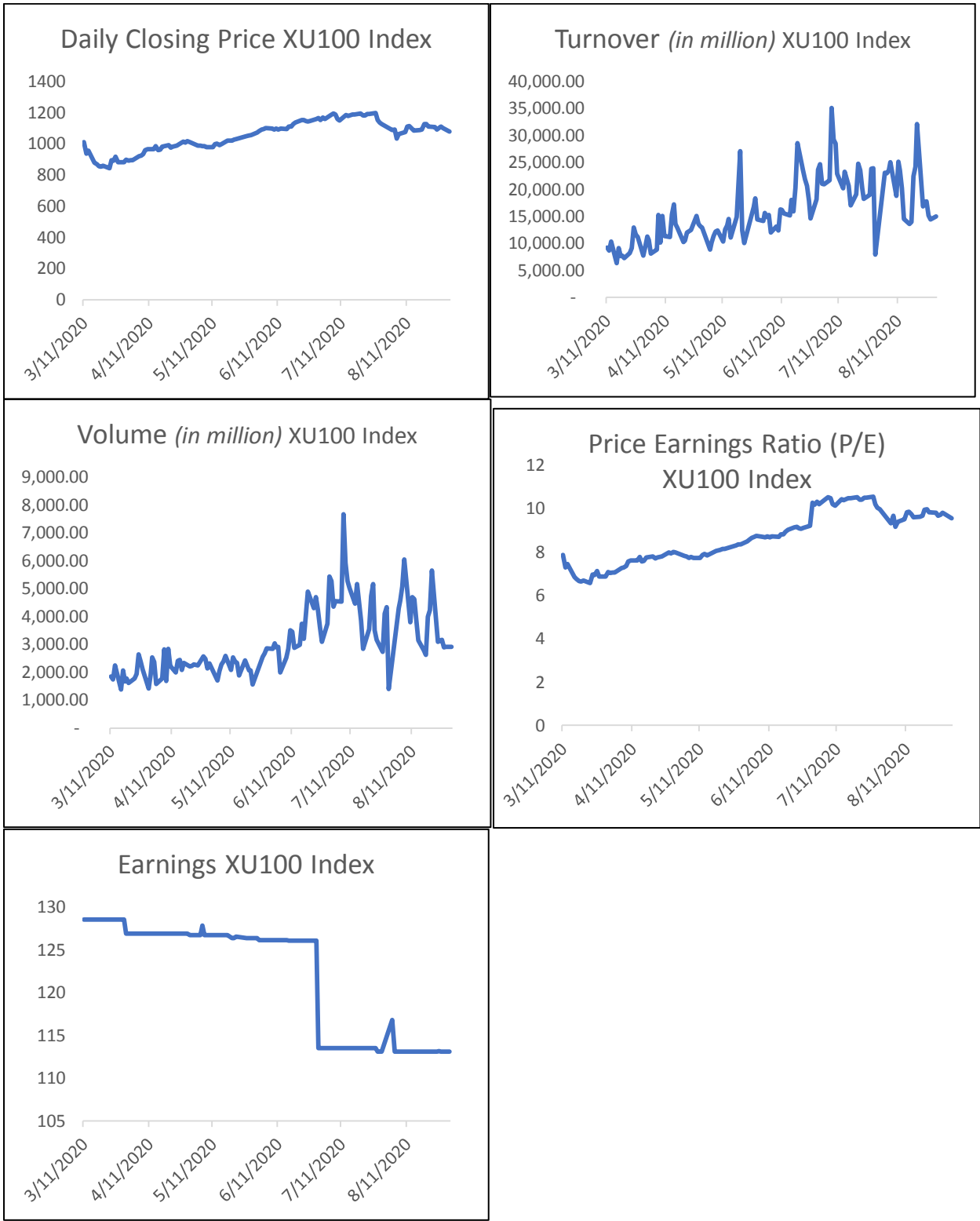
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