

Economic Performance: An Analysis Of Mergers And Acquisitions In Brazil

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Abstract:

The study aims to investigate the relationship between economic performance and the phenomenon of corporate mergers and acquisitions in the Brazilian economy. For this purpose, descriptive and correlation statistics analysis and Granger causality test were used, with annual series covering the period from 1994 to 2021. The results pointed out that the growth rate of the mergers and acquisitions market is highly volatile. They present several short cyclical periods and with a strong correlation with the GDP and the basic interest rate of the economy, the Selic. The causality tests pointed to a precedence relation or Granger cause from the interest rate to the transactions of mergers and acquisitions of domestic capital, demonstrating that changes in the basic interest rate, which affects money supply, causes in the Granger sense the movement of mergers and acquisitions of companies. This behavior is also ratified with the total value of operations. This prevalence also occurs among the number of domestic capital transactions over cross-border capital merger and acquisitions transactions.

Key Word: *Mergers; Acquisitions; GDP; Strategy; Performance.*

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I. Introduction

Company mergers and acquisitions and other partnerships tend to move with business cycles. In periods of economic expansion, the probability of buying and selling companies increases, which causes waves of mergers and acquisitions, as portrayed by Gaughan (2018), Harford (2005), Mitchell and Mulherin (1996), Mulherin and Boone (2000), Andrade, Mitchell and Stafford (2001) and Ching (2019). Gaughan (2010) and Harford (2005) showed at least five major waves of acquisitions and mergers that took place in the US and had repercussions for the world economy. The first four were recorded between 1897 and 1904, 1916 and 1929, 1965 and 1969 and 1984 and 1989. The fifth and last one took place in the early 1990s and was completed in 2007.

The clustering of mergers at the industry level is confirmed for the 1990s by Mulherin and Boone (2000) and Andrade, Mitchell and Stafford (2001). However, there is no consensus on why merger waves occur. For Mitchell and Mulherin (1996), Harford (2005), the waves within industries are linked to various technological, economic or regulatory shocks for these industries. Shleifer and Vishny (2003) and Gerbaud, York (2006) Auer Schuhmacher (2013) discuss that the propagation of mergers and acquisitions is related to high valuations in the companies' stock market, increased capital liquidity and reduced capital financing constraints.

In addition, corporations need to be more competitive in increasingly globalized markets. And, given the challenges associated with the high pressure of competition, it is essential to promote constant changes, innovation and diversification of products, services and processes as a way of creating value. For Silva et al (2004). Harford (2005), Gaughan (2018), one of the fastest, most effective and profitable strategic measures that contribute to companies diversifying their activities and becoming more solid and competitive, is through the process of mergers and acquisitions. However, the literature on economic-financial strategy, as argued by Gerbaud, York and Wohar (2006), has still not been able to fully explain the influence of an acquisition on the performance of the acquiring company. Kumar and Bansal (2008) comment that evaluating the performance of mergers and acquisitions is not an easy task and the results are not always the same.

In this context, the aim of this study is to investigate the existing relationship between economic performance and the phenomenon of corporate mergers and acquisitions in the Brazilian economy from 1994 to 2021. It is important to investigate and understand the behavior and effects of change provoked in economic performance promoted by the monetary policy on the basic interest rate with repercussions on the mergers and acquisitions market. It should be noted that the literature on this subject is very scarce. Thus, the evidence found may contribute to the academic discussion in the sense of pointing out economic policies that promote stability, macroeconomic growth and increase the competitiveness of corporations through mergers and acquisitions. In fact, one of the results shows that GDP and the basic interest rate are relevant variables for encouraging the purchase and sale of companies.

This study is organized into four more sections, in addition to this introduction. Initially, a review of the academic literature on mergers and acquisitions intends to bring the state-of-the-art knowledge of the studied phenomenon. Then in the third section, the methodological approach adopted is explained in order to guarantee scientific solidity for the research in question and the definition of variables. The processed data are then analyzed and the results evaluated and discussed in the fourth section. Finally, the last section deals with conclusions and final considerations

II. Mergers And Acquisitions Market

Corporate mergers and acquisitions provide a quick way for a company to leverage, protect itself from unwanted acquisitions, explore new markets and take advantage of investment opportunities. Acquisitions and mergers have become, from the second half of the twentieth century, important strategies used by large and small companies to grow and overcome competitive challenges, as discussed by Krishnan et al (2004), Gaughan (2018), Harford (2005), Mitchell and Mulherin (1996), Triches (1996), Mulherin and Boone (2000), Andrade, Mitchell and Stafford (2001), Ching (2019) and Crotti et al (2020).

Mergers and acquisitions are treated as a response in improving efficiency to changes in the economic environment, such as antitrust policies and deregulation or market opening and internationalization, increased competition and greater integration of capital markets, as discussed by Jovanovic and Rousseau (2002). Mergers and Acquisitions of companies are implemented with the aim of operating in new geographic or product areas, achieving financial synergies and obtaining additional resources through the sharing of skills, experience, information and technological means. However, for Bender and Ward (2008), there is a tendency to link mergers and acquisitions solely to the benefits generated: competitive, structural, financial.

