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Brazilian sovereign debt renegotiation (1931-43): a game-theoretical analysis

Monografia de final de curso

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I thank the seas, for they are full of danger and abyss but also mirror the skies (Fernando Pessoa)

Contents

I. Introduction

> "I shall be content if it is judged useful by those who will want to have a clear understanding of what happened – and, such is the human condition, will happen again at some time in the same or a similar pattern."
>
> Thucydides, History of the Peloponnesian War (1:22)

Hailed as a father of historical science and a pioneer in the usage of narratives to understand human behaviour (Greif, 1998), Greek historian Thucydides is a brilliant thinker, placed by some on the same level as his contemporaries Plato and Aristotle, due to his unrivalled ability to analyse and draw lessons from historical facts. Indeed, according to political philosopher Leo Strauss (1978), "Thucydides sees political life in its own life; he does not transcend it; he does not stand above the turmoil, but in the midst of it". In other words, when reading Thucydides, one is immersed not only in the theoretical depths of philosophy but in the genuine dilemmas and choices where theory meets practice.

The description accurately illustrates how I felt when reading Thucydides for the first time, stunned by the sharpness and topicality of his observations. When he describes the factional strife in Greece during the Peloponnesian War, it is hard not to have in mind the contemporary political polarisation that, just like then, pitches brother against brother and father against son; when he talks of the geopolitical strategies taken up by Athens in Sparta, parallels with current international conflicts naturally arise. His work, as he explicitly claimed, aimed not simply to showcase specific events that happened in one point of space and time; rather, he saw those as a gateway to "the human condition", shining light on what "will happen again at some time in the same or similar pattern" (Thucydides, 2009).

Akin is my intention in writing this essay. History and historical narrative not only allow us better to make sense of our roots in the past, but are powerful tools to enrich our imagination and prepare ourselves for the future. Moreover, as we might be entering a new age of unpredictability and insecurity resembling that of the 1930s and 1940s, studying that critical period of human history is essential to preparing for what is ahead.

In studying such a turbulent period and its effects on Brazil, the sovereign debt issue stood out as of great importance. The stretch from 1931 to 1943 marks a massive overhaul of the Brazilian debt structure, along with a dramatic shift in the global distribution of power. The American recovery and its rise to hemispherical hegemon ran simultaneously with an increase of its influence in South America – a situation that, to some extent, endures in the present. The Brazilian sovereign debt narrative from this period illustrates the larger movement from Europe to North America and captures with rich detail some of the manoeuvres and assets that made possible such change.

Furthermore, debt is an everlasting issue in both politics and economics. To some, it is the engine that makes the economy flow. To others, a burdensome weight that keeps countries from sustainable development. However, one way or the other, it remains relevant in the modern era, as the recent European debt crisis demonstrates its huge implications on social and political life.

Even in Brazil, a country where most considered the matter of sovereign debt soothed after the 90s and early 2000s, the country's fiscal health came back into light during Michel Temer's administration. The approval of the 95th Constitutional Amendment in 2016, which set a "spending ceiling" (*Teto de gastos*) to thwart the increase of the Debt-to-GDP Ratio, was a controversial political move, with the opposition renewing calls for an audit of the sovereign debt (*Auditoria Cidadã da Divida*). In the aftermath of the Covid pandemic, the ratio lies at 87% (Tesouro Nacional, 2021), with interest payments alone consuming 12.7% of the Federal Revenue (Idem). The sovereign debt issue, therefore, remains alive in our horizons.

In the analysed period, notwithstanding, it was even more prominent. Brazil's debt restructuring saga began in 1931, with the Third Funding Loan, an ill-succeeded attempt at restoring economic balance in the aftermath of the Wall Street Crash of 1929. After just three years, a new system of payments, known as the "Aranha Scheme", named after Minister of Finance Oswaldo Aranha, replaced it. The *Estado Novo* coup led by Getúlio Vargas in 1937, however, changed everything. Brazil declared a debt moratorium, only resuming payments by 1940. A final debt settlement allowing sovereign debt reduction to manageable levels was only reached in 1943, during World War II.

This paper aims to explore each of these periods and negotiations and strives to recognise the underlying reasons why particular actions were or were not taken at given moments and which lessons those past events can teach us now, for the present and the future. In that, we follow and update the lessons of Thucydides who, besides being one of the fathers of history, political science, and international relations studies, was also proclaimed by political economist George Tsebelis (1989) as the “father of game theory”, being “interested in historical questions as a means of finding theoretical answers". Such is an accurate description of my goal as I move through this paper and, therefore, the reason why I use the game-theory framework.

This thesis is structured in three sections. Section 1 is dedicated to introducing the theme, the analytical techniques and the historical context of further analysis. Chapter I – this Introduction – explored the motivations behind the topics studied and their relevance for current and future matters. Next, in Chapter II an exposition of the chosen methodology and data that helps fuel the rest of the essay will come; finally, the third chapter deals with the surrounding events of the period from 1931 to 1943 that will be studied, both in Brazil and in the world. Section 2, comprising chapters IV to VI, presents the core of the game-theory analysis of three different defining moments of Brazil's debt restructuring, modelling them in detailed games and offering initial conclusions that can be taken from each game. The chapters will cover the 1931 Funding Loan, the 1934 A ranha Scheme, and the 1943 Debt Settlement Agreement in chronological order. Finally, Section 3 – the remaining two chapters – highlights early insights and discusses how general or useful they can be. In Chapter VII, I summarise the takeaways from the games of Section 2 and discuss whether they were also valid in other time periods, using the example of the 1990s. Lastly, Chapter VIII wraps up all conclusions both practical and theoretical, addressing their validity and relevance at the present days.

II. Methodology

The goal of the present paper is to go through the narrative of historical events and use game theory tools to interpret the actions and results of the past. To do so, I will use the method known as "Analytic Narrative", described and exemplified by Avner Greif in the homonymous book (1998). In essence, this method consists of using modern economic theory and models to retell historical events. However, before we get into more detail about this technique, it is crucial to run over the historical narrative and the theoretical frameworks that will be used as the basis for this future synthesis.

II.1 Historical Narrative

In terms of historical narrative, the primary sources used throughout this piece are the works of Marcelo Paiva Abreu. He has written extensively and with vibrant details on Brazilian economic history for the analysed period. Professor Abreu's books *Patrimonialismo e Autarquia* (2020) and *Brazil and the World Economy 1930-1945* (1975) are two of the main sources of documentation and narrative that will be further unveiled. In cases where Abreu's narrative is incomplete or absent, other authors were used, such as Galano (1994) and Boughton (2012). It is important to note, however, that while some of the conclusions and statements made by those authors are naturally up to dispute, the focus of this paper is to extract from them the objective narrative of events, which can then be unravelled with the help of economic theory in order to reach new conclusions that may or may not contradict the authors'. In that sense, those sources were chosen for their reputed attention to the truth of narrated facts and careful attention to detail and commentary.

II.2 Game Theory

Once the historical narrative is assembled, it will be coupled with Game Theory tools, defined as the "study of mathematical models of strategic interaction among rational decision-makers" (Mierson, 1991). While of multidisciplinary use and application, this discipline is often applied to economics. It can be understood as a branch of decision theory, mainly concerned with "games" – situations where multiple players must make choices that will affect one another. Game Theory, in short, is the study and modelling of those choices and their consequences, being naturally useful to describe and interpret real-life events.

II.3 Analytic Narrative

History and theory will then come together through the Analytic Narratives method, which "combines analytic tools that are commonly employed in economics and political science with the narrative form, which is more commonly employed in history" (Greif, 1998). Such an approach is "narrative; it pays close attention to stories, accounts, and context", but also "analytic in that it extracts explicit and formal lines of reasoning, which facilitate both exposition and explanation" (Idem).

In essence, the goal of the present paper is to delve deeply into historical events, driven not by theory but by real problems that those events bring forward. From the narrative, we can extract the main elements: the actors, the choices they have upon them, the setting, the sequence of actions taken and the outcome. Once those items are isolated, often from macro-narratives, it is possible to develop micro-analyses of specific moments and decisions. In this way, an analytic narrative allows the reader to understand more clearly the mechanisms that led to the resolution of one specific problem inside a more extensive narrative frame.

Finally, the means for checking the validity and usefulness of the conclusions reached through this method are listed by the authors (Greif, 1998) as a series of answers to the following five questions:

1) Do the assumptions fit the facts, as they are known?
2) Do conclusions follow from premises?
3) Do its implications find confirmation in the data?
4) How well does the theory stand up by comparison with other explanations?
5) How general is the explanation? Does it apply to other cases?