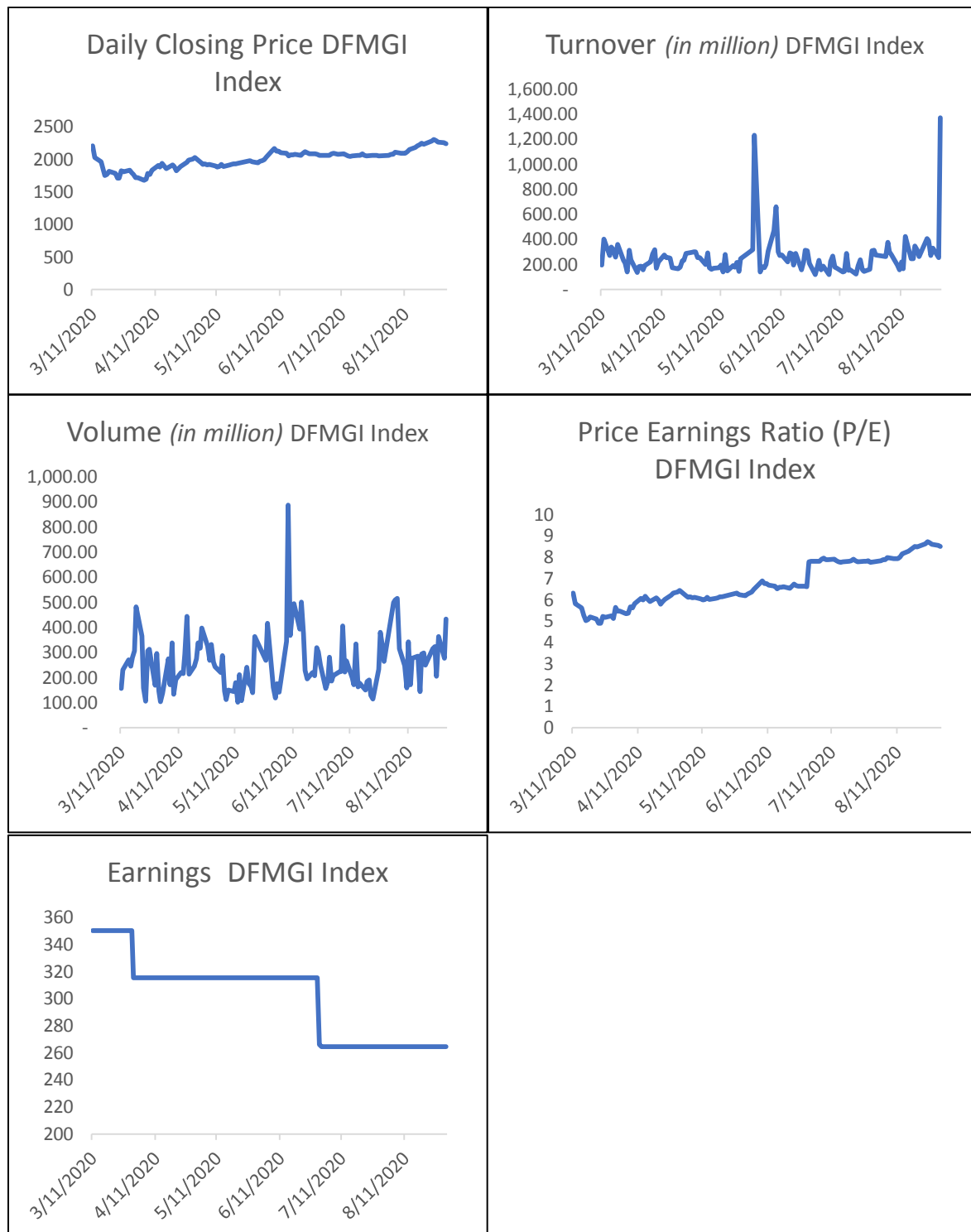
SET Index



XU100 Index



DFMGI Index



ADSMI Index

