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Assessing the First Shocks of the Covid-19 Pandemic on the Idiosyncratic Risk in the Brazilian and the Others Emerging Markets

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Abstract. The Covid-19 Pandemic has affected social and economic relations in the world economy, the national economies, and the financial markets. The production investment and financing in economies occur through these markets, particularly in the capital market. The idiosyncratic risk, one of the two total risk components, is associated with a specific productive project, an economic sector, a specific national economy or a capital market. This work aims to estimate the idiosyncratic risk of the Brazilian economy through heteroscedastic conditional models, to verify the initial impact of the Covid-19 Pandemic on the risk associated with productive projects developed in the Brazilian economy and the emerging economies. Daily data in US$, spanning from June 30, 2017, to July 1, 2020, were used.

Keywords. Covid-19 Pandemic, Idiosyncratic Risk, Brazilian Economy, Emerging Economies.

1. Introduction

The sanitary crisis caused by the Covid-19 Pandemic could be compared to the 1918 crisis caused by the H1N1 Influenza Pandemic. The sanitary crisis that triggered the Covid-19 Pandemic began with news of a public health problem that started in Wuhan, the capital of Hubei province in China, caused by a virus identified as SARS-CoV-2, a new Coronavirus, which quickly spread over 180 countries causing high mortality. As the 1918 crisis caused by the H1N1 Influenza Pandemic haunted humanity at the beginning of the twentieth century, Covid-19 Pandemic has also triggered many studies and research in the most diverse areas of knowledge.

The great crises' repercussions throughout the last centuries have been the object of studies and research. Most of these researches aimed to verify the immediate effects and influence of these crises on the world population welfare and the world's economic and social behaviour and relations. Among these researches, (Mackellar, 2007) can be mentioned. In a broad study on the economic impacts of the Influenza Pandemic, (Mackellar, 2007) highlights that the loss is more human than material. The economic impacts of this Pandemic, according to (Mackellar, 2007), can be classified as direct and indirect. The study includes hospital costs, lost days of work, medicine costs, decreased tax revenue and increased health and economic aid expenditures to difficult sectors, followed by government fiscal deficits as direct impacts. Among the indirect economic impacts, (Mackellar, 2007) includes the economic multiplier effects of direct costs and the behaviour of consumers, affecting consumption relationships.

The crisis caused by the Covid-19 Pandemic directly impacted social and economic relations in all regions of the world, affecting national economies and the world economy as well as world financial

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markets. These financial markets signal the expectations of national and world economies through money, foreign exchange, credit and capital markets. While in the public health area, efforts are being made to minimize the severe problems in public health systems, economic agents seek to verify the problems that the Covid-19 Pandemic has caused. They should cause in the years to come, with the growing disorder in the production costs and the production chains.

The financing and investment of production in economies happen through the financial market, mainly via the capital market. The productive projects that provide the necessary infrastructure for the development of economies and maintenance of jobs and income growth have in the capital market the source of resources for investments and financing. In this way, one of the advanced indicators of the economy is the performance of the capital market, whose first indicator is the stock market profitability index. This index reflects the expectations of economic agents regarding the economy. It allows estimates of the volatility or risk associated with productive projects, sectors of national economies, a national economy and the global economy. The total risk has two components, the market risk and the idiosyncratic or unique risk. The market risk refers to the risk of exposure of productive projects, sectors of national economies, and a national economy to the behaviour of the respective market portfolios, respectively, the sector project portfolio associated with the productive project concerned, the portfolio that represents the national economy, and the portfolio that represents everything that is produced in all national economies. The idiosyncratic risk is the unique risk associated only with a specific productive project or the project portfolio of a sector, a sector of a national economy, or a national economy. Thus, each national economy has as an indicator that represents the portfolio that encompasses most of the productive projects of each of the national economies, that is, the indicator closest to a market portfolio which is the equity market profitability index of each national economy. These economies are part of the world economy, so a global equity market profitability index is a proxy for the world market portfolio. Some agencies or market institutions calculate and make some national and global equity market profitability indexes available.