Mergers and acquisitions movements are relevant to the strategy of organizations, which aim to expand the market, especially in a scenario of world recovery after the 2008 economic crisis, as shown by Gaughan (2018), Triches (2023a), (2023b) and Divyaranjani (2018). The survey produced by KPMG (2021), Brazil recorded 375 mergers and acquisitions in the first three months of 2021. Most of them took place between Brazilian companies, around 244 transactions. This result makes the first quarter of 2021 the record holder in mergers and acquisitions in the last 20 years. It is possible to highlight some basic distinctions between merger or consolidation and acquisition: a) in a merger, there may be the creation of a new firm (consolidation), while in the acquisition one of the companies involved generally maintains its legal identity; b) in mergers, the form of payment generally used is an exchange of shares, while in acquisitions the form of payment may be cash, shares or other securities; c) in mergers, firms are usually from the same sector, have the same core activity, whereas in acquisitions, it is common for firms to be from different sectors.

In reality, there are several reasons that encourage the merger and acquisition of a target company, such as i) to obtain operational efficiencies and economies of scale; ii) to eliminate competition and gain market share from the target company iii) to obtain the technology of the company to be acquired; iv) increasing the size, scope and influence of the acquiring company as argued by Auer and Schuhmacher (2013), Harford (2005), Fusillo (2009), Gaughan (2018), Mitchell and Mulherin (1996), Mulherin and Boone (2000), Ross et al (2013) and Triches (1996),(2023a) and (2023b).

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Synergy in mergers and acquisitions

The operational efficiency of a company, for Damodaran (2004), determines its operating margin and, therefore, its operating profit. More efficient companies have higher operating margins, when other factors remain constant, than less efficient companies operating in the same industry. Thus, if a company manages to increase its operating margin (profitability) on existing assets, it will generate additional value.

Synergies are related to the one main reasons behind the merger and acquisition. The motives and expected synergies of mergers and acquisitions overlap, which makes it even more difficult to identify what was the motivation for the company to undertake this movement. They represent the gains and benefits resulting from the business union. For Healy, Palepu and Ruback (1992), and Capron and Pistre (2002), mergers and acquisitions are in agreement, the main sources of synergies which are: i) economies of operational scales: arising from the reduction or elimination of production costs and expenses with corporate activities (marketing, finance, etc.); ii) greater rationalization of the research and development effort; iii) financial savings due to a better capital structure, greater leverage associated with a lower cost of debt; iv) improvements in managerial efficiency, caused by the replacement of inefficient management, usually of the acquired company, thus improving its economic and financial performance; greater market power: the increase in size leads to greater market power, negotiation with

suppliers, competitors, government, improving the competitive capacity of companies; v) technological advancement: arising from the joint use of non-divisible specific inputs and complementary resources, transfer of technology and knowledge (know-how), as well as economies of vertical integration; vi) tax savings resulting from the use of tax credits related to net operating losses accumulated in previous years by one of the companies involved, which can be offset in future years by the firm.

Waves of mergers and acquisitions

The evolution of mergers and acquisitions activity is permeated by cyclical movements (waves), in which periods of greater and lesser intensity of this activity succeed one another. The international financial economic literature, based mainly on the US market, points out four major waves of mergers and acquisitions as discussed by Gaughan (2018), Harford (2005), Mitchell and Mulherin (1996), Mulherin and Boone (2000) and Ching (2019). These waves played a relevant role, worldwide, in the concentration of capital, in the restructuring of assets and in the consolidation of economic sectors, also described by Scherer and Ross (1990), Weston and Brigham (2000) and Waack (2000), which are:

i) Great wave of mergers (1887-1904) started with the recovery from the world depression of 1883, and lasted until the depression of 1904. Its predominant characteristics were: the great transformations in transport, communications, manufacturing technologies; competition and legal institutions, with consolidations in the oil, steel, tobacco and other basic industries, in addition to the formation of large monopolies.

ii) Mergers movement (1916-1929) had a capital market boom that helped financial investors to consolidate firms in various sectors. Such as public utility services (electricity and gas), communications and automobiles. The mergers of several companies into a single one were no longer allowed with the emergence of antitrust laws. This wave featured more mergers through vertical integration and diversification than the previous one. It was characterized by mergers that aimed at oligopoly power, while the preceding wave was characterized by mergers that aimed at monopoly, as addressed by Stigler (1950).

iii) The wave of conglomerate mergers in the 1960s, predominantly mergers aimed at diversification, of the conglomerate type, with the union of different activities, as a response to greater restrictions on horizontal and vertical mergers introduced by changes in antitrust laws in 1950. During the 1960s, acquisitions were influenced by the capital market boom and encouraged by innovations in financial mechanisms. Most of the mergers and acquisitions of this wave failed because, as a rule, the production in a conglomerate fails in the allocation of resources and in the control of its subsidiaries, ignoring the fundamental principle of Adam Smith, that the specialization increases efficiency and productivity as shown by Triches (1996).