In general, the games and analyses developed here will always be concerned with those questions, but also with the broader goal of analytic narrative: a movement "from 'thick' accounts to 'thin' forms of reasoning", which "highlights and focus upon the logic of the processes that generate the phenomena studied". Especially regarding Game Theory, Greif remarks:

> "The theory is actor-centric; in extensive form, games explicitly take sequence into account and highlight its significance for outcomes. They capture the influence of history, the importance of uncertainty, and the capacity of people to manipulate and strategise, as well as the limits of their ability to do so. The structure of extensive-form games thus readily accommodates the narrative form. To distil the essential properties of a narrative, we seek to construct the game that provides the link between the prominent features of the narrative and its outcome".

In using Game Theory to schematise historical narrative, therefore, I attempt to follow the footprints of Greif et al., but also of a growing tradition of historians, economists, and political scientists, who applied and perfected the principles described above, such as Josiah Ober (2016) and Manuela Dal Borgo (2019). Finally, this method is also part of a great tradition, which remounts as far back as to Thucydides, hailed by the authors of Analytic Narratives as the precursor of the usage of the narrative form to "explain human behaviour" – the main goal of this paper.

III. Historical Background

III.1 Brazil as a debtor (1824-1931)

According to Abreu (2006), the history of Brazilian foreign debt can be divided into three periods. The first period began in 1824, almost immediately after the country's independence from Portugal, and ended with the 1931 Funding Loan. The Funding Loan, first in a sequence of measures taken by then-president Getulio Vargas (1930-45) in order to alleviate the impact of interest payments in the economy following the big crash of 1929, marked a new, less orthodox approach to debt policy that was progressively implemented throughout the decade.

In that sense, Abreu remarks that in contrast to most unindustrialised economies of the 19th and early 20th centuries, Brazil was a relatively well-behaved debtor throughout this first period. It was the only Latin American economy not to have suspended foreign debt payments until 1898 when the new republican government restructured the foreign debt through the first Funding Loan. Even then, the conditions of said restructuring were respected, as were those after the Funding Loan of 1914 and during the three years from 1931 to 1934 that succeeded the third Funding Loan, until the 1934 paying settlement known as the "Aranha Scheme”.

In that sense, the Imperial period (1822-91) mainly recorded modest and controlled increases in foreign debt, except during the Paraguayan War from 1864 to 1870. It was only after the new republican government had to deal with rebellions and instability during the 1890s that Brazilian debt had a sizable increase. This national increase was coupled with increments in state and city debts, following the adoption of federalism by the new regime and the official policy of keeping coffee prices high conducted by local governments (mainly the state of São Paulo).

By 1930, total Brazilian debt corresponded to £251.6 million, of which 76.5 million had been contracted in American dollars and another 163 million in the British currency. Moreover, £101.7 million or over 60% of the debt owed to British creditors pertained to the federal government, while in the case of debt contracted in dollars, the situation was reversed: £46.4 million of the total £76.5, roughly 60% as well, pertained to state and local governments (Abreu, 2006).

Those values are remarkable for they indicate that the British position of economic supremacy over Brazil, held during the 19th century but already long gone in the 1930s, was still reflected in its foreign debt. In that sense, British loans were the oldest – some going back to the first Funding Loan of 1898 and the less risky, many of them under federal guarantees. On the other hand, American loans were more recent; many contracted in the post-war "Roaring Twenties", primarily by state and local governments with higher interest rates. As a result, when the 1930s started, London firms held a vast majority of the Brazilian federal debt and were by far the country's most important creditors. At the same time, however, American influence was rising, consisting with their position as the largest market for Brazilian coffee and, therefore, Brazil's foremost trading partner.

III.2 The World Economy from 1930 to 1945

Following the stock market crash of 1929, the temporary collapse of the American economy had extreme consequences for the rest of the world. The Hoover administration, incapable of dealing with the crisis, was succeeded in 1933 by President Franklin Delano Roosevelt, whose "New Deal" policies allowed for some degree of economic recovery during the remainder of the decade. Besides his bold domestic policy, Roosevelt's administration was also remarkable for its paradigmatic change in the American trade policy and its ties to foreign policy more broadly. While his rivals in the Republican Party – and even many Democratic politicians back then – were isolationists, Roosevelt adopted a liberal foreign policy, which later culminated in the founding of the United Nations after World War II.

Not coincidentally, the organisation was considered a "pet-project" of Roosevelt's then widow Eleanor, who became the first chair of its Commission on Human Rights from 1946 to 1952.

If Roosevelt's international liberalism was more modest than his wife's, he nonetheless presided over a significant transformation regarding the American position on trade. Before him, most American administrations had been to some extent protectionists, or at the very least cautious about unrestrained international trade. If it is true that change was already underway during the presidencies of Wilson (1913-21) and Coolidge (1923-29), it was only during FDR's terms that the dispute between liberals and protectionists was finally settled, remaining more or less unquestioned until the election of President Donald J. Trump in 2016.

During this long period, free trade was regarded as a corollary of American liberal principles, first contrasted with fascist Germany, which prioritised bilateral compensation agreements between countries, and then with the socialist Soviet Union. In that sense, the radical defence of free trade was in line with foreign policy priorities, as it made it easier to attract countries to the American sphere of influence. At the same time, it is also understood to have benefited the American industry, expanding the available consumer market for its goods.

Incidentally, America's positioning as the world's most prominent defender of international liberalism was simultaneous to British retirement from that role: in the 1930s, British policy regarding trade alternated between an ardent defence of free trade, primarily used with countries with which they had buoyant net exports or lacked the power to influence, to the "Buy British" motto they employed against more dependent nations under their sway (one remarkable case being Argentina). However, the decay of Great Britain as the world's foremost producer of industrial goods, and the rise of America to occupy its place, led to a reversal of the two countries' policies regarding free trade.

Nevertheless, while Great Britain adopted ambivalent positions, the other growing power of the decade, Nazi Germany, had a more coherent strategy. Hurt by World War I and the economic instabilities that followed it, Germany was an industrial powerhouse that lacked the penetration of its rivals in foreign markets. Therefore, the promotion of bilateral compensation agreements, captained by Economics *Reichsminister* Hjalmar Schacht, was the natural route to expand the market for German goods. At the same time, it was also compatible with German fascist ideology, which rejected multilateralism and promoted bilateralism in defence of national interests.

With the outbreak of World War II, however, the German position became less relevant for the rest of the world. The British and American navies could cut any German intercontinental trade, thus drastically weakening their economic relations with American countries. Moreover, this also meant that European markets were temporarily focused on war and, after the German occupation, were seen as natural extensions of the German industrial market. Countries in the Americas, like Brazil, suffered from this situation, being incapable of trading with Europe and therefore relying even more on the United States.

Therefore, the 1930-45 period is a pivotal moment for America's affirmation as the preeminent world power in its side of the hemisphere. During those fifteen years, the United States increased its industrial capacity and trade relationships with most American countries, including Brazil, at the expense of European economies. Moreover, they put forward a global platform in defence of free trade and multilateralism, which later culminated not only in the United Nations but also in the General Agreement on Tariffs and Trade (GATT) of 1947, the precursor for the World Trade Organization.

IV. The 1931 Funding Loan

IV.1 Narrative: “the man who sank three times."

Throughout the early history of Brazil's debt, there are three inflexion points known as the "Funding Loans". The first took place in 1898, less than a decade after the Proclamation of the Republic when the new government had depleted its financial capabilities to contain the many rebellions that followed the regime change. The second one took place in 1914, right at the beginning of WWI, following the growth of Brazilian debt associated with upholding high coffee prices and the decreasing value of exports like rubber. Finally, the third one, which will be the object of a more detailed analysis, happened in 1931, during the aftermath of the global destabilisation caused by the Crash of 1929.

Nevertheless, before we go into details, it is essential to explain what a Funding Loan is. According to Abreu (2002), the Brazilian Funding Loans were inspired by a previous financial agreement settled between England and Argentina in 1891. Buenos Aires borrowed 15 million pounds from British bankers to refinance other loans the government had contracted in the past. After some adjustments, by 1896, the situation reduced the actual interest rate and provided an exemption of redemption payments for the first years. The format of the agreement was also applied in Brazil, with the first funding loan of 1898.

However, by the time of the third Funding Loan of 1931, the situation was much direr. If in 1900, right after the first agreement, the ratio between debt and exports was 1.73, by 1930, it had grown to 4.04 (Abreu, 2000). The economic circumstances were of such grave concern that in 1930, even before the coup d'état that led Getúlio Vargas to power later in that year, president-elect Júlio Prestes went on a tour to Europe aiming to begin talks for restructuring Brazilian debt once again. As a result of those initial talks, Sir Otto Niemeyer, a high-level officer of the Bank of England, was sent to Brazil to access the current state of the government and its debt.