Many studies and research started to verify and mitigate the pressing public health and economic problems that presented themselves during the Covid-19 Pandemic and the possible problems that will be coming. Among these studies it must be mentioned: (Naidenova et al., 2019), which deals with idiosyncratic and systematic shocks caused by pandemics in financial markets; (Gaurinchas, 2020), who discusses the economic impact of the Covid-19 Pandemic. Besides that, it must highlight the study by (Şenol & Zeren, 2020), which deals with the influence of the Covid-19 Pandemic on the global economy through the capital market using the global market share profitability index to study the long-term relationship between the markets of actions and the effects of the Covid-19 Pandemic; the research by (Zeren & Hizarci, 2020) which deals with the influence of the Covid-19 Pandemic in the capital markets of selected countries, the research conducted by (Alam et al., 2020) which presents a study on the effect of the lockdown period on the Indian capital market through a sample of 31 companies listed on the Bombay Stock Exchange. Other research related to this topic, such as (Pata, 2020), (Khanthavit, 2020), (Atkeson, 2020), (Barro et al., 2020), (Anderson et al., 2020) and (Mckibbin and Roshen, 2020) can be mentioned.

Concerning financial risk, based on the seminal work of (Sharpe, 1963), many studies have been carried out to determine the total risk and its components: systematic risk and idiosyncratic risk. The estimate of the single index model, suggested by (Sharpe, 1963), allows the determination of the primary indicator of market risk, the beta coefficient, and the idiosyncratic risk, also called specific risk or unique risk. In a pioneering work, (Rosenberg and McKibben, 1973) seek to forecast the systematic risk and the specific risk of stocks and propose stochastic models for determining the beta coefficient and the idiosyncratic risk using the Single Index Model. This work originated other research. (Fu, 2008) estimated the idiosyncratic risk and its relationship with the monthly stock returns using the three-factor model suggested by (Fama and French, 1993). Besides that, (Fu, 2008) employed some of the ARCH family for volatility models available in the finance literature developed from the seminal work of (Engle, 1982) and the work of (Bollerslev, 1986). In another relevant work, (Angelidis and Tessaromatis, 2008) note that the idiosyncratic risk has been neglected to the detriment of a greater

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emphasis on systematic or market risk in determining the risk premium. (Campbell et al., 2008) emphasized the importance of assessing idiosyncratic risk. In general, market volatility increases in the periods leading up to crises and during crises, as (Kalva, 2008) observed in the recent period of the world economy with the subprime crisis. Among the most recent studies that attempt to estimate idiosyncratic risk, it is noteworthy to mention the following research: (Blitz et al., 2018) that deal with this risk as an anomaly, (Chang et al., 2018) that using the Japanese economy data and (Zhou and Shi, 2019) verify the idiosyncratic risk of the Chinese stock market.

This work aims to estimate the idiosyncratic risk or unique risk of the Brazilian economy and the emerging economies, using heteroscedastic conditional models of the ARCH family models in order to verify the impact of the Covid-19 Pandemic on the Brazilian and other emerging countries' productive projects as well as on the risk associated with the investments and financing of these projects.

Besides this introduction in Section 2, the methodological approach implemented in this research is presented, and Section 3 presents the data or the sample used. The analysis of the results obtained in this research is reported in Section 4. Finally, Section 5 presents this work's conclusions and final comments, followed by the bibliographic references used.

2. Applied Methodology

The concept and the determination of the total risk and its portions, systematic risk and idiosyncratic risk, were established from the Single Index Model, which explains the risk asset portfolio returns through market portfolio returns. In the scope of this work: the risk asset portfolio is characterized by the Brazilian stock market profitability index, represented by the MSCI Brazil index, and the emerging stock market profitability, represented by the MSCI Emerging index. At the same time, the world stock market portfolio is characterized by the equity market profitability index represented by the MSCI ACWorld index. These indices are calculated by Morgan Stanley Financial Services (MSCI) and will be described in this work in the section dealing with the data used. The market model can be described as follows:

$$R_t = \alpha + \beta R_{Mt} + e_t \tag{1}$$

Where: R_t = the return of the MSCI-Brazil index or MSCI-Emerging index in period *t*; R_{Mt} = the return of the ACWorld index in period *t*. Thus, the conditional average and conditional variance of the financial asset returns can be determined as follows:

$$\textit{Mean}: \quad E(R_t|R_{Mt}) = \alpha + \beta R_{Mt} \tag{2}$$

$$\textit{Variance}: \quad V(R_t|R_{Mt}) = \beta^2 V(R_{Mt}) + V(e_t) \tag{3}$$

The estimation of the beta coefficient, the leading indicator of market risk, takes place through linear regression model analysis, as in the works elaborated by (Scholes & Williams, 1993), using corrections from a classic univariate model, and conducted by (Salles, 2006), using a multivariate Bayesian model. While estimating the idiosyncratic risk time series can be done through volatility models such as the ARCH family models, particularly the GARCH model proposed by (Bollerslev, 1986). The GARCH model seeks to capture a typical behaviour of financial asset return time series, in which high values are followed by high values in the following periods, not necessarily in the same direction but following a predictable process. Thus a market model can be built to obtain estimates of the two components of the total risk. In addition to the GARCH model, some of the other relevant models of the ARCH family, such as ARCH, IGARCH, EGARCH and TGARCH, as described in (Enders, 2010), were implemented in this research. Therefore using the model selection criterion suggested by Akaike -- the AIC, which can be seen in (Gujarati & Porter, 2011) or (Wooldridge, 2014), the market model to estimate the idiosyncratic risk was selected. With the alpha and betas parameters greater than zero, the volatility models estimated in this work have their general form given by the expressions shown below: the ARCH

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(q) model represented by the expression (4); the GARCH (p, q) model represented by expression (5); the IGARCH (p, q) model represented by expression (6); the EGARCH (p, q, r) model represented by the expression (7); and TGARCH (p, q, r) model represented by the expression (8).

$$\sigma_t^2 = \alpha_0 + \sum_{j=1}^{q} \alpha_j e_{t-j}^2 \quad (4)$$

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i e_{t-i}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 \quad (5)$$

$$\sigma_t^2 = \sum_{i=1}^{q} \alpha_i e_{t-i}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 \quad (6)$$

$$ln\sigma_t^2 = \alpha_0 + \sum_{j=1}^{p} \beta_j \, ln\sigma_{t-j}^2 + \sum_{i=1}^{q} \alpha_i \left| \frac{e_{t-i}}{\sigma_{t-i}} - E\left(\frac{e_{t-i}}{\sigma_{t-i}}\right) \right| + \sum_{k=1}^{r} \gamma_k \frac{e_{t-i}}{\sigma_{t-i}} \quad (7)$$

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i e_{t-i}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 + \sum_{k=1}^{r} \gamma_k \, d_{(e_{t-k} \leq 0)} |e_{t-k}|^2 \quad (8)$$

Thus, the model used in this work to estimate idiosyncratic risk was a heteroscedastic linear regression model, where the stochastic terms are distributed according to a Student t distribution and the variance is given by a GARCH (1, 1) model, which can be described as follows:

$$R_t = \alpha + \beta \, R_{Mt} + e_t \;,\; e_t \sim Student\,(0; \sigma_t^2; \nu) \quad (9)$$

$$\sigma_t^2 = \alpha_0 + \alpha e_{t-1}^2 + \beta \sigma_{t-1}^2 \quad (10)$$

3. The Sample – Data Used

The primary data on the equity market indices that form the sample used in this work were collected on the Investing.com website. The financial services company Morgan Stanley Capital International (MSCI) calculates and releases these indices. The sample indicators were: the profitability index of the Brazilian stock market -- MSCI Brazil; the profitability index of the stock market of emerging countries -- MSCI Emerging Markets; and the worldwide stock market profitability index -- MSCI All-Country World Equity -- or simply the MSCI ACWI Index. The Brazilian stock market index comprises 56 shares, represents 85% of the equities traded in the country, and includes the main sectors of the Brazilian economy. The emerging markets index is composed of equities traded in China (33.00%), South Korea (13.02%), Taiwan (11.35%), India (9.16%), Brazil (7. 73%), South Africa (5.89%), Russia (3.77%), Mexico (2.55%), Thailand (2.34%) and others (11.59%). The global stock market index used is composed of equities from eleven sectors of the world economy traded on the markets from developed countries in the Americas -- two countries, from Europe and the Middle East -- sixteen countries; and from the Pacific -- five countries; and from emerging countries in the Americas -- six countries, from Africa, Europe and the Middle East -- eleven countries, and from Asia -- nine countries. Further details about the description of these indexes can be seen at https://www.msci.com. All information collected was daily data in US$ from June 30, 2017, to July 1, 2020.