iv) The wave of mergers in the 1980s was characterized by business expansion due not to investments in new plants or in the firm itself, but rather to the acquisition of other firms, as the low value of shares in the capital market made the acquisition cheaper than new investments. The New York Stock Exchange crash of October 1987 made it possible for foreign firms to buy up American firms, which resulted in an explosion of hostile takeovers. In addition, this wave featured a large number of transactions between firms of the same size, unlike the others, in which negotiations between firms of different sizes predominated. Again, innovations in financial mechanisms contributed to increase the number of takeover attempts. The boom in the mergers and acquisitions market in the US economy in the 1980s aimed, for Triches (1996) and Harford (2005), mainly at the international expansion of large multinational corporations, while in the 1990s this activity can be seen as an intelligent adaptation to business environments. constantly changing, adequacy determined by a shrinking market, government reforms and technological changes.

III. Methodological Aspects And Causality

To evaluate the phenomenon of mergers and acquisitions from the economic performance of the country, an analysis of descriptive statistics, correlation and Granger causality test was adopted. The series used were the economy's basic interest rate at Selic and the GDP growth rate, both collected from the Central Bank of Brazil. The series related to mergers and acquisitions transactions were extracted, according to the concept and from KPMG reports, separated into three variables. i) Domestic refers to transactions carried out within the national territory; ii) Cross-border concerns five definitions; a) Foreign control company acquiring Brazilian control company based in Brazil; b) Brazilian control company acquiring foreign control company based abroad; c) Brazilian control company acquiring foreign control company based in Brazil; d) Foreign control company acquiring foreign control company based in Brazil; e) Company with foreign majority capital acquiring, from Brazilians, capital of a company established abroad. iii) total number of transactions, i.e. the sum of the two variables according to KPMG (2022).

The econometric procedures used to analyze the causal relationships between variables started, initially, by investigating their stationarity. For this purpose, the presence of a unit root in the series was evaluated. The adopted tests were; i) Augmented Dickey-Fuller, (ADF); ii) Elliot-Rothenberg-Stock (DF-GLS); iii) Phillips-

Perron, PP; iv) Kwiatkowski-Phillips-Schmidt-Shin (KPSS), in order to corroborate the results found in the ADF test, as discussed by Gujarati and Porter (2011).

Granger's (1969) causality tests were used to investigate the existing precedence relationship between the variables specified above, as suggested by Gujarati and Porter (2011). The application of the causality test between two variables depends on the characteristics of the variables, that is, whether they are stationary, unit integrated or cointegrated. Causality, in the Granger sense, is derived from two types of tests performed based on the most general specification, according to equations (1) and (2) below:

$$y_t = \sum_{i=1}^n \alpha_i x_{t-i} + \sum_{j=1}^n \beta_j y_{t-j} + u_{1t} \quad (1)$$

$$x_t = \sum_{i=1}^n \lambda_i x_{t-i} + \sum_{j=1}^n \delta_j y_{t-j} + u_{2t} \quad (2)$$

Where the error terms u_{1t} and u_{2t} are not correlated and as there are two variables x_t and y_t , there is bilateral causality. Equation (1) says that the current value of y_t is related to its own past values x_t , as well as past values x_t , and equation (2) shows similar behavior for x_t values. Based on this, four cases can be inferred; i) causality is unidirectional from x_t to y_t if the estimated coefficients of the lags of x_t or the α_i in equation (1) are statistically different from zero as a group and the set of estimated coefficients of the y_t or the δ_i , in equation (2) is not statistically different from zero. ii) causality is unidirectional from y_t to x_t if the set of lagged coefficients in equation (1) is not statistically different from zero and the set of coefficients of the y_t or the δ_i in equation (2) is statistically different from zero, iii) causality is two-sided or feedback, when the sets of x_t and y_t coefficients are statistically different from zero in both regressions. iv) independence is suggested when the sets of x_t and y_t coefficients are not statistically significant in any of the estimated equations.

In general terms, since the future cannot predict the past, if the variable x_t (Granger) causes the variable y_t , changes in x_t should precede changes in y_t . Thus, in a regression of y_t on other variables (including its own past values), if you include the past or lagged values of x_t and it significantly improves the prediction of y_t , x_t (Granger) can be said to cause y_t . A similar definition applies if y_t (Granger) causes x_t . In regression, if the calculated value of the F statistic is greater than the critical value of F at the chosen significance level, the null hypothesis, that the parameters in their set are equal to zero, is rejected.¹