Table 1: Brazil's Foreign Debt Indicators – 1830-1940

	Ratio debt/exports	Ratio payments/exports	Ratio payments/total revenue
1830	1.68	0.0936	0.1960
1840/1841	0.71	0.0361	0.1280
1850/1851	0.56	0.0523	0.1084
1860/1861	0.42	0.0418	0.1029
1870/1871	0.78	0.0657	0.1152
1880/1881	0.57	0.0854	0.1534
1890	1.17	0.0573	0.0823
1900	1.73	0.0436	0.1206
1910	2.05	0.1595	0.1699
1920	2.00	0.1319	0.1493

1930	4.04	0.2949	0.2617
1940	3.28	0.0414	0.0440

Source : Abreu, 2002 (p. 518)

Sir Otto Niemeyer was initially opposed to the idea of a new Funding Loan, arguing that "a man who sinks three times will eventually drown". However, things changed when, in October 1931, Great Britain dropped the gold standard for the pound – the crisis of the global economy was sharpening, and it became clear to everyone that Brazil was unable to pay its massive debt. What followed then, after some negotiation, was an agreement whereby loans to Brazil would be divided into two categories: 1) relative to the former Funding Loans of 1898 and 1914, whose instalments would remain being paid in full; 2) all other loans, which would have their redemption payments suspended and would be paid at a consolidated interest rate of 5% (Abreu, 1975). Notably, the deal meant no loans acquired with American banks would be privileged since the former Funding Loans had been contracted mainly with British and French creditors. This was a result of abysmal relations between the recently installed Vargas government and Washington, who had initially refused to recognise the new regime.

IV.2 Theory: A sequential game in time

Among the many ways we can analyse the decision-making that led to the Third Funding Loan, one is through the wise analogy made by Sir Otto Niemeyer: "a man who sinks three times will eventually drown". In those words, the loss of confidence in the debtor that results in default or debt restructuring is exposed. Thus, the more Funding Loans a country takes, the more likely it seems to a potential creditor that it will not be able to fully pay its debt in the future, asking for a new funding loan. In other words, the probability of default increases at every attempt. A good way to model this scenario is through a sequential game, where the player must decide whether to take part in a new Funding Loan.

Players

This game will model how the financial community reacts to a Funding Loan proposal from Brazil. For the sake of simplicity, we will assume that the Financial Community acts as a single player.

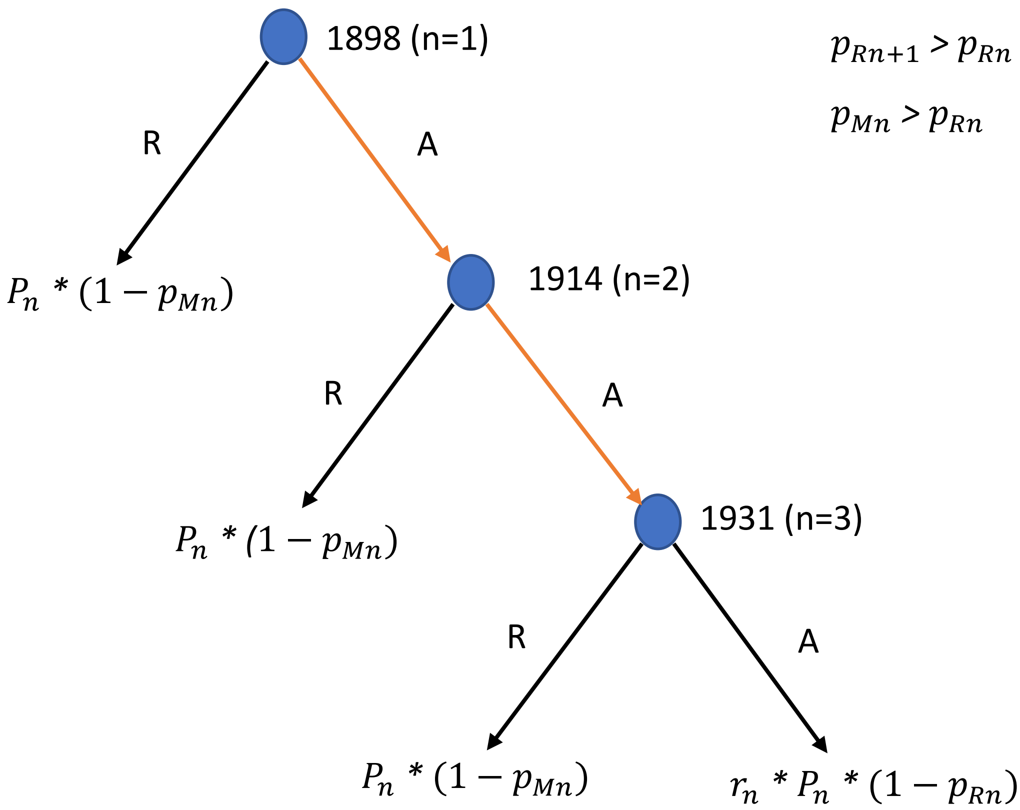
Actions

For every Funding Loan proposal, we will assume the Financial Community has two options: A) Reject and request full payment of the debt (R); B) Accept the restructuring (A).

Payoffs

To estimate the payoffs, let us consider the following: the best, optimal scenario for the Financial Community is where Brazil delivers full payment of its debt. This value will be called P_n, with n being the number of the Funding Loan. However, there will always be a certain probability that Brazil may declare itself unable to pay the total debt and declare a moratorium. This probability will be referred to as p_{Mn}.

Furthermore, if the financial community accepts the Funding Loan, it should receive a value $r_n * P_n$, where $r_n < 1$. Even then, there is the risk that in the long run, Brazil will not be able to pay the restructured debt, p_{Rn}, which increases every time the country takes a Funding Loan. Since this risk is both smaller due to the more manageable nature of the Brazilian debt following a Funding Loan and also due to encompassing the possibility of a new Funding Loan, we shall consider that $p_{Rn} > p_{Mn}$ for any same n. Therefore, we reach the following tree of actions and payoffs:



As we can see, for each scenario, the player will have to choose between the following payoffs:

Reject: $P_n * (1 - p_{Mn})$

Accept: $r_n * P_n * (1 - p_{Rn})$

Dominant Strategies

The financial community will accept a new Funding Loan when the payoff for accepting is larger, that is, when:

$$r_n * P_n * (1 - p_{Rn}) > P_n * (1 - p_{Mn})$$

Simplifying the equation, we reach:

$$r_n * (1 - p_{Rn}) > (1 - p_{Mn})$$

$$r_n > \frac{1 - p_{Mn}}{1 - p_{Rn}}$$

This means that the ratio r_n corresponding to the Funding Loan payment compared to the total payment must be larger than the ratio corresponding to the probability of payment (1-p) in the case of rejection over the probability in case of acceptance.

IV.3 Back to Narrative: The outcome of the Funding Loan

As did Sir Otto Niemeyer, we consider that the probability of default increases with each funding loan, then p_{R3} must have been greater than p_{R2} and p_{R1}, disregarding external changes. While that is naturally a very simplified model, it does point to the fact that the ratio r_n will have to be bigger with each iteration of the Funding Loan game, as a higher p_R implies a lower denominator. Does this conclusion match reality?

Apparently, it does. According to Abreu (1975), the 5% interest rate negotiated at the 1931 Funding Loan was somewhat equivalent to the weighted average of all interest rates. The agreement, in fact, was not made to last – authorities both in Rio and in London knew that, in the long run, Brazil would not be able to pay its entire debt. Because of that, the new rules set in 1931 were only to be in effect for three years, with a revision after the first or second year (Abreu, 2002). Thus, the long debt restructuring process Brazil went through in the 30s and 40s was only beginning.

IV.4 Conclusion: Why the third Funding Loan did not work?

The third Funding Loan episode is emblematic of the loss of confidence that results from a country or organisation being a lousy debtor. If a particular institution has an unreliable history regarding its debt payments, it is more than natural that financial authorities will charge higher interest rates for future loans. In some cases, this might even lead to a snowballing situation, where having a high amount of debt will lead to high interest rates that further cause the debt to increase. In such extreme cases, debt restructuring is an option when coupled with a long-term perspective of growth and structural adjustments, as it was in the Brazilian case during the first two Funding Loans.

By 1931, however, there was no perspective of recovery of the global economy. Not only that, but investors were already cautious about lending money to Brazil, a country that was at risk of acquiring the reputation of a bad debtor following its two previous Funding Loans. The 1931 Funding Loan, in that sense, put an adhesive tape on the problem, postponing it for three years when more drastic agreements were eventually reached. As Sir Otto Niemeyer analogised, the man who had sunk three times was indeed very close to drowning.