Table 1 presents the time series statistical summaries used in this work to estimate the idiosyncratic risks time series of the markets studied. It can be seen that the time series location measures are disparate and do not have symmetry. As expected for the financial asset return, the volatility of the return time series studied is high. As for the asymmetry and kurtosis coefficients, all the asymmetry coefficients shown in Table 1 differ from the normal distribution asymmetry coefficient. The same occurs about the kurtosis coefficients calculated for all time series used. The Jarque-Bera test confirms the inferences from the asymmetry and kurtosis coefficients for every time series used. That is normality hypothesis cannot be accepted. Concerning the stationarity hypothesis of the time series summarized in Table 1, the MSCI-ACWorld index time series stationarity can be rejected according to the ADF test results.

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However, it should be noted that the ADF test allows the stationarity hypothesis acceptance of the equity index MSCI-ACWorld time series returns.

Regarding the MSCI-Brazil index and the MSCI-Emerging Markets index time series, given the ADF test, the stationarity hypothesis cannot be accepted. For these indices returns, a contrary decision occurs. That is, the stationarity hypothesis is accepted for these two times series.

Table 1 - Statistical Summary of Time Series

Statistics	Quotes MSCI ACWorld	Quotes MSCI Brazil	Quotes MSCI Emerging	Return MSCI ACWorld	Return MSCI Brazil	Return MSCI Emerging
Mean	508.4525	1974.8900	1055.6170	0.0002	-0.0002	-0.0001
Median	510.7950	2051.7250	1054.8600	0.0007	0.0006	0.0006
Maximum	581.0200	2428.7100	1273.0700	0.0806	0.1516	0.0557
Minimum	384.0400	1036.3000	758.2000	-0.1000	-0.1943	-0.0694
Std Deviation	29.0043	299.2842	83.3356	0.0111	0.0238	0.0107
Skewness	-0.2542	-1.2263	-0.2568	-1.7250	-1.4790	-1.0731
Kurtosis	4.3565	3.9992	3.4671	26.5880	19.2500	11.5687
Jarque-Bera test	68.5466	229.0998	15.7404	18564.320	8911.8340	2548.9370
(p value)	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000
ADF test	-3.4276	-2.5858	-3.2140	-6.7032	-6.2662	-9.5897
(p value)	(0.0485)	(0.2870)	(0.0824)	(0.0000)	(0.0000)	(0.0000)

4. Results Obtained and Discussion

Regarding the idiosyncratic risk of the Brazilian market, the time series was estimated using the market model for mean and an EGARCH model (p, q, r) for variance. In this market model, according to the descriptions in Section 3, the returns of the profitability index of the Brazilian equity market, given by the equity profitability index MSCI-Brazil (MSCI-Br) as a response variable and the market portfolio given by the MSCI-ACWorld (ACW) index as a regressor. The market model selected was the model without intercept. Thus, the selected model was similar to that described by the expressions in (9), without the α parameter, with the EGARCH model (1,1,1) replacing the expression (10) since this model was selected using the criterion AIC.

$$\begin{array}{rl} MSCI\text{-}Br_t = & 1.2433\ ACW_t \\ se & (0.0592) \\ t & (20.9870) \\ p\text{-}value & (0.0000) \end{array} \tag{11}$$

$$\begin{array}{rllll} ln\sigma_t^2 = & -0.2504 + 0.1294\, ln\sigma_{t-1}^2 & - 0.0553 \left|\frac{e_{t-1}}{\sigma_{t-1}}\right| & + 0.9814 \frac{e_{t-i}}{\sigma_{t-i}} \\ se & (0.0713) \quad (0.0327) & (0.0201) & (0.0072) \\ t & (-3.5121) \quad (3.9625) & (-2.7541) & (138.2680) \\ p\text{-}value & (0.0004) \quad (0.0001) & (0.0059) & (0.0000) \end{array} \tag{12}$$

$$\begin{array}{l} t\ Student\ distribution\ \text{--}\ 6.48\ degree\ of\ freedom \\ R^2 = 0.4636 \quad \text{----------} \quad Durbin\text{-}Watson = 2.1010 \\ SE\ Regression = 0.0174 \quad \text{----------} \quad Sum\ Squared\ Resid = 0.2379 \\ Akaike\ Criterion\ (AIC) = -5.5364 \end{array} \tag{13}$$

This model was selected among the 18 models with all the significant parameters among the 175 models estimated with different combinations, that is, varying: the estimation of the constant parameter in the average model; the probability distribution of stochastic terms, normal or Student t; inclusion of dummy variables, in the average and or variance; and the volatility model. Additionally, as observed from the Pan American Health Organization (PAHO) information at https://www.paho.org/bra, these variable dummies consider the following dates: January 23, the day of the first lockdown in Wuhan in China; January 30, the day of outbreak declaration from the World Health Organization - WHO, that declares that the outbreak of the New Coronavirus is a Public Health Emergency of International

