



# Analyzing the Quantitative and Domino impact of Selected Financial Crises on the Brazil's Banking and Economic parameters- A Diverse and Inclusive Challenge

2851

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## Abstract

Financial crises impact the economy as well as the banking sector of the country in a systemic risk form. It's a contagion impact that rolls from one nation to the another, one bank to the another, one crisis to the another and one factor to the another. This paper studies and analyses this domino impact of the 4 selected financial crises (US subprime crises, Russian financial crises, Eurozone crises and Covid 19 crises) on the Brazil's economy and banking sector, along with the quantitative impact on various key variables. The researcher analysed the financial position of top 2 banks of Brazil from 2002 to 2021 along with the country's macroeconomic position in the same period. The researcher has done an in-depth analysis of each bank with financial factors as dependent variables, macroeconomic factors as independent variables and selected financial crises as fixed and latent variables. MANOVA is used to analyse the mean difference of each parameter during each selected financial crises for both the banks. The groups of key factors are formed based upon the results, which showed almost no discrepancy in the results of both the banks. ANOVA pairwise comparisons is used to understand the domino impact of each variable and the corresponding pairs of each selected crises. The first bank showed much dominance of US subprime crises on Russian, Eurozone and Covid 19 crises for many factors, and only one factor (ROE) dominance for Russian on eurozone and covid 19. The second bank showed all the selected financial crises dominance on each other for many factors.

**Keywords:** Financial crisis, deposits, debt leverage, total assets, GDP, exchange rate, inflation, tax

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## Brazil and its Economy

Brazil faced the tough time after the 2007-08 US subprime crisis and have also become the victim of the aftershocks of Russian 2014 crisis. But eventually Brazil came out as a survivor against the worst shocks of the global economy as the inflation rates in Brazil were controlled due to 'The Real Plan' during 1990's till earlier years of 2000's (Kaltenbrunner, 2010). It was believed that Brazil would follow the strategy of decoupling to shell out the effects of the global crisis. But the monetary policies and regulation have kept the Brazilian economy on hold and kept its foreign investments intact. The economic, social, and political global voice of Brazil as an emerging market economy has let it withstand the major financial disorders in the economy.

During the 2008 US subprime crisis, Brazil was one of the emerging economies. Investors wanted to bring back the money to Brazil which has led to increase in demand and consumption. Credit increased along with the loan maturity and the credit risk (Janot, Garcia and Novaes, 2021). But the intensity of credit supply as the percentage of GDP was still low as compared to other countries. The positive side was that there was a continuous expansion of credit supply at low default levels. The Brazilian Central Bank has attempted several measures to enhance the liquidity and reduce the stress of global crisis. It has issued various dollars for auctions, loan reserves and currency swaps for auctions with the intent to buy them back in future (Janot, Garcia and Novaes, 2021).

Brazilian economy was well countered by the introduction of 'The Real Plan' in 1997-98, which



has put an end to the high inflation rates and high indexation. But it has even led to the over exaggerated exchange rates that has given rise to the increasing bad debts, fiscal deficits, and external debts (Cuevas, Karpowicz, Mulas-Granados and Soto, 2017). Due to this Brazil was the first one to get hit hard by the Asian crisis of 1997 when it started to spread and lost 11 Billion US Dollars in the span of 3 months.

The **2002** recession of IT bubble was contagious to Brazil even (Janot, Garcia and Novaes, 2021). The contraction of money supply while increase in the fiscal surplus target and interest rates led to the negative effect but a long run of 5 years growth stabilization thereafter till the adverse effect of 2008 global crisis. During these 5 years the average growth rate reached 5%. There were extreme level of exports and the current account grows into surplus of 1.8% during the period from **1998 to 2004** (Janot, Garcia and Novaes, 2021). The policy measures of 1999 drew this level of growth which stood firm against the crisis of 2008.

In **2006**, the intervention of state in the economy has increased, thus leading to the deterioration in fiscal balances. Under the growth acceleration program, the government has started investing heavily in the national companies to boost the global competitiveness. It has expanded the fiscal deficits and the government started 'Creative Accounting' in terms of artificially boosting the primary surplus to meet the fiscal policy targets.

The period of **2012- 2016** was surprisingly a slowdown period with real GDP falling up to only 1% and the subsequent drop in the commodity prices. There was a deep rise in fiscal deficits, or we can say fiscal deterioration (Cuevas, Karpowicz, Mulas-Granados and Soto, 2017). Thus, the policy of '**Creative accounting**' to raise the surplus artificially became more pronounced. Another measure taken by the government was the lowering down the prices of the goods and services sold by the State-owned enterprises without any control over other enterprises. The government played hiding strategy by asking the public and private banks to issue social security pensions to the public, which were never reimbursed by the government to the banks. This has led to the increase in the banks losses which were originally the fiscal deficit. This strategy was '**Pedaladas Fiscais**'.