V. The 1934 “Aranha Scheme”

V.1 Narrative: American trade policy dilemma

In 1933, when President Franklin D. Roosevelt took office in the United States, he promised a "good neighbourhood" policy toward fellow countries in the Americas.[1]. In that sense, while his domestic platform championed the interventionist “New Deal” agenda, his foreign policy was much less hawkish. After an initial clash between advisors, President Roosevelt chose to pursue the international defence of "multilateralism" in international trade under the influence of Under Secretary of State Summer Welles (Abreu, 1975). Multilateralism, in many ways, was considered beneficial for the United States in the long run since its competitiveness could be globally enhanced in an environment deprived of tariff restrictions.

The 1929 Crisis, therefore, accelerated Washington's replacement of London in the position of the world's most adamant defender of free trade. While His Majesty's Government pursued a pragmatic strategy, adopting a "multilateral approach where its bargaining power was weak and a bilateral approach where it was strong."[2] (Abreu, 2020), the United States remained relatively coherent in its global defence of freer international markets. That decision, however, had significant implications for the case of Brazil.

Firstly, in that sense, one must consider that by 1934 the Brazilian settlement that made the 1931 Funding Loan was about to expire. After three years, it was clear to both Brazilian and international authorities that new terms had to be

[1] The "good neighbourhood policy" was first announced in President Roosevelt's inaugural speech of 1933, where he proclaimed to ‘dedicate this nation to the policy of the good neighbour, the neighbour who resolutely respects himself and, because he does so, respects the rights of others, the neighbour who respects his obligations and respects the sanctity of his agreements in and with a World of neighbours’

[2] The definitive mark of this new approach can be traced to the Ottawa Conference of 1932 when Great Britain adopted the idea of "Imperial Preference", aiming for reduced tariffs within members of the British Crown and higher tariffs with the rest of the world.

agreed upon. It is almost certain that, otherwise, Brazilian president Getúlio Vargas would have been persuaded to default in the following year. Back then, Brazil's two main creditors were, respectively, the United Kingdom and the United States – therefore, the two main players interested in the debt renegotiation (See Table 1).

Table 2: Brazil's Yearly Debt in Foreign Currency (Millions), 1934-37

	Sterling	Dollars	Francs	Total
1934	162.2	76.1	22.8	262.4
1935	160.4	75.2	22.5	259.8
1936	157.9	74.5	16.0	249.3
1937	156.4	71.4	11.4	240.1

Source : Abreu, 1975 (p. 232)

The first move in that direction was made by the British, then represented by Sir Otto Niemeyer. He proposed to the Brazilian Minister of Finance, Oswaldo Aranha, a payment scheme that divided Brazilian public loans into seven different categories – of which only the first two would receive the full payment of their interests. The scheme placed a much higher priority on Sterling loans than the dollar's, which naturally angered American authorities. By 1934, America had a much better balance of trade with Brazil than the United Kingdom, holding more bargaining power and the ability to enforce its interests. The British position in Brazil, on the other hand, had been waning since as early as the Great War, and its Brazilian exports were then but a fraction of the American ones.

Despite pressuring to achieve a more favourable agreement, the American effort was generally perceived as unsuccessful. Notwithstanding their overwhelming bargaining power, however, as Niemeyer himself would later put, "the changes they accepted at the end of the plan in 1934, as originally proposed by the Brazilian government, were minimal before the whole". Thus, the United States, despite a strong negotiation position, failed to convert it into immediate economic gain. Why did that happen?

The explanation for the American shyness in this situation can only be assessed when considered within another dispute involving Brazil: the adoption of Compensation Agreements between Rio de Janeiro and Berlin. As a country firmly against bilateral compensation agreements – which result in unfair treatment and diversion of trade – the United States was very eager to prevent Brazil from striking such a deal with Germany. Despite that, Getúlio Vargas had plenty of good reasons to support the arrangement, as it allowed both for the increased importing of essential materials and the exporting of important national products, such as cotton[3]. German-Brazilian trade became a key source of public support for the government in cotton-producing areas in the Northeast and in the South.

In both these scenarios, the United States had a robust bargaining tool: the threat to impose compensation agreements, in the same fashion as Germany. Since the United States had a large trade deficit with Brazil due to its coffee imports, such an agreement would primarily harm the Brazilian economy and potentially even put political pressure on Vargas's government. Despite the bold talk, however, the United States never seriously pursued such a measure – in fact, in 1934, the Reciprocal Tariff Act was enacted by the American Congress, creating the framework for the institution of free trade agreements with American trade

[3] It is also worth noting that cotton was traditionally an American-dominated market due to this crop's production in the South. In that sense, Brazilian production in the Northeast also harmed American domestic interests and reduced German dependence on its potential rival, the United States.

partners. The two countries signed a trade agreement containing an MFN (Most Favoured Nation) clause in the following year. The rationale behind that decision was that America opted to strengthen its global position in favour of multilateralism, aiming for long-term gains. Any other option would have seriously damaged American pretention to be a worldwide champion of free trade, which, in the calculations of its decision makers, would do more harm than good in the long run.

V.2 Theory: two different games at play

America's decision making in the 1934 scenario can be better depicted through two different games, using the tools of game theory. Let us call them the i) International Trade Game, which deals with America's possible retaliation on Brazil due to its compensation agreements with Germany; and the ii) Debt Renegotiation Game, which deals with America's similar pressure aimed at achieving a better loan payment plan through the "Aranha Scheme".

V.2.1 International Trade Game

Players

In this first game, we must at start consider three decision-makers, which operate simultaneously. These are Germany, Brazil and the United States.

Actions

Each of the players has a different set of actions they can take in the game.

Germany can both A) propose a compensation agreement or B) propose a free trade agreement to Brazil; for circumstances distinct to the German economy, we will consider that **action A is always the dominant one**[4]. Because Germany's

[4] A significant part of Germany's strategy for economic recovery was Hjalmar Schacht's "New Plan", based on compensation agreements to expand German access to foreign markets. Since the

action is already determined, we can depict the game only considering the actions of Brazil and America.

On the other hand, Brazil can either A) accept or B) reject the German agreement proposal.

Finally, the United States can either A) pressure Brazil to reject the agreement or B) accept the Brazilian decision and stick with free trade.

Payoffs

We know from Abreu (1975) that, without considering an external intervention, a compensation agreement with Germany was seen as favourable to Getúlio Vargas, both in economic and political terms. Therefore, let us call the payoff from the agreement *P*.

Given *P*, retaliation from the United States, in the form of the imposition of a compensation agreement, would cause a negative payoff to Brazil in the form of -*R*, with *R* > *P*.

Washington, on the other hand, has two possible payoffs. If Brazil and Germany strike the deal, they would have economic losses, which we can call -*L*. For the sake of simplicity, let us assume that there are no substantial economic costs to the United States in retaliating against Brazil. However, we can understand that such a move would result in a loss of American "soft power" in defence of free trade: this diplomatic loss can be called -*S*, with *S* > *L*.

Then we may have the following payoff table:

	United States

German economy was being reorganised according to this plan, it would have made no sense for them to pursue any other strategy.

		Pressure	Accept
Brazil	Accept Compensation agreement	P – R, - S – L	P, - L
	Reject Compensation agreement	0, -S	0, – L

Dominant Strategies

From the table above, we can see that the United States' preferred actions will always be to accept Brazil's decision, given that $S > L$. In other words, their loss of soft power does not compensate for the economic loss caused by the compensation agreement. Knowing this strategy beforehand, Brazil can safely accept and maintain its trade deal with Germany since it is a dominant strategy when America refrains from pressure. The resultant dominant strategies are:

S = {Compensation agreement, Accept, Accept}

V.2.2 Debt Negotiation Game

Players

In this second game, there are again three different decision-makers: Brazil, United States and Britain. In this scenario, I shall consider, both for historical reasons and to account for the fact that London does **not** have bargaining power over Brazil, that the United Kingdom will act before the other players.

Actions

The United Kingdom has two options when presenting a draft proposal. They can either A) present a balanced proposal or B) present an unbalanced proposal[5]. The choice they will make will depend on how they assume the other two players will act.

Given a proposal by the UK, Brazil has the option to either A) accept or B) reject it, which would mean declaring a default.

The United States, on the other hand, has the option to A) pressure Brazil to change the proposal into a better one (in this case, a balanced British proposal would become unbalanced favouring Washington, and an unbalanced British proposal would become a balanced one) or B) to accept the British proposal.

Payoffs

The payoffs for each player are as follow:

The preferred outcome for the United Kingdom is the acceptance of an unbalanced British proposal, with payoff B. A balanced proposal will have a payoff of 0. An unbalanced proposal will have a payoff $-B$. Finally, a default would have a payoff $-D$. We also should have the following data: $D > B > 0$.