IV. Analysis And Discussion Of Results

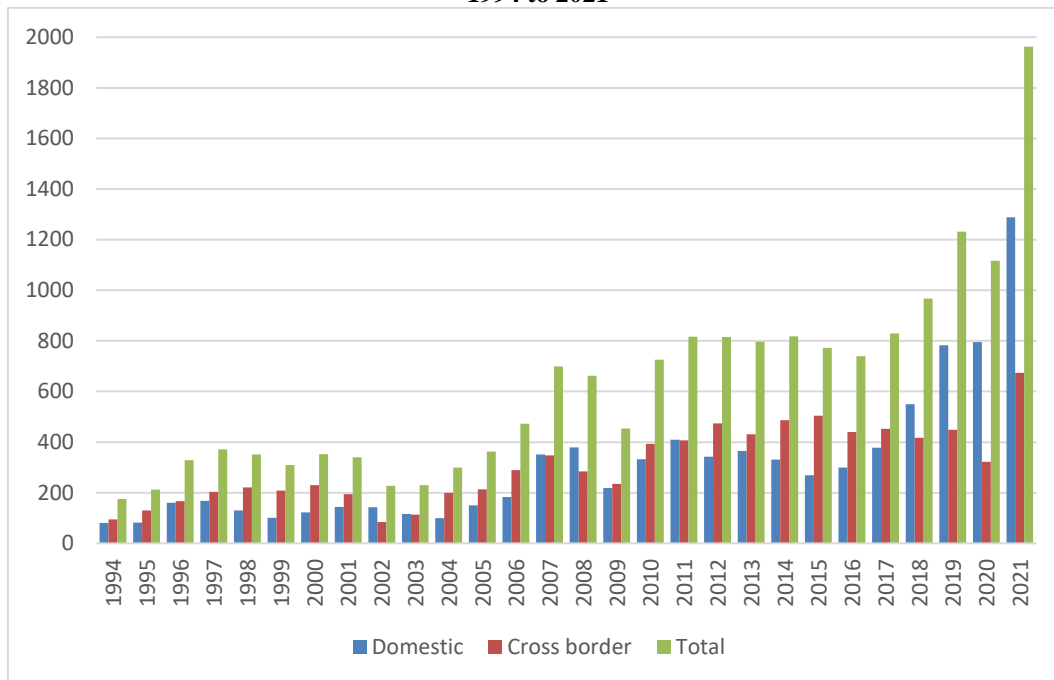
The evolution of the number of annual mergers and acquisitions transactions, in the period from 1994 to 2021 are reported in Figure 1. It is observed that this movement of transactions is similar to waves that the first one occurs from 1994 to 2004. This period coincides with the stabilization of the Brazilian economy with the adoption of the Real Plan and two years after the end of Fernando Henrique Cardoso's presidential term. The second wave, quite short, starts in 2005 and ends one year after the subprime crisis that occurred in the United States, that is, in 2009. The third, also very short, starts in 2010 and ends in 2016, a period in which the Brazilian economy is going through a severe crisis with a drop-in GDP growth rate of 3.6% in 2015 and 3.3% in 2016.

In 2017 and after, the movement in the merger market intensifies, leveraged mainly by domestic operations that exceed 600 operations for the first time in 2019. transactions surpassed the mark of 800, in 2020, and 1,200 in the following year, making the total reach a record value of 1,963 operations.

The annual growth rates of annual mergers and acquisitions transactions and GDP and the Selic interest rate are shown in Figure 2. This illustrates in more detail the volatility of the M&A market. It is well known that the purchase and sale of a company is very sensitive to the economic conditions of the economy, with emphasis on the beginning of the first term of the Workers' Party, the international financial crisis of 2018 and the Covi19 crisis in 2020.

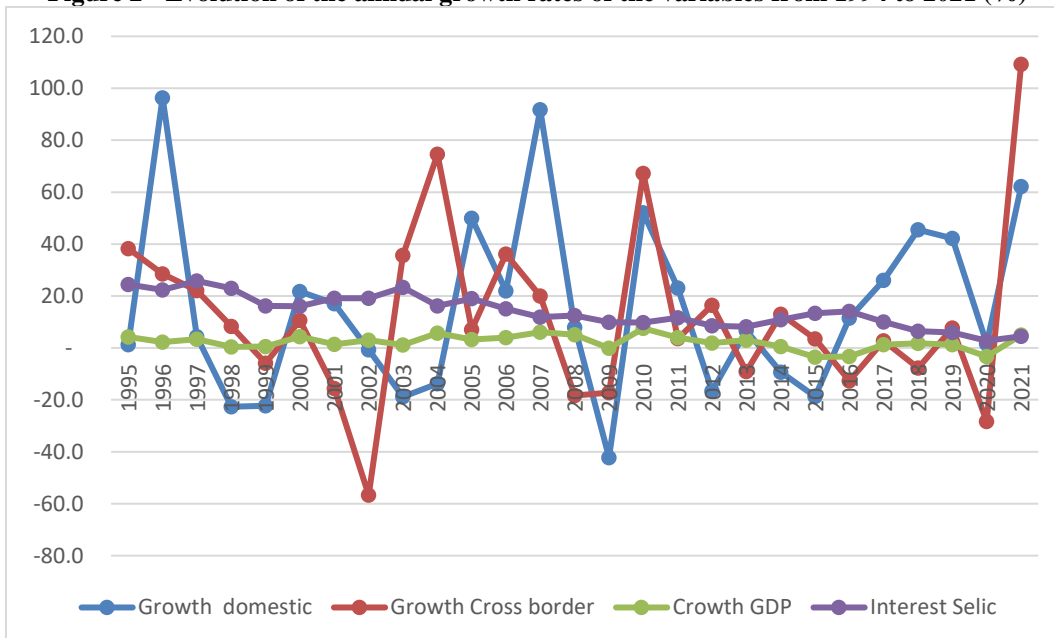
¹ An example of the existing causality between the money stock and interest rate and the US GNP money stock is found in Gujarati and Porter (2011, p.650), showing that caution should be exercised in interpreting the results, because these tests are quite sensitive to the chosen lag number.