The **2015 and 2016** were the worst years when the fiscal deficits reached at the height of 7% of GDP, the domestic public debt rose, non-performing assets rose to the great heights, high tax burden and less government revenues.

The capital adequacy ratio was dropped during 2015 to induce more liquidity in the system as seen in the below graph, which kept on reducing till 2019 until it reached a stable rate of 8%. The Brazilian economy was still recovering from the shocks of 2015- 16 trench as the after -effects of 2008 crisis. The emergence of Covid 19 has once again posed trouble in the economy and its growth rates are once again dropped to counter the recent crisis all over the world.

2852

### Objectives of the Study

- ✓ To analyze the quantitative impact of selected financial crises on the Brazil's banking and economic parameters.
- ✓ To analyze the domino impact of selected financial crises on the Brazil's banking and economic parameters.

### Research Methodology

#### Dependent Variables: Banks Financial Performance

The dependent variables to be studied are pertaining to financial performance of the banks. These are Liquidity / Cash in hand, Deposits, NPA's (Allowances for credit losses to total loans ratio), Capital Adequacy Ratio, Net Income, Return on Assets, Return on Equity, Debt Leverage.

#### Independent Variables:

#### Quantitative Variables- financial metrics

The Quantitative financial independent variables are GDP (Gross Domestic Product), Inflation rate, Exchange rate, Tax rate, Interest rate, Fiscal Deficit, Net Trade (Exports- Imports), Repo Rate, Foreign Direct Investments, Forex reserves.

#### Fixed factors (Latent Variables)

The latent variables are US subprime financial crises, Russian financial crises, Eurozone crises, Covid 19 financial crises

#### Type of study:

It is a descriptive study followed by the implications taken through the extensive literature review. The study is a cross sectional, and the data will be collected at one specific point



of time. The Researcher did analysis over the 19-year period of 2002 – 2021 in distinct phases of financial crises.

**Data Collection:**

The data is secondary in nature. The secondary data will be the main source of data as this data will be used to derive the conclusion and results with proper facts. The source of data will be world bank data, bank-based country wise data and reserve bank of India time series publications.

**Sampling:**

The sample of top 2 Brazil's locally controlled commercial banks according to market capitalization.

**Brazil** ("Banks in Brazil - Overview and Guide to Top 10 Banks in Brazil", 2021)

Banco do Brasil

Banco Bradesco

**Banco Do Brasil**

Banco do Brasil was founded in 1808. It's one of the oldest banks of Brazil. Its market capitalization as of now is 15.95 billion Brazilian Real.

The trajectory of the financial parameters of the bank will be studied in the wake of selected financial crises and macroeconomic factors to understand the quantitative impact of crises on the factors and to see any domino impact of the crises during the tenure of 20 years on its factors.

**Impact on all these variables (Financial and macroeconomic) during each selected financial crisis**

To analyse the impact, the researcher has performed MANOVA and found out these results.

During the US subprime crisis the impact was worse, and it was more on cash, deposits, CAR, debt leverage, net income, total assets, exchange rate, tax revenue, net trade, and forex reserves. Russian financial crisis was the aftermath of the US subprime mortgage crisis, and the effect is well observed where the parameters that are hard hit were CAR, ROA, ROE, debt leverage is seen recovering, GDP declined, inflation rate increased, interest rate got a hard hit with average mean of .200, net trade remain negative, repo rate decreased slightly, and fiscal deficit increased. During Eurozone crisis, the most hit parameters are NPA's that increased to average mean of 3%, ROA, ROE, Net Income, GDP (average mean -

.0200), inflation rose to maximum (average mean 7.00), exchange rate and interest rate increased, Net trade was normal, repo rate increased, FDI reduced, forex reserves were constant and fiscal deficit increased. Covid 19 crisis has led positive impact on cash and deposits (increased average mean), CAR, ROA, ROE, Debt leverage, net income, total assets NPA remain the same as in the Eurozone crisis, GDP increased, Inflation rate reduced, Exchange rate increased, tax revenue increased, interest rate and repo rate reduced, Net trade reduced and fiscal deficit also got reduced.