Naturally, the preferred outcome for the United States is an unbalanced proposal in its favour, which would render the payoff B. Similarly, a balanced proposal would render 0 as a payoff, and an unbalanced British proposal would result in $-B$. A default would have a payoff $-d$, with $D > d$. This is because the Brazilian debt in pound sterling was considerably higher than the Brazilian debt in dollars. We should also consider the soft-power cost of exerting pressure, already defined as $-S$.

[5] In this case, the balance of each proposal shall be within the context of the United States, as the other creditor; we shall assume that either proposal is equally balanced towards Brazil.

Finally, Brazilian payoff is either 0, when they accept a unanimous proposal, or $D + d - C$ in case of default (C being the loss of international confidence following a default). This leads us to the following two tables:

Scenario 1: Balanced British Proposal

		United States	
		Pressure	Accept
Brazil	Accept	0, B - S, - B	0, 0, 0
	Reject	(D + d – C), (- d – S), - D	(D + d – C), - d, - D

Scenario 2: Unbalanced British Proposal

		United States	
		Pressure	Accept
Brazil	Accept	0, -S, 0	0, -B, B
	Reject	(D + d – C), (- d – S), - D	(D + d – C), - d, - D

Dominant Strategies

As we can see, the British action to send an unbalanced proposal is **weakly dominant**. It results in a better outcome in scenarios where Brazil accepts a proposal and in an equal outcome when such a proposal is rejected. That means that Britain, as long as it plays first, will always present an unbalanced proposal.

Given that, it is notable that there is one element of uncertainty in the payoffs. For the United States, it is unclear whether B is bigger or smaller than S – a factor that is only known to the United States. We also do not know whether the Brazilian government considers $D + d - C > 0$; however, for the sake of simplicity, we can assume that any proposal made by either the UK or the US will aim to cross that threshold so that Brazil will not have an incentive to default in 1934 (as we will later see, this premise was not valid in future negotiations).

The only uncertainty, therefore, regards the valuations of S and B under Washington's lens. Going back to the historical narrative, what we saw was a small American negotiation effort aimed at reducing its disadvantage (that is, replacing B with B^*, which $B>B^*$) to a level that became sustainable. The threat of retaliation (which would result in a -S payoff) was dropped since the newly achieved B*, albeit only slightly smaller than B, was enough to deter any American action. These two games explain the leniency of the American foreign policy related to Brazil in the early 1930s.

S = {Accept, Accept, Unbalanced}

V.3 Back to the narrative: "Good Neighbour Policy" and Brazilian default

By 1937, with international tensions in Manchuria and Ethiopia increasing, it was clear that world peace was threatened. That new scenario emphasised another essential aspect of Roosevelt's foreign policy on Latin America: the so-called "Good Neighbour Policy". The Inter-American Conference for the Maintenance of Peace, held in December of 1936 in Buenos Aires at the request of the American president, can attest to this. Aimed at solidifying American leadership in the namesake continent, the conference eventually led to the subsequent Declaration of Lima of 1938, essentially sealing a treaty of friendship between the

American countries[6]. In that scenario, it was of utmost importance to the United States to maintain Brazil within its grip, especially to offset the leadership of more independently minded Argentina.

Nationally, Brazil faced a *coup d'état* in 1937, when president Getúlio Vargas closed legislative bodies and singlehandedly instituted a new Constitution. One of his first measures, aimed at rallying support across the country, was the cessation of debt payments. According to Abreu (2020), there were three reasons behind that logic: first, it would help Brazil maintain a favourable trade balance, allowing the country to continuously import essential industrial items and therefore to move forward with the Import Substitution strategy; moreover, it allowed for more significant spending in the military, an essential body to maintain control of the country; finally, it was a longstanding demand of the far-right movement *Ação Integralista Brasileira*, and therefore an attempt at appeasing the fast-growing organisation.

The reactions to the default, however, were different in the two major countries. While in the United Kingdom there was a great outrage at the moratorium, with plenty of editorials bashing the Brazilian position, the American reaction was much calmer and more nuanced. In fact, during the following two years, there were many attempts at restoring negotiations with Brazil and convincing the government to resume paying its debts. According to Abreu (1975), these attempts failed because "the United Kingdom did not dispose of enough bargaining power to impose a policy of better treatment of its financial interests. On the other hand, it was not in the United States' interest to enforce the payments since such procedure would compromise wider goals of its policy towards Brazil". In other words, the Brazilian default went unpunished by international markets

[6] Considered a major American foreign policy victory, the declaration produced at the end of the conference provided for a multilateral "consultation" between American countries to "to make effective their solidarity" in case of threat to the "peace, security or territorial integrity" of any American republic. In addition, this agreement further established the basis for the future entry of Latin American countries in World War II.

because the United States chose not to pursue retaliation. Once again, the reasons why this happened can be better explained through a game-theoretical analysis.

V.4 Theory: Debt Default Game

Players

In most aspects, this game is very similar to the Debt Renegotiation game presented above. However, in this scenario, there is no "proposal" from the British – in fact, the British are unable to do anything whatsoever. It all comes down to the actions of Brazil and the United States.

Actions

Brazil can either choose to A) continue paying its debt or B) declare a moratorium.

The United States can either A) retaliate or B) accept.

Payoffs

At this moment, let us consider that instead of S, the cost of American intervention is given by S^*, being S^* the newly updated loss of soft power that such an intervention would cause. It is natural to assume that $S^* > S$, given the new international scenario and the new prioritisation given by the Roosevelt Administration to its Latin American partnerships, in the light of the "Good Neighbour Policy".

In this case, let us consider that an American retaliation would cause a Brazilian loss of $-C$, while in the case of American omission, the Brazilian loss for defaulting would be $-c$, with $C > c$. We can then visualise the following table:

		United States	
		Pressure/Retaliate	Accept
Brazil	Maintain	0, -S*	0, 0
	Default	(D + d – C), (- d – S*)	(D + d – c), - d

Dominant Strategies

In this scenario, we can assume that *(D + d – c) > 0 > (D + d – C)*, implying that Brazil will have incentives to default in case the US does not retaliate. However, the decisions of both players are not simultaneous – in fact, we know America was able to send a signal to Brazil, anticipating its position (Abreu, 1975). In a mission to the United States, Brazilian minister Sousa Costa understood that while they opposed the moratorium, they would not effectively retaliate against Brazil.

To understand the American position, we must consider their expected payoffs given the two circumstances: if they choose to signal an intervention, their payoff would have been -*S**, even in the case of maintenance of payments. If, instead, they choose to accept the default, their payoff would have been -*d*. If we assume that the Americans attributed a probability p to the possibility that Brazil would follow their indication (i.e. if they signal tolerance, Brazil will default; otherwise, Brazil would remain disciplined), we would have the following possible payoffs:

Retaliate: $(1-p)*(-d-S^{*})+p*(-S^{*}) = -d-S^{*}+dp$

Accept: $p*(-d) = -dp$

For retaliation to the preferred strategy, the following would have to be true:

$$d + S^* < 2dp$$

It is easily seen that even for $p = 1$ (the United States is sure its recommendation will be followed), as long as $S^* > d$ the proposition cannot be accurate. Despite being Brazil's main trade partner, given the fact the United States was not the country's main creditor (with dollar loans representing less than 30% of the total Brazilian sovereign debt, according to Table 1), and also having in mind the high level of importance given to the "Good Neighbour Policy" in the late 30s, it is reasonable to assume that S^* was, indeed, perceived as larger than d by the American government. That would explain why they were lenient and accepted the Brazilian default.

S = {Default, Accept}

V.5 Contrapositive scenario: the case of Argentina

In order to test the validity of the previously presented games, it might be worthwhile to compare Brazil's situation to that of its neighbour Argentina. Similarly, Argentina also had an export-oriented economy, heavily dependent on the markets of industrialised countries. However, while Brazil's leading trading partner was the United States, Argentina's was the United Kingdom. Britain represented 30% of all Argentinian exports – compared to just 5% of Brazil's – and over ¾ of its meat exports (Abreu, 2020). In a sense, British bargaining power in Buenos Aires was "as great as" American power in Rio de Janeiro. Nevertheless, while Brazil had a relatively smooth path to renegotiate and later default its debt, the same did not occur with its southern neighbour.

Perhaps the leading cause behind this difference in paths is the Roca-Runciman Agreement of 1933, signed between Argentina and the United Kingdom. Elaborated in response to British plans to reduce its meat imports from Argentina, the deal was influenced by cattle interests, highly influential in Buenos Aires. They worked to make sure Britain would not decrease its meat imports; on the other hand, tariffs would be reduced for many British industrial products. As a result, the accord had severe adverse effects on the Argentinian economy, slowing down the recovery from the 1929 Crisis.