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Importance (ESPII) and it is spread for 19 countries; February 26, the day of the first case of Covid-19 in the São Paulo city -- Brazil, a patient coming from Italy; and March 11, the day of the characterization of the Covid-19 Pandemic by the World Health Organization - WHO. The mean and variance added the variable dummies to the market model. However, none of these models was selected to estimate the idiosyncratic risk of Brazilian economic activity.

Therefore the idiosyncratic risk used, hereafter IDR, was obtained for the Brazilian market by estimating the market model without intercept term in the average equation, where the stochastic terms adjusted to a Student t distribution with approximately 6 degrees of freedom and an EGARCH (1,1,1) model for the variance. The selected model is described in expressions (11) and (12), with the estimates and the necessary metrics to observe the performance of the estimates obtained listed in (13).

The market model for emerging countries was estimated to compare with the IDR Brazil time series results. Thus, the same methodology was used to obtain the IDR Brazil using the MSCI-Emerging index (MSCI-Em) to obtain estimates for IDR-Emerging. From 18 estimated models, the results pointed to the selection of the market model using the AIC criterion. Thus, this model is described in expressions (14) and (15), respectively, for the mean and the variance given by a GARCH model and the performance metrics listed in (16) in the following.

$$MSCI\text{-}Em_t = 0.8142\ ACW_t \quad (14)$$
$$se\ (0.0232)$$
$$t\ (35.1654)$$
$$p\text{-}value\ (0.0000)$$

$$\sigma_t^2 = 1.84 \times 10^{-6} + 0.0864\ e_{t-1}^2 + 0.8764\ \sigma_{t-1}^2 \quad (15)$$
$$se\ (7.45 \times 10^{-7})\ (0.0232)\ (0.0305)$$
$$Stat\ t\ (2.4652)\ (3.7285)\ (28.7151)$$
$$p\text{-}value\ (0.0137)\ (0.0002)\ (0.0000)$$

$$t\ Student\ distribution\ --\ 7.49\ degree\ of\ freedom \quad (16)$$
$$R^2 = 0.5177 \quad ---------- \quad Durbin\text{-}Watson = 2.4399$$
$$SE\ Regression = 0.0074 \quad ---------- \quad Sum\ Squared\ Resid = 0.0428$$
$$Akaike\ Criterion\ (AIC) = -7.2559$$

Therefore, the IDR-Brazil and the IDR-Emerging were obtained from the market model for Brazil and the emerging countries. The two plots in Figure 1 illustrate the IDR-Brazil and the IDR-Emerging time series behaviour.

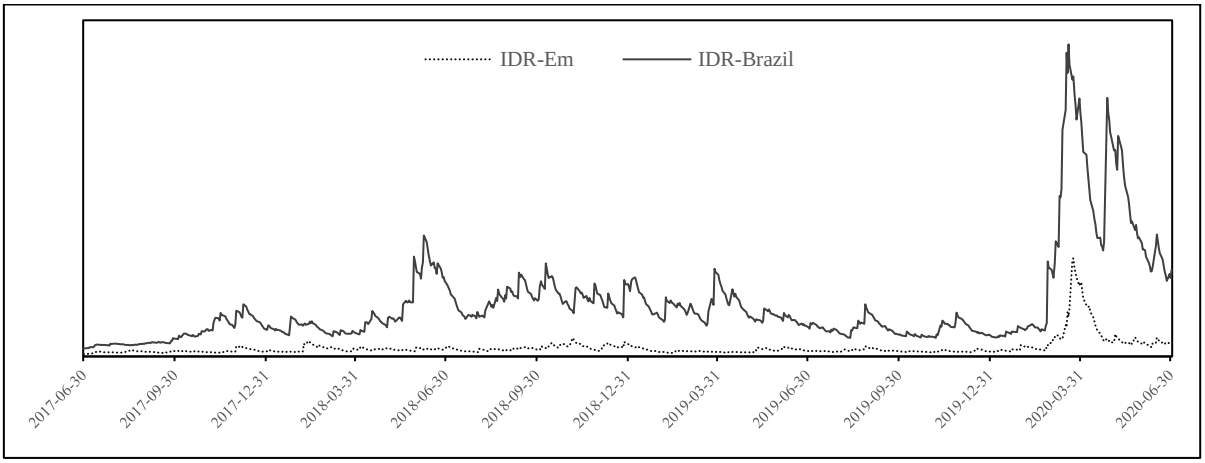

Figure 1 - The Idiosyncratic Risk of the Brazilian Market and the Emerging Markets (June 2017 / July 2020)