Figure 1 - Evolution of the number of annual mergers and acquisitions transactions in the period from 1994 to 2021



Source: KMGP

Figure 2 - Evolution of the annual growth rates of the variables from 1994 to 2021 (%)



Source: KMGP/Central Bank of Brazil

Regarding economic sectors, Table 1 illustrates the businesses with the highest number of mergers and acquisitions over the course of 1994 to 2021. It is observed that the Information Technology segment appears in the first position by the accumulated value from 2002 to 2021 with 1,980 transactions, making up 13.2% of the total. In 1994, this sector registered four purchase and sale operations of companies, which represented 4.6% of the total, in 2021, 358 were accounted for, 18.2% of the total, with an average growth rate of 15.1%. In 2021, this market was led by the internet companies' sector, with a record 658 transactions, representing 33.5% of the grand total, with an extremely high average annual rate of 38.7%, over the last 10 years. The accumulated value of transactions since 2008, the year marked the start of the count, until 2021 was 1,904 or 12.7% of total transactions. It should be noted that these two sectors were very aggressive in this market, concentrating more than a quarter

of the accumulated total and more than half of the operations carried out in 2021. This fact is justified by the consolidation of the trend of strategic investments in digital transformation, contributed by Brazilian companies, multinationals and financial investors as shown by KPMG (2022).

In the accumulated period from 2002 to 2021, as shown in Table 1, it is noted that the third place in terms of purchase and sale operations of companies is occupied by the segment Food, beverages and tobacco with a participation of 6.1% of the total or 918 transactions. In 1994, this sector registered 21 operations, with 12.4% of the total. This share dropped to 10.2% in 2000, 5.4% in 2011 and 2.2% in 2021. This factor made the average growth rate stand at 2.7% per year. The fourth position is held by the Company services segment, with 806 operations in the accumulated or 5.4%, also registering a strong average annual growth of 14.5%. In 2021, this sector ranked third with 4.0% of the total or 78 mergers and acquisitions transactions.

Table 1: Main economic sectors of mergers and acquisitions of companies from 1994 to 2021

Sector	1994	%	2000	%	2011	%	2021	%	Var %	Ac.*	%
Information Technology (IT)	8	4.6	57	16.1	90	11.0	358	18.2	15.1	1,980	13.2
Internet companies (**)	-	-	-	-	25	3.1	658	33.5	38.7	1,904	12.7
Food, beverages and tobacco	21	12.0	36	10.2	44	5.4	43	2.2	2.7	918	6.1
Company services	2	1.1	5	1.4	41	5.0	78	4.0	14.5	806	5.4
Energy companies	-	-	20	5.7	42	5.1	60	3.1	5.4	712	4.7
Financial institutions	15	8.6	18	5.1	35	4.3	161	8.2	9.2	683	4.6
Real Estate (**)	-	-	-	-	46	5.6	39	2.0	-1.6	547	3.6
Telecommunications and media	5	2.9	26	7.4	34	4.2	66	3.4	10.0	528	3.5
Others	124	70.8	161	54.1	460	56.3	500	25.4	5.3	6,924	46.2
Total	175	100	353	100	817	100	1,963	100	9.4	15,002	100

Source: KPMG various reports.

*Accumulated from 2002 to 2021, # Annual geometric mean rate

** Named in 2008, previously part of the item, others.

The energy companies and financial institutions sectors emerged in the next positions, with an accumulated amount, with 712 transactions or 4.5% of the total and 683, or 4.6% of the total respectively. The financial institutions sector recorded an average annual growth rate of 9.2% over the period from 1994 to 2021. It was heavily impacted by different types of transactions, most of which were also in pursuit of more innovative business models such as digitalization of banking and financial transactions. The list of the eight main sectors operating in the mergers and acquisitions market is completed by Telecommunications and media, accumulating 528 transactions or 3.5% of the total and showing an average annual growth rate of 10.0% over the last 27 years. This sector was greatly impacted by transactions in infrastructure and connectivity for innovative models.

The other sectors held a share of around 71% of the total in 1994, falling to 54% in 2000, increasing to 56.3% in 2011 and falling again to 25.5% in 2021. In the accumulated quantity, this participation was 46.2% with 6,924 company purchase and sale operations. Finally, it should be noted that the average growth rate of total operations was 9.4% and, in the period 2002 to 2021, 15,002 merger and acquisition transactions were recorded.