According to Abreu (1982):

> To the extent that Argentina's policies discriminated in favour of imports of British origin, they fostered the purchase of less competitive goods, at the expense of the Argentinian consumers or of the efficiency of domestic industry, or even the purchase of consumer goods at the expense of capital goods as Britain was an important supplier of capital goods. Indeed, it is a striking feature of Argentina's import bill that capital goods imports remained even in the good years around 1937 at least 30% below (in quantum terms) its pre-depression levels. This is at least partly related to the continued importance of consumer goods imports: textile imports (including inputs), for instance, remained in the second half of the decade roughly at the same quantum level of pre-depression years.

The negative effects of the Roca-Runciman Convention can ultimately be traced to Argentinian dependence on trade with Britain and to the deliberate choice of Buenos Aires to privilege exporter interests. While the Americans sought geopolitical goals within Latin America and allowed themselves to be more lenient with financial and trade agreements if it meant a closer political association, the UK was more interested in extracting the most they could for a favourable agreement. Instead of going by a "free trade for all" policy, as the United States attempted to put forward, London's slogan in Buenos Aires was "comprar a quien nos compra", demanding that Argentinian imports increase to match the country's exports to Great Britain. If those demands were not matched, Britain would probably not hesitate to use its Debts Clearing Offices And Import Restrictions Act of 1934, whose effects would have seriously damaged the Argentinian economy – a strategy that was simply not available in Brazil because of the reversed trade surplus.

Ultimately, while Brazil was successful in negotiating relatively good agreements and abiding by a free trade policy with the United States, “the opposite happened in countries where bargaining power benefited developing countries whose international economic policies were moving away from liberal principles regarding trade and payments, as illustrated by the case of Argentina" (Abreu, 2020). With the help of Game Theory analysis, it is possible to confirm this assertion, since in a situation where the United States did not care about "S" loss in soft-power – as it was the case of Great Britain in its relationship with Argentina – the rational decision would have been to make use of superior bargaining power to achieve better deals. The Argentinian counter-example, in that sense, reinforces the idea that political needs took priorities over economic interests when it comes to Brazil.

V.6 Conclusion: Foreign Policy and Sovereign Debt Management

The main conclusion we can draw from the 1934-37 period is that economic decisions, especially when it comes to governments, are never strictly economic. The three games depicted above showcase how, during the 1930s, the American policy towards Brazil was one of extreme leniency, tolerating both the compensation agreements with Germany and the 1937 default and avoiding excessive pressure in the 1934 debt negotiations.

At first, it might be hard to understand why America acted in such a way. Without game theory, one can make conjectures about what may have led them in such a direction. Other possibilities, however, such as the sheer incompetence of American officials or the high skill of Brazilian diplomats, could be discarded. Through a game-theoretical analysis, though, it is possible to understand how Washington's actions may have turned out to be entirely rational, at least based on the information they had available at the time. Essentially, Americans prioritised trade interests over financial ones – contrasting, for instance, with the British.

These cases generally illustrate how a country can profit from a favourable external scenario, such as the 1930s. In a world convoluted with the always-growing risk of war and the threat of bilateralism, the simple circulations of ideas that condoned these two processes represented a threat to the United States; in order to respond to such threat, they had to be more flexible with undisciplined countries. More generally, these cases display how a multipolar world, without a central worldview, may create room for more divergent policies, as there is less incentive to enforce orthodoxy.

VI. The 1943 Debt Settlement

VI.1 Historical Narrative: Rogue Negotiation

Two years after the 1937 moratorium, renewed pressure from America and Great Britain forced Brazil back to the negotiating table. By that time, Oswaldo Aranha had left his post as Minister of Finance but soon took on another office of the highest significance: the Ministry of Foreign Affairs. Under those credentials, when visiting America at the beginning of 1939, he promised Roosevelt's Secretary of State Cordell Hull that Brazil would resume its payments by July of that year (Abreu, 1975).

Although Vargas had never authorised such promise, the circumstances forced the government to begin negotiations, with a symbolic payment of 1 Million dollars being deposited at the agreed date. The conversations that followed had the participation of both American and British authorities, culminating in another temporary agreement, whereby Brazil would resume payments at 50% of the original values established during the 1934 Aranha Scheme. According to Abreu (1975), those were considered “relatively low”, a fact attributed both to the already discussed American benevolence towards its ally and to the fact that the other main creditors – France and Britain – were eager to receive any amount in the context of the recently outbroken war against Germany.

By 1943, however, Brazil's initiative occasioned new talks, this time due to the increase of Brazilian pound reserves caused by British imports aimed at sustaining the war effort. Artur de Sousa Costa, then the Brazilian finance minister, understood the moment to be ideal for solving the Brazilian debt situation and initially proposed to the British Council of Foreign Bondholders (CFB) a one-time payment of 26.5 million pounds to pay off part of the debt at a discount plus yearly payments of 7.5 million pounds for the remainder (First Proposal).

The brokering that ensued led to a further proposal, presented three months later in two equivalent options: option A meant yearly payments of $7.3 million (70% of the Aranha Scheme), with no one-time payment; option B had a one-time payment of 20.7 million pounds, enough to pay off $85.6 million of debt (around 40% of the total) at 24% of the full price, with the remainder being refinanced with an interest rate of 4%, through further annual payments of $8.1 million (Second Proposal).

Despite the concessions made by the Brazilian delegation, London remained unconvinced. The impasse persisted until June when Sousa Costa eventually let the American Department of State know of the negotiations that had already been on course for almost six months. This revelation caused immediate embarrassment for the CFB and, according to Abreu (1975), "was an important reason behind American resentments regarding the British in the negotiations that followed". The American proposal then radically scrapped the plans outlined in initial discussions, which were always modelled around the categories of the Aranha Scheme. Instead, they argued for rearranging the categories of interest payments, uplifting the status of American loans at the expense of London's.

The final agreement turned out to abolish the different categories of loans, significantly damaging British financial interests as they had been the primary beneficiaries of the original Aranha Scheme's classifications. Besides that, the final agreement followed the format of the Brazilian proposal, with two options: option A represented annual payments of 7.7 million pounds, while option B matched the ransom of a $79 million debt at the discounted price of $22.9 million (29%), with the remainder to be refinanced by bonds with an interest rate of 3.75% and cleared through annual payments of $8.4 million.

Even after an agreement was reached, tensions remained between British and American negotiators, with British authorities in general very upset about the downgrading of their status compared to 1934 or even to the more recent temporary scheme of 1940. The Americans, on the other hand, although able to impose their economic hegemony on Brazil[7], were still resented about being excluded from earlier talks. The Brazilian strategy, made clear when Sousa Costa let the Americans know of the ongoing discussions, was to stir conflict between the creditors, in such a way that would argue about their own shares in the final value instead of joining together against Brazil to increase the total of payments. However, argues Abreu (1975), "in every negotiation, the opposite would happen, with the difficulties aroused by the distribution of payments of dollar loans and pound loans would end up demanding larger total payments to work around the impasse". Thus, the final deal, albeit not entirely unsatisfactory for Brazilian authorities, was still far from optimal.

VI.2 Theory: Three Players Negotiation

The negotiation process that was just described can be divided into two phases: in the first phase, Brazil negotiated only with the CFB, presumably with the intent of arriving at a unified agreement with its largest creditor and then present it as a given to the Department of State; in the second phase, however, Americans are called into the bargaining table, and the talks happen simultaneously between three different parts. To better understand the events that took place, we will model those two different moments.

VI.2.1 Bilateral Negotiation Game

One way of transcribing a negotiation into Game Theory is a turn-based sequence of choices as if the two players are exchanging proposals in turn. This game will therefore take the shape of a sequential decision tree.

Players

[7] According to Abreu (2020), the Department of State had even stated that "the American ambassador in Brazil occupies a similar position to that of the British ambassador in Egypt".

The two players in this initial phase are the Brazilian government and the Council of Foreign Bondholders (CFB), associated with the British government.

Actions

For each round of proposals, the players have three options. They can either A) accept, B) offer a counterproposal or C) leave the negotiation; the game ends either when one side either accepts or leaves.