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Regarding IDR-Brazil, observing the risk associated with investments and financing of economic activities in Brazil is possible. The period near the end of the first half of 2018 can be observed an increase with variations until the same period in 2019, maintaining a lower level with peaks close to the beginning of September and December 2019. At the end of February 2020, the IDR-Brazil plot shows atypical behaviour reaching a peak, the highest level in the period studied, on March 17, 2020, after March 11, when the Covid-19 epidemic was characterized as a Pandemic by WHO. At the end of April 2020, the IDR-Brazil decreased and grew until this month's end. Figure 1 shows that the IDR-Brazil is always above the idiosyncratic risk of the group or the portfolio of emerging countries. Another relevant inference from the observation of IDR-Brazil behaviour can be made at the end of the period studied, that is, on June 30, 2020, when the lowest level of risk in the period after the decree of the Covid-19 Pandemic by WHO was reached, which corresponds to the highest level the idiosyncratic risk of emerging countries that happened on March 23, 2020.

5. Conclusions and Final Remarks

This work aimed to conduct initial studies of the shocks of the Covid-19 Pandemic on national economies through idiosyncratic risks associated with economic activity in Brazil and emerging economies. The primary objective of this paper was to verify these first shocks in Brazilian economic activity. This work used a methodological approach based on the portfolio theory, a fundamental milestone of the finance theory, to obtain estimates of the idiosyncratic risk associated with the financing and investment of economic activity in Brazil or the productive projects implemented in the Brazilian economy and emerging economies.

One of the two instalments of the total risk of an asset portfolio or an economy is the idiosyncratic risk which allows us to observe the part of the total risk that refers only to the asset portfolio or a particular national economy. Thus, once the idiosyncratic risk can be estimated through the market model, heteroscedastic market models were estimated for a portfolio of assets in the Brazilian economy and a portfolio of assets traded in emerging countries. In addition to heteroscedastic conditional models, Student t distribution was used in these models as an alternative to the normal distribution for the stochastic terms. The idiosyncratic risk time series estimate allowed us to observe the influence of the Covid-19 Pandemic on the risk of Brazilian economic activities and emerging economies over the studied period.

It should be emphasized that the allocation of resources in productive projects or national economies occurs by observing the trade-off risk and return. This way, resource managers available for applications in the international market seek to invest in projects and national economies that can offer returns compatible with the level of risk externalized in the international market. The level of specific or idiosyncratic risk associated with economic activity in Brazil demonstrated itself well above the risk of other emerging countries in the entire period of the study sample, which the Covid-19 Pandemic accentuated.

Future works can be done with other samples and methodologies that will provide more accurate results to allow for further subsidies that will minimize the Covid-19 Pandemic effects on economic activities, particularly the financing and investment of production. Besides that, it is important to compare the influence of the Covid-19 Pandemic between emerging and developed economies and to study the relationship between the impact of the Covid-19 Pandemic and the income variation in these economies.

References

[1] Alam, M., Alam, S., Chavali, K. (2020). Stock Market response during COVID-19 Lockdown Period in India: An Event Study. Journal of Asian Finance, Economics and Business, 7 (7), pp. 131-137.

[2] Anderson, R., Heersterbeek, H., Klinkenberg, D., Hollingsworth, T. (2020). How will country-based mitigation measures influence the course of the Covid-19 epidemic? The Lancet. March.

[3] Angelidis, T., Tessaromatis, N. (2008). Idiosyncratic Volatility and Equity Returns: UK

Technium Business and Management (TBM)
Vol. 4, pp.1-9 (2023)
ISSN: 2821-4366
www.techniumscience.com

Evidence. International Review of Financial Analysis, 17, pp. 539-556.

[4] Atkeson, A. (2020). What Will Be the Economic Impact of Covid-19 in the US? Rough Estimates of Disease Scenarios. NBER Working Paper Series, http://www.nber.org/papers/w26867.