Regarding the analysis of the descriptive statistics of the variables M&A transactions with domestic capital, cross-border capital and the total with their respective growth rates, in addition to the real GDP growth rate, the nominal value and basic interest rate of the Selic economy. The analyzed period extends from 1994 to 2021. These statistics are reported in Table 2. It is noted that the transactions of mergers and acquisitions of domestic capital acquiring national capital companies, domestic, presented a minimum value of 82 and a maximum of 1,289 operations and with an average growth rate of 25.0% per year in the period considered well above the total average, which was 22.3%. This type of transaction revealed a strong volatility with a standard deviation of 269.6 and 34.5 in the number of transactions and their growth rate respectively.

The cross-border capital mergers and acquisitions transactions showed a minimum of 84 and a maximum of 674 transactions and with an average annual growth rate of 17.8% per year in the period 1994 to 2021. Such transactions also exhibited strong volatility with deviation default, in order 145.13 and 33.8 in the number of transactions and their growth rate.

Table 2 - Descriptive statistics by variable from 1994 to 2021

Variable	Annual average	Mean	Median	Std. Dev	Minimum	Maximum	Skewness
Domestic		332.0	269.0	269.6	82.0	1,289.0	2.06
Growth rate (%)	25.9	15.5	8.0	34.5	-42.2	96.3	0.71
Cross border		317.4	290.0	145.1	84.0	674.0	0.38

Growth rate. (%)	17.8	12.3	7.67	33.8	-56.7	109.3	0.86
Total		639.5	663.0	389.2	212.0	1,963.0	5.95
Growth rate (%)	22.3	12.2	12.2	25.9	-33.3	75.7	0.61
Growth rate GDP (%)	5.0	2.2	2.2	2.8	-3.5	7.5	-0.44
PIB (R\$ trillion)		3.6	3.1	2.5	0.7	8.9	0.45
Interest rate Selic (%)		14.07	13.3	6.4	2.8	25.8	0.18

Source: KMGP/Central Bank of Brazil

With regard to the total transaction values, the maximum was 1,963.0 and the minimum was 212.0 with an average of 639.5 and standard deviation of 389.2. When compared with its average growth, the maximum value was 75.7% and the minimum -33.3% with a standard deviation of 25.9. The behavior of the Brazilian Gross Domestic Product at its level showed a maximum value of R\$ 8.9 trillion and a minimum of R\$ 0.7 trillion with a volatility of 2.5. Its real growth rate fluctuated between a minimum of -3.5% and a maximum of 7.5%, a volatility of 2.8 and presented an average annual growth rate of 5.0%. The Selic interest rate, in turn, varied between 25.8% and 2.8% with a variability of 6.4 and its average of 14.07%.

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Notably, the purchase and sale operations of companies exhibited a behavior with greater variability, when compared with the growth of the GDP and the interest rate of the Brazilian economy. Finally, almost all indicators show positive asymmetries. The exception was the GDP growth rate, which was negative. It should be noted, however, that this asymmetry is slightly pronounced, the highest being 5.95, shown by total merger and acquisition operations, as shown in the last column of Table 2.²

The correlations between merger and acquisition transactions and GDP and the Selic rate in the period from 1994 to 2021 are illustrated in Table 3. A very high correlation coefficient can be observed between them, all above 0.70. This means that these variables tend to have a strong correlation with each other. Domestic and cross-border transactions tend to move in the same direction with a ratio of 0.7385. These transactions, as well as their total, in relation to GDP, are even more related to coefficients, in the order of 0.8359, 0.8854 and 0.9090. This fact tends to demonstrate that the performance of the Brazilian economy has a positive effect on the merger and acquisition market.

The movement of the economy's basic interest rate, Selic, has been in the opposite direction, as expected, with regard to the set of variables considered. The correlation coefficient between the interest rate and domestic capital transactions was -0.7632, with cross-border transactions -0.7732 and -0.8168 for total transactions. With GDP, the coefficient was -0.8664 as expected, which confirms the veracity of the results obtained.

Table 3: Correlation coefficient of mergers and acquisitions transactions and GDP and Selic rate in the period from 1994 to 2021

Variable	Domestic	Cross Border	Total	GDP	Selic
Domestic	1.0000				
Transfronteira	0.7385	1.0000			
Cross Border	0.9679	0.8842	1.0000		
GDP	0.8359	0.8854	0.9090	1.0000	
Selic	-0.7632	-0.7732	-0.8168	-0.8664	1.0000

The investigation of the stationarity of the series was based on four-unit root tests; o ADF (Augmented Dickey Fuller), Dickey Fuller GLS (ERS, PP (Phillips-Perron) and KPSS (Kwiatkowski-Phillips-Smidt-Shin). The results of the first difference with intercept and trend of the series are reported in Table 4. In all cases, it was not possible to accept the null hypothesis, therefore, the series have an order of integration equal to one or (1) in their level. Nevertheless their first difference, the series showed an order of integration equal to zero which means that they are stationary at the 1% significance level, the only exception being the first difference in the GDP nominal value which was I(0) at the 5% significance level presented by the test, GLS(ERS). In the KPSS test, unlike the others, acceptance of the null hypothesis implies the existence of stationarity in the series, so this hypothesis was rejected with intercept and trend in the series.