Payoffs

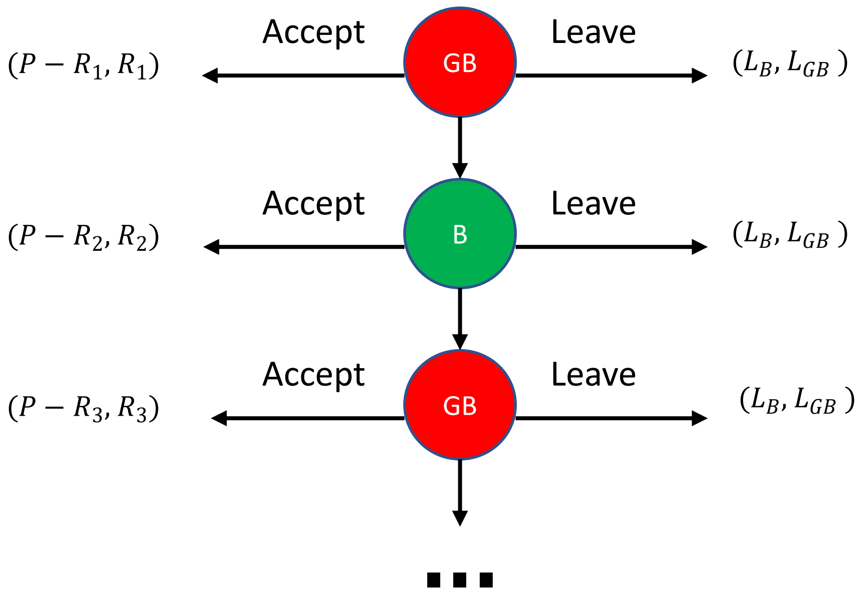
If we call the full Brazilian debt P, we can refer to the payoffs of Brazil and Great Britain, respectively, as $\boldsymbol{(P - R_n, R_n)}$, with R_n being the amount that would end up being paid to creditors. Therefore, the Brazilian goal is to minimise R, while the British will aim for the opposite.

However, since Brazil made the first move in the case we described, we can assume $R_1 < R_n$ for any value of n. Likewise, the first British counterproposal will have the largest possible value for R, with that $R_2 > R_n$ for any value of n. We can therefore define the possible values of R_n as $\{R_1, R_2\}$. Finally, this set must be discrete values; otherwise, the negotiation would go on forever.

Besides R_n, we must consider that Brazil and Great Britain have a specific payoff for leaving the negotiations, referred to as $\boldsymbol{L_B}$ and $\boldsymbol{L_{GB}}$. This means that any counterproposal which offers a payoff smaller than the payoff for leaving will cause the end of negotiations.

Moreover, since the sum of proposal payoffs can only be P, a situation whereas $L_B + L_{GB} > P$ means that the negotiations will necessarily fail – i.e. it is mathematically impossible that both players are satisfied with the agreement since the payoff for leaving will always overcome the payoff proposed for at least one of them.

Now that we have outlined some fundamentals of this model, we can move forward to the decision tree:



Dominant Strategies

As we can see, the two players will keep exchanging proposals until either both $P - R_n > L_B$ and $R_n > L_{GB}$ or until one of them realises this condition will never be met, in which case he will then opt out of the bargaining table.

That happened in June 1943, when Sousa Costa got in touch with the State Department to inform them of the talks going on up to this moment. In doing so, the Brazilian government was convinced that the expected payoff from leaving the bilateral talks would be greater than what they could expect from Great Britain. London, on the other hand, was not willing to lower its demands to meet an agreement.

VI.2.2 The Creditors' Dilemma

Once the new situation is set up, we have three players dealing with Brazil, the debtor, Great Britain and the United States, the creditors. While certainly much can be said about the best behaviour for Brazil in this scenario, we opt for investigating with more detail the dynamics of the relationship between the two creditors. In order to do so, we will use a version of the famous "Prisoners' Dilemma", where the two creditors can choose how they will behave at the bargaining table.

Players

The players are the two creditor countries, the United Kingdom and the United States, whose bondholders are represented respectively by the CFB and the State Department.

Actions

Each creditor has the option to A) collude, which means to act together with the other player in exerting pressure over Brazil to increase the total payment; or to B) collide, by which they would focus on the distribution of the Brazilian payment, entering in conflict with his fellow creditor instead of the debtor.

Payoffs

For the sake of simplicity, we will assume payoffs are symmetrical for both players. This means that if both players collude, they will receive the payoffs (R, R). Furthermore, if only player 1 chooses collusion, but player 2 prefers to collide, the payoffs would be (r, R*), and vice versa. Finally, in the case where both players choose to conflict, the payoffs are (r*, r*). In this scenario, R* > R > r* > r. Those payoffs can be summarised in the table below:

	United States	
	Collide	Collude

United Kingdom	Collide	r*, r*	R*, r
	Collude	r, R*	R, R

Dominant Strategies

We can observe that for each player, the action of **colliding** is strictly preferred over the action of colluding when the game is simultaneous. That happens because the payoff for collision is higher than that for collusion in every circumstance. That said, it is also clear that the situation where both players choose to collide does not yield them the better payoff – if they had both chosen collusions, they would have been able to increase the total payment, thus increasing their shares.

VI.3 Back to Narrative: an irrational decision?

Regarding the games we have just analysed, there are two primary questions to be made. Firstly, we want to understand why did the first game result in a failure of the bilateral negotiations and in Sousa Costa calling in the Americans, and if Brazilian and British representatives acted rationally in this matter. Then, we will investigate the outcome of the conflict between the two creditors in the later stage and how this outcome fits or does not fit our model.

To answer the first question, one must remember that the condition for the negotiations to fail was that $L_B + L_{GB} > P$, where L_B and L_{GB} represent the expected payoffs both players would get from putting an end to their bilateral talks. It is crucial to have in mind here that both values refer to **expectations** and, as such, may be frustrated by different results. In fact, when we analyse the further developments of the negotiation, it is not unreasonable to postulate that both Brazil and the United Kingdom ended up with worse results than they would have if they had reached an early agreement.

We know that is true to a certain extent to London by the British reactions to the deal, consistently negative, and by the scrapping that the system of loan categorisation that upheld the higher status of British bonds. In the Brazilian case, we have an indicator in the already quoted words of Abreu (1975), who describes a process where the discussions between the creditors would often result in stronger demands for the increasing of the total Brazilian payment.

In a sense, both countries' expectations must have been, therefore, detached from reality. In the British case, this is corroborated by the words of John Philimore, one of the British negotiators, who believed the CFB's position to be unrealistic, having previously argued that "the problem is not Brazil's ability to pay but the political hardships the government had to face in order to resume payments" (Abreu, 1975). Philimore understood that the Brazilian government "was not offering the deal due to some sentiment of moral obligation, but for strictly material reasons". Unfortunately for the British creditors, it seems, those wise considerations were discarded by the CFB, culminating in the failure of those initial talks.

On Brazil's side, on the other hand, it is not hard to imagine that Sousa Costa envisioned some sort of "prisoners" game playing out between Great Britain and the United States, as described. Brazilian authorities must have thought that by pitching the creditors against each other, it would have been possible to acquire a better financial deal, especially given that the resentment caused by the secret conduct of prior talks would further doom any possibilities of cooperation. Because they worked with this favourable scenario, Brazilian negotiators probably expected a better payoff than what they managed to in the end.

That expectation brings us to our second question: whether real-world results fit the Creditor's dilemma outlined in the previous section. In that sense, it must first be recognised that the Brazilian strategy did work to some extent. By sowing antagonism between the creditors, they caused London to deal with large losses, probably acquiring a much better result than if both parties were colluding from the beginning. However, one major flaw in the Sousa Costa's decision was that debt negotiations are not a simultaneous game. Instead, proposals tend to go back and forth for months before a final deal is agreed upon, giving the creditors plenty of time to align their incentives and to overcome the initial resentment with the view of cooperating and yielding better results. As Abreu (1975) pointed out, that was to a certain extent what happened, with the disagreements between the two creditors often fueling their demands for increased payments from Brazil.

VI.4 Conclusion: human actions, human failures

In this chapter, we went through two different examples of how Game Theory may not always lead to the optimal decision for players. That happens because models are not – and cannot be – perfect representations of reality. At most, they are very rough approximations and mental frameworks that help us understand complex events. However, since human action is much more complex than any mathematical abstraction can capture, those kinds of failures and miscalculations will always be part of the economic science – and Game Theory is no exception to this rule.

The two games we explored here displayed some of this technique's vulnerabilities: first, even if actors were entirely rational, they would still be bound to the information they have at their disposal and their beliefs about the information others have at their disposal. The talks between British and Brazilian authorities illustrate this point since the British seem to have imputed on their counterparts a different value for how much they were willing to pay. As we have analysed, those assumptions led to the failure of the initial bilateral negotiations, which in turn caused the Americans to sit at the bargaining table and ultimately worsen the situation of both initial players.

Besides those issues, the second stage of negotiation also calls attention to irrational factors in decision-making. Thus, for example, while collusion between London and Washington certainly happened to a certain extent, it is not difficult to imagine that they could have extracted better conditions from Brazil if not for the antagonism between them that the initially secret talks provoked. Even then, however, Sousa Costa's calculations were also imprecise and may have resulted in a non-optimal result. The upshot here is that Game Theory is by no means an exact, failproof science, but rather a schematic and simplistic, although undoubtedly practical, way of understanding and explaining human behaviour.