2853

The researcher derived following impact groups with the highest mean variability (lowest mean in the selected financial crises:

**Table: 2.2 Group 1- US Subprime crises**

Dependent Variables	Independent Variables
Cash	Exchange rate
Deposits	Tax revenue
Net Income	FDI
Total Assets	Forex reserves
CAR	Fiscal Deficit
Debt Leverage	NPA

**Table: 2.3 Group 2- Russian Financial crises**

Dependent Variables	Independent Variables
	Interest rate
CAR	Net trade
Debt leverage	Fiscal deficit

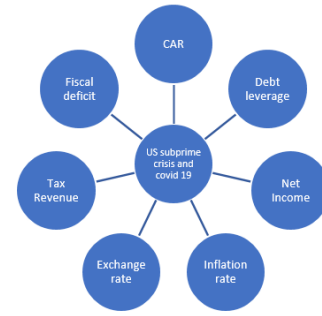
**Table: 2.4 Group 3- Eurozone Financial crises**

Dependent Variables	Independent Variables
ROA	GDP
ROE	FDI
Net income	Inflation
NPA	Fiscal deficit



**Table: 2.5 Group 4- Covid 19 Financial crises**

Dependent Variables	Independent Variables
NPA	GDP
Debt leverage	Inflation rate
cash	Repo rate
Net income	FDI
Interest rate	



**Fig: 1.3 US subprime crises and Covid 19**

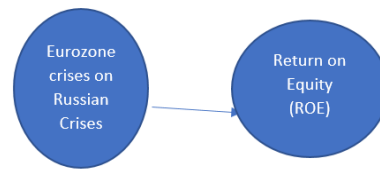
**Pairwise Comparisons (ANOVA Analysis)**

The pair wise comparisons showed the domino impact of the variables from one crisis to another in following diagrams:

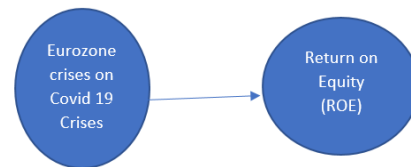
**Domino Impact Diagram**



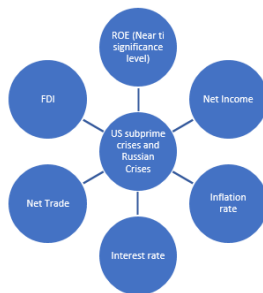
**Fig: 1.1 US Subprime Crises and Eurozone financial crises**



**Fig: 1.4 Eurozone crisis on Russian crises**



**Fig: 1.5 Eurozone crisis on Covid 19 crises**



**Fig: 1.2 US subprime and Russian Financial Crises**

**Domino impact (selected financial crises)- Banco Do Brasil**



The domino impact is seen diversely across the different period of times with diverse factors which are all interlinked and follows an inclusive approach.

**BANCO BRADESCO**

Banco Bradesco was founded in 1943. It is one of the top banking institutions in Brazil. Its market capitalization is 42.02 billion Brazilian Real.



**MANOVA**

The most impacted variables during US Subprime financial crises were cash, deposits, CAR, net income, total assets, exchange rate, tax revenue, FDI and forex reserves. During Russian Financial crises, there are only two factors that were most impacted and those are Interest rate and net trade in goods and services. The parameters that were most impacted during Eurozone financial crises were ROA, ROE, GDP, net trade, and fiscal deficit. During Covid 19 financial crises, the most impacted factors were NPA, debt leverage, GDP, inflation rate and repo rate.

Therefore, we have got following subgroups according to the most impacted parameters during each financial crises.

**Table: 3.2 Group 1- US Subprime crises**

Dependent Variables	Independent Variables
Cash	Exchange rate
Deposits	Tax revenue
Net Income	FDI
Total Assets	Forex reserves
CAR	Fiscal Deficit

**Table: 3.3 Group 2- Russian Financial crises**

Dependent Variables	Independent Variables
CAR	Interest rate
	Net trade
	FDI
	Fiscal deficit

**Table: 3.4 Group 3- Eurozone Financial crises**

Dependent Variables	Independent Variables
ROA	GDP
ROE	Inflation rate
NPA	Interest rate
Debt leverage	Fiscal deficit

**Table: 3.5 Group 4- Covid 19 Financial crises**

Dependent Variables	Independent Variables
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NPA	GDP
Debt leverage	Inflation rate
cash	Repo rate
CAR	Interest rate
Net income	

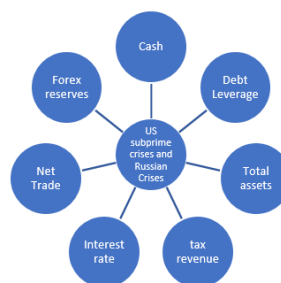
**ANOVA- Pairwise Comparisons Analysis**

The pair wise comparisons showed the domino impact of the variables from one crisis to another in following diagrams:

**Domino Impact Diagram**



**Fig:2.1 US Subprime Crises and Eurozone financial crises**



**Fig:2.2 US subprime and Russian Financial Crises**



**Fig:2.3 US subprime crises and Covid 19**





**Fig:2.4 Russian on Eurozone Crises:**



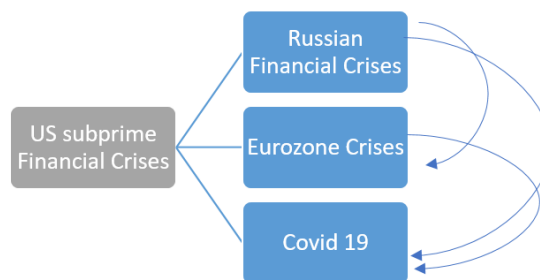
**Fig:2.5 Russian on Covid 19 crises:**



**Fig: 2.6 Eurozone crisis on Covid 19 crises**



**Domino Impact (selected financial crises)-  
Banco Bradesco**



Brazil's Banco Bradesco's financial and macroeconomic parameters were greatly impacted by US subprime crises with a great domino impact in the time of Covid 19 crises and less impact during Russian and Eurozone crises. The main financial and macroeconomic parameters that were impacted were deposits, total assets, ROA, ROE, Debt leverage, Net income, exchange rate, tax revenue, interest rate, repo rate and GDP.

**Interpretation**

According to the results analysis of Banco do Brasil and Banco Bradesco, the most impacted parameters for each selected financial crises are mostly same, except debt leverage which was impacted during Russian financial crises for Banco do Brasil. It got impacted more during covid 19 for Banco Bradesco. Rest, for all the parameters there was a symmetrical pattern of impact. The reason behind this change is the debt structure of the bank at the time of crises. Russian financial crises were majorly inclined towards debt failure, therefore the bank's that had weakened debt structure or more dependency on loans/outer funds faced the trauma than the banks whose debt structure is more inclined towards equity, as in the case of Bradesco. The domino impact of the financial crises in each of these banks followed a symmetrical line of pattern for the parameters of US Subprime crises. Interestingly, the Russian crises was more dominantly active for Eurozone and Covid 19 crises in the case of Banco Bradesco as compared to Banco Do Brasil. There were many factors like deposits, debt leverage, total assets, repo rate, interest rate, exchange rate, fiscal deficit that showed domino impact of Russian crises on Eurozone and covid 19 and Eurozone crises on Covid 19 for Banco Bradesco as against only one parameter that showed domino impact for Banco Do Brasil and that was ROE. The reason for this line of discrepancy is the balance sheet structure of the individual banks with the difference in the total assets' ratio, debt leverage percentage and



deposits ratio as against the loans. In case of Banco Bradesco, the total domino impact was seen during each crises for the impactful selected variables through ANOVA paired comparisons, tested with Structural Equation Modelling (SEM).

## Conclusion

Brazil's liquidity was affected most in the US subprime crisis as depicted by the results of the analysis of both of its top banks. But it kept of rising later after immediately because of the strong monetary policy, reserves, buyback auctions and currency swaps engaged by the government. The deposits, total assets and tax revenue were seen as the most impacted parameters of Brazil's banks during US subprime crisis. Brazil has softened its credit policy in the dawn of 2008 and wake of 2009, increased employment and waived off the taxes. This step has led to the saviour of the country while increasing its liquidity. The real plan of Brazil has left the inflation rate non impacted during the US subprime financial crises but surely exaggerated the exchange rate, the effect of which is seen during the US subprime financial crisis. This has even worsened the NPA's, fiscal deficits, FDI's, the effect of which is seen in both the bank's financials and country's macroeconomics during the subsequent crises as well. To counter this emerging risk of foreign investments and debt, the repo rates were infringed, and the impact was seen during Russian and covid 19 crises. The net trade was impacted most during Russian financial crisis, due to exchange rate risk, mistrust of investors, fiscal deficits, and aftershocks in the already shattered economy. The changes in the bank's monetary policies for easing out, somehow led to the triggering of inflation rates after 2015 at the wake of Eurozone and later covid 19 crises. The GDP of the country started falling after the shocks of Russian crisis later during 2015 and so on, at the wake of eurozone and covid 19 crisis. During Eurozone crisis, Brazil faced its worst when its GDP, NPA, inflation, Debt leverage, fiscal deficit, tax burden was impacted the most negatively, which is depicted in the analysis of its banks financial and country's macroeconomic performance above. The composite CAR was constant but started declining after 2015 eurozone crisis and during covid 19 crisis. There was a significant domino impact as seen during the analysis of both the banks. US subprime crisis has its impact till another decade, from Russian to covid 19 crisis. Few of the parameters like

deposits, ROE, debt leverage, total assets, repo rate, interest rate and fiscal deficit has the domino impact from Russian to Eurozone crisis and Eurozone to Covid 19 crisis. The domino impact or systemic risk is interrelated to bank's component structure, its viability and dominance, country's economic policies and position at the time of crisis. All the parameters are interdependent with almost 100% significance level, except net trade which is insignificant ( $>.05$  p value). Therefore, policy changes, ups and downs or effects of one parameter will lead to the changes and significant impact on all other parameters, with intensity according to the period (selected financial crises).

2857

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2858

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