² The asymmetry parameter shows that if it is equal to zero the distribution is symmetrical, if it is positive or negative the distribution is positive or negative asymmetry, respectively.

Table 4 - Unit root tests with intercept and trend in the series' first difference

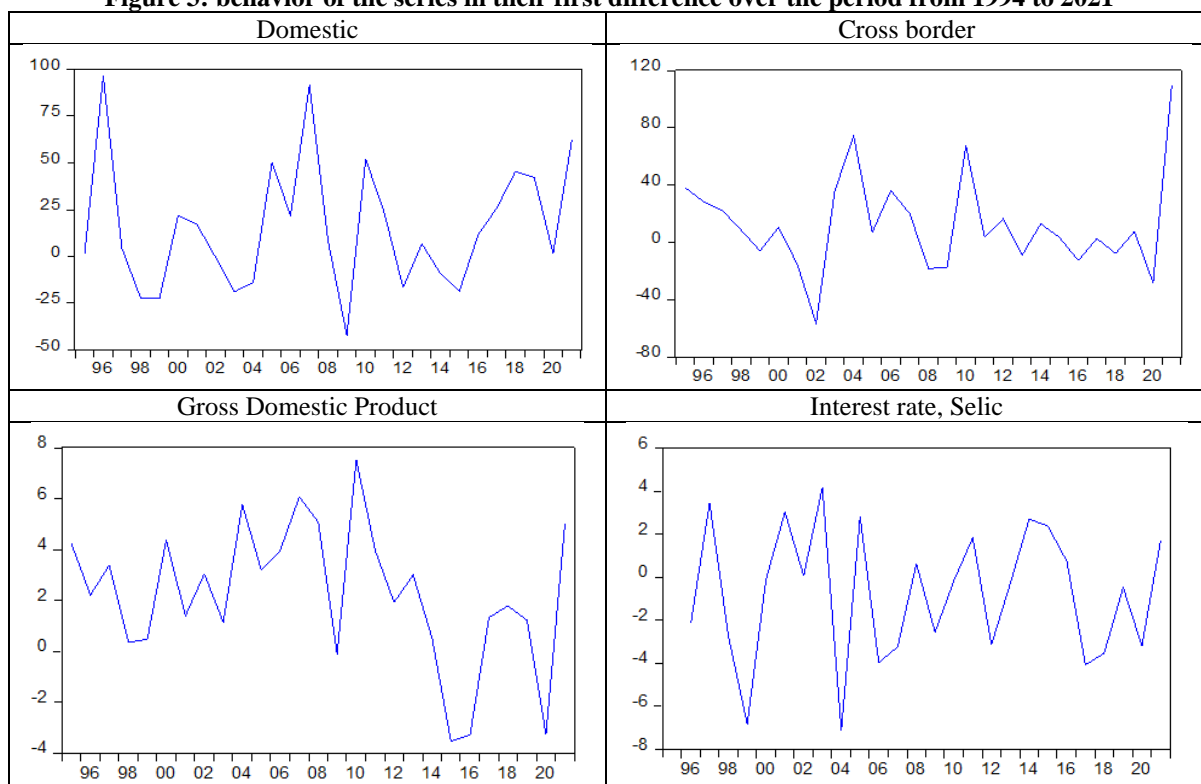
	ADF	GLS(ERS)	PP	KSSP	Decision
Domestic	-4.5360	-4.7180	4.5176	0.1000	I(0)
Cross border	-4.6555	-4.8203	-4.5386	0.0716	I(0)
total	-4.2578	-4.4552	-4.0626	0.0772	I(0)
GDP	-5.8294	3.1486*	4.9285	0.1795	I(0)
Interest rate Selic	-5.8281	-5.8265	-5.8281	0.0657	I(0)

* significance 5%

The graphic visualization of the behavior of the series in their first difference is illustrated in Figure 3. Thus, it is possible to infer the stationarity of the variables. It should be noted that normally interest rates tend to show a stationary behavior at their level. However, the Selic interest rate showed an integration of order one at its level, since, in the period considered, this series increased from 38.7% per year, in 1994, to 4.4% per year in 2021.

Then, the Granger causality test was performed in order to more consistently assess the existence of a precedence relationship or statistical causality between the variables considered. Table 4 reports results obtained using seven lags. It is noted that there is a precedence relationship of the interest rate for mergers and acquisitions of domestic capital, domestic, or in other words causality flows from the Selic interest rate for mergers and acquisitions domestic transactions with a lower level of significance at 5%, corroborating the correlation coefficient of -0.7632. This means that changes in the basic interest rate, which affect the money supply, cause companies to buy and sell in the Granger sense. Such behavior is also verified with the total value of mergers and acquisitions operations.