VII. First Lessons

VII.1 Recapitulating

The last three chapters went through five different Game Theory models that dealt with debt negotiation. Firstly, analytical methods were used to understand the failure of the Brazilian Funding Loan of 1931, the third in a sequence of attempts to rearrange the country's finances. A simple sequential model in time allowed for the verification of some essential premises of the current literature on debt restructuring – for example, institutions with a lousy reputation as debtors will have a more challenging time getting access to new credit.

After concluding the analysis of the third Funding Loan, it was possible to move on to a deeper understanding of the Aranha Scheme that worked from 1934 to 1937, understood as a sequential game in two steps, where creditors had to balance their desire for payment with political and even geopolitical considerations. Through both the episode of the Aranha Scheme and the Brazilian default of 1937, it was possible to confirm an implicit premise of the narrative regarding American foreign policy of said period: that the political need to maintain friendly alignment of fellow countries in the Americas often took the upper hand over financial and commercial interests. In that sense, both analyses also attempted at balancing quantifiable and unquantifiable variables – such as monetary payments and soft power.

Finally, the developments that led to the final Debt Settlement Agreement of 1943 illustrated reasons why negotiations may fail or not go the way some of its parties planned. Because of different beliefs and ways of describing reality, players can reach different conclusions regarding what they should expect from a possible deal. Those miscalculations are singled out as culprits behind the inability of the Brazilian and the British delegations to reach a satisfactory agreement at an earlier stage, as both sides ended up committing strategic mistakes that might have costed a better agreement in the end.

In general, the analyses developed illustrate the explanatory power of Game Theory, helping, as Greif (1998) would say, the move from "thick" to "thin" forms of reasoning. Moreover, they allow for further assessments regarding the historical context studied. For instance, they tell the reader about Brazil's position in the global economy during that period, when it played a role of an underdeveloped but sovereign country, able to negotiate on relatively equal footing with the world's major powers and to aptly – albeit imperfectly – exploit their conflicts of interest to its benefit. During the Vargas period from 1930 to 1945, Brazil rearranged its sovereign debt, using a mix of sharp-witted diplomacy, political manoeuvres, sound economic management, and, of course, some luck. While there were undoubtedly some flaws along the way, it is fair to say that Brazil could enter the Post-War World in much better shape than other countries, like its neighbour Argentina.

Finally, the analysed episodes also reveal or confirm necessary premises behind the theory and practice of debt renegotiation. Issues like the impact of previous default history (Bullow, 1988), the coordination between creditors (Wright, 2005), and the political implications of negotiation between weak and strong powers (Varoufakis, 1997) have been on the minds of both creditors and debtors for years, provoking never-ending discussions and constantly renewing approaches. Hence, while the conclusions taken in this article are by no means definitive, they do strengthen or weaken specific interpretations, at least for the Brazilian case.

VII.2 The test of time: how general the insights are?

According to the Analytical Narratives method, there are five questions that one must answer to evaluate the quality of the theories he may present. While I made an effort to answer the first four ones, concerning issues like facts, data and premises, throughout this paper, it remains open the question of how general – and, therefore, how useful – the explanations are. Attempting to answer this question, we will briefly look into another period of Brazilian History: the 1990s.

Fifty years later, Brazil's debt was once again out of control and posing a serious threat to the country's economic and political stability. Brazilian debt began to increase soon after the 1943 settlement, reaching new heights during the military dictatorship (1964-85). By the early 80s, high levels of debt accrued to finance parastatal corporations and infrastructure projects, coupled with the raise in the US Federal Reserve rates, generate a spike in inflation as the national budget became entirely consumed by interest payments (Galano, 1994). Despite that, the decade was marked by unsuccessful attempts at dealing with the twin evils of inflation and debt, which persisted until the 1989 Brady Plan, unveiled by the American government.

In the early 90s, specially during the Collor and Franco administrations (1989-94), successive talks were conducted with the iMF, international banks, and creditors, aimed at restructuring the country’s sovereign debt. It was only when former World Bank economist Pedro Malan was charged with leading the negotiations by 1991, however, that talks began to move forward. Subsequent failures of Brazil’s economic recovery plans however kept undermining the international financial community’s trust in Brazil, and so it was only by 1994 that Malan, then Central Bank Governor, together with then Minister of Finance Fernando Henrique Cardoso, was able to strike a definitive deal with bank creditors – even without support of the IMF, still sceptical about then recently introduced “Plano Real”(Boughton, 2012)

There are remarkable differences between this second series of negotiations in the 90s and the one analysed in more detail in this thesis. While, in the 1930s, Brazilian authorities mainly negotiated with British and American bodies – as the two countries alone corresponded to around 95% of the Brazilian debt – by 1990, the world was much more globalised, and the economy was more diversified and integrated. Negotiation then took place with global banks and their investment boards, as well with the IMF, a multilateral institution that didn't even exist when the 1943 Debt Settlement was reached. To countries like Brazil, this might have represented a setback, as the IMF remained controlled by developed countries and its centralized nature allowed it to make imposing demands over debtors, such as requiring the adoption of certain fiscal policies as a precondition for getting loans needed for restructuring the sovereign debt (Galano, 1994). Moreover, there were no dilemmas regarding international trade, such as the conflict between bilateralism and multilateralism that had opposed Washington and Berlin in the past. The newly created World Trade Organization (WTO) meant that countries had to comply with the same rules, drastically reducing the space of manoeuvres such as the compensation agreements championed by Hjalmar Schacht.

On the other hand, many conclusions from the 30s still stood. The most universal might be that debtors with bad reputations have the hardest times when trying to reach agreements. Like in 1931, when the new Brazilian government struggled to negotiate the third Funding Loan, the new administrations that succeeded the Military Dictatorship faced investors and international organisations' low confidence. Besides, the political aspect of debt restructuring also remained relevant, as the IMF conditionality requirements eventually ushered a new wave of Anti-Americanism in Latin America. Finally, most general conclusions such as that debtors can benefit from having disagreeing creditors (and suffer when they're united), or that negotiators are prone to misjudgements, seem to remain valid. All in all, even as circumstances change some insights from the 30s could also be deducted through a closer look to the 90s, and vice-versa, attesting to the generality of such explanations.

VIII. Conclusion

The paper attempted to reframe historical negotiations regarding the Brazilian sovereign debt through Game Theory, identifying specific situations and distilling the incentives and motivations at work. The conclusions taken from the theoretical frameworks were in line with the current historical consensus and shed light on issues such as debtor reputation, competition between creditors, misaligned expectations, and political interference – topics that have long occupied the minds of those who study and practice debt renegotiation.

With the help of games, the failure of the 1931 Funding Loan is explained by, in part, Brazil's reputation as an unreliable debtor, attempting to contract its third restructuring in little more than three decades. The three-year Aranha Scheme of 1934 and the subsequent default that followed the *Estado Novo* coup of 1937 were analysed through the prism of great powers competition, confirming Abreu's (1975, 2020) view that Brazil benefited from American geopolitical and ideological interests, notably regarding the conflict with Germany. Finally, the negotiations of the 1943 Debt Settlement Agreement were explored as examples of human miscalculations that harmed the interests of Brazil and Great Britain. The negotiator's inability to correctly evaluate their payoffs or anticipate each other's actions led to unproductive conversations and ultimately suboptimal results.

When contrasted with the period from 1989 to 1994, when Brazil again attempted restructuring of its sovereign debt, the most remarkable shift is the emergence of multilateralism and international organisations, although those in many ways corresponded to American interests. A brief look at how those talks went on reinforced certain observations, regarding, for instance, the role of reputation and of matching beliefs to achieve a deal; at the same time, some conclusions from the earlier period were no longer applicable in the same way, especially those concerning the effects of great powers competition and conflict between creditors.

However, in a moment when many political commentators point to the re-emergence of a multipolar world and the weakening of liberalism as an international framework (Maçães, 2021), it is not unreasonable to expect the world to resemble a bit more the 1930s – although, hopefully, without the threat of a new World War. By 1930, Great Britain had begun relinquishing its global role as a promoter of free trade; many warn that the same might be happening right now with the United States. Moreover, with tensions between America and China escalating and new powers like India and the European Union wanting to make their voices heard, the next few decades may be set for a rebirth of bilateralism and great powers competition – that is not to mention the new problems arising from Covid.

Furthermore, some lessons to be taken are also valid in the current status quo. Most importantly, the need for having a solid reputation with international creditors may prove fundamental for Brazil's economic recovery. With the country's sovereign debt reaching a new high after the recent health crisis, foreign and domestic investors must trust and respect the Brazilian government and its conduct of finances. Likewise, lessons about the harmful effects of mismatching beliefs remain as accurate as ever. Rather than proclaiming idealist mottos, it is crucial to face the economic and geopolitical situation with realism, understanding Brazil's strengths and weaknesses. Further Game Theory analyses of current economic agreements on the international stage will certainly be relevant to overcoming Brazilian present and future challenges.

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