[5] Barro, R., Ursua, J., Weng, J. (2020). The Coronavirus and the Great Influenza Epidemic - Lessons from the "Spanish Flu" for the Coronavirus's Potential Effects on Mortality and Economic Activity. CESifo Working Paper Series 8166.

[6] Blitz, D., Hanauer, M., Vidojevic, M. (2018). The Idiosyncratic Momentum Anomaly. Available at SSRN 2947044.

[7] Bollerslev, T. (1986). Generalized Autoregressive Conditional Heteroskedasticity. Journal of Econometrics, 31, pp. 307-327.

[8] Campbell, J., Lettau, M., Malkiel, B., Xu, Y. (2008). Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk, The Journal of Finance, 56, pp. 1-43.

[9] Chang, R., Ko, K., Nakano, S., Rhee, S. (2018). Residual momentum in Japan. Journal Empirical Finance, 45, pp. 283-299.

[10] Enders, W. (2010). Applied Econometric Time Series. 3th Ed, John Wiley & Sons, New York.

[11] Engle, R. (1982). Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation. Econometrica, 50, 4, pp. 987-1007.

[12] Fama, E., French, K. (1993). Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics, 33, pp. 3-56.

[13] Fu, F. (2008). Idiosyncratic Risk and the Cross-Section of Expected Stock Returns. Journal of Financial Economics, 91, pp. 24-37.

[14] Gaurinchas, P. (2020). Flattening the Pandemic and Recession Curves. https://drive.google.com/file/d/1mvMDiPQK88x27JznMkWzEQpUVm8Vb4WI/view?usp=sharing.

[15] Gujarati, D., Porter, D. (2011). Basic Econometric. 4th Ed. New York, The McGraw−Hill Companies.

[16] Kalva, S. (2008). Global Volatility and Forex Returns in East Asia. International Monetary Fund, IMF Working Paper WP/08/208.

[17] Khanthavit, A. (2020). World and National Stock Market Reactions to COVID-19. https://www.researchgate.net/publiction/341152018.

[18] Mackellar, L. (2007). Pandemic Influenza: A Review. Population and Development Review, 33, pp. 429-451.

[19] Mckibbin, W., Roshen, F. (2020). The Global Macroeconomic Impacts of Covid-19: Seven Scenarios. https://www.brookings.edu/research/the-global-macroeconomic-impacts-of-covid-19-seven-scenarios/.

[20] Naidenova, I., Parshakov, P., Shakina, E. (2020). Idiosyncratic and Systematic Shocks of Covid-19 Pandemic on Financial Markets. https://papers.ssrn.com/sol3/papers.cfm?abstractid=3574774.

[21] Pata, U. (2020). Is the Covid-19 Pandemic a Financial Disaster for G7Countries? Evidence from a Fourier Cointegration Test. http://www.researchgate.net/publication/341584345.

[22] Rosenberg, B., Mckibben, W. (1973). The Prediction of Systematic and Specific Risk in Common Stocks. The Journal of Financial and Quantitative Analysis. 8, pp. 317-333.

[23] Salles, A. A. (2006). Evaluation and Seasonality of the Market Risk in Latin América: A Bayesian Approach. in Anales del XIII Congreso Latino-Iberoamericano de Investigación Operativa, Montevideo, Asociación Latino-Iberoamericano de Investigación Operativa (ALIO).

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[24] Scholes, M., Williams, J. (1977). Estimating Betas from Nonsynchronous Data. Journal of Financial Economics, 5, pp. 341-360.

[25] Şenol, Z., Zeren, F. (2020). Coronavirus (Covid-19) and Stock Markets: The Effects of the Pandemic on the Global Economy. Eurasian journal of Researches in Social and Economics, 7, Issue 4, pp. 1-16.

[26] Sharpe, W. (1963). A Simplified Model of Portfolio Analysis. Management Science, January, pp. 277-293.

[27] Wooldridge, J. (2014). Introduction to Econometrics. EMEA Edition.

[28] Zeren, F., Hizarci, A. (2020). The Impact of COVID-19 Coronavirus on Stock Markets: Evidence from Selected Countries. Bulletin of Accounting and Finance Reviews, 3, pp. 78-84.

[29] Zhou, W., Shi, H. (2019). Weekly Idiosyncratic Risk Metrics and Idiosyncratic Momentum: Evidence from the Chinese Stock Market, Preprint submitted to Elsevier.