Figure 3: behavior of the series in their first difference over the period from 1994 to 2021



As for the causality between the variation in the SELIC interest rate and the number of cross-border acquisitions and mergers transactions and the total number, the results showed that there is an opposite temporal precedence relationship between these variables, but there is no temporal precedence relationship between the rate of SELIC interest from GDP. The number of domestic transactions, on the other hand, has indicated a prevalence ratio over mergers or cross-border transactions with a significance level of approximately 1%.

The causality tests in the Granger sense pointed out, still according to table 4, the existence of a prevalence ratio of GDP on cross-border mergers and acquisitions transactions, but the hypothesis is supported only at a significance level just below 10%. This result suggests that the performance of the Brazilian economy is a more relevant indicator than the interest rate to trigger mergers and acquisitions of companies with cross-border capital. The tests did not indicate prevalence relationships between GDP and the number of domestic M&A

transactions and, therefore, with the total number, although the correlation between these variables is high, that is, greater than 0.8 as shown in Table 4.

Table 4 - Granger causality test results

Null hypothesis	Statistic F	Prob.
GDP does not Granger cause Domestic	2.9021	0.1294
Domestic does not Granger cause GDP	0.52157	0.7904
Cross border does not Granger cause GDP	0.52897	0.7856
GDP does not Granger cause Cross border	3.40196	0.0982
Total does not Granger cause GDP	0.1917	0.9741
GDP does not Granger cause Total	1.5402	0.3279
Selic does not Granger cause Domestic	5.4645	0.0399
Domestic does not Granger cause Selic	1.1345	0.4606
Cross border does not Granger cause Selic	6.70453	0.0425
Selic does not Granger cause Cross border	0.46305	0.8240
Total does not Granger cause Selic	2.5779	0.1573
Selic does not Granger cause Total	0.5867	0.7485
Selic does not Granger cause GDP	1.6566	0.2991
GDP does not Granger cause Selic	0.3887	0.8749
Cross border does not Granger cause Domestic	8.8657	0.0144
Domestic does not Granger cause Cross border	1.9556	0.2389

Finally, the recent KPMG report shows that, in 2022, Brazil recorded a 12% drop compared to 2021. Of the total of 1728 mergers and acquisitions, accounted for in 2022, 1114 were domestic (among companies with Brazilian capital) ; 482 between companies with foreign majority capital acquiring, from Brazilians, capital of a company established in Brazil; 40 between a company with Brazilian majority capital acquiring, from foreigners, capital of a company established abroad; 21 operations between a company with Brazilian majority capital acquiring, from foreigners, the capital of a company established in Brazil and 71 between a company with foreign majority capital acquiring, from foreigners, the capital of a company established in Brazil. This reduction was pointed out by the decrease in investments by technology companies, which have historically contributed with the vast majority of the number of transactions. Another reason for the decline was the worsening of the international economic scenario and the increase in medium and long-term uncertainties in the Brazilian economic scenario.

V. Conclusions And Final Remark

The process of merging and acquiring companies has been characterized as an economical solution from the point of view of reducing operations and reducing operating costs and gaining access to new technologies and eliminating competition and gaining market share from the target company. The search for synergies between companies tends to be another factor that encourages market movements for buying and selling companies.

These movements have been treated in the literature as cyclical or waves in which periods of high or low intensity of this merger and acquisition activity are recorded, such as that which occurred in the USA. In the case of the Brazilian market, the movements of company transactions turned out to be small cycles, recorded between 1994 and 2004 with the adoption of the Real Plan, starting in 2005 until one year after the subprime crisis and from 2010 to 2016, the period in which the Brazilian economy going through a severe economic crisis

The sectors of economic activities with the highest volume of mergers and acquisitions business were Information Technology, the Internet companies' sector, which concentrate more than a quarter of the total operations in the accumulated result. In 2021 these two segments broke record values with more than half of the total transactions. These results consolidate the trend of strategic investments in digital transformation and innovation.

However, the results of the descriptive statistics analysis showed that the mergers and acquisitions market presented a high variability in its growth rate, and was very sensitive to the macroeconomic conditions of the Brazilian economy. This conclusion is corroborated by the also high correlation coefficient with GDP and with the economy's basic interest rate at Selic. The investigation of the stationarity of the series based on four-unit root tests; the ADF revealed that in all variables considered they have an order of integration equal to one or at their level and zero order their first difference. Based on this definition of stationary, causality tests were carried out in the Granger sense. Such tests pointed to the existence of a precedence relation of the interest rate for the transactions of mergers and acquisitions of domestic capital, demonstrating that changes in the basic interest rate, which affects money supply, causes in the Granger sense the movement of mergers and acquisitions of companies. This behavior is also verified with the total value of operations. The tests also showed a prevalence relationship between the number of domestic capital transactions over cross-border capital merger transactions.

Future research may investigate similar analysis, comparing economic performance such as that of the mergers and acquisitions market in different countries. For this, other variables may be included, such as the unemployment rate and the exchange rate to compose an autoregressive vector (VAR) econometric model.

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