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Financial Results of the Renegotiation of Law 9.496

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ABSTRACT

This paper updates previous estimates of the financial results of the renegotiation of state debts promoted by Law 9496 of 1997. It takes into account not only the larger data set, but also the changes that the original contractual conditions have undergone since they came into force, which included changing the charges and lengthening the payment periods. It was observed that under the original conditions the refinancing of debts would achieve a positive financial result for the Union, and that the contractual changes promoted by Complementary Laws 148 and 156 were decisive in reversing this expectation, especially the former.

Keywords: Debt Refinancing, Fiscal Federalism, Public Finances.
JEL: H63, H74, H77

SUMMARY

1. INTRODUCTION

The aim of this study is to estimate the financial result of the renegotiation of state debts that resulted from the approval of Law 9496 in 1997. This estimate will be calculated according to the original format of the contracts, but also by assessing the impacts resulting from the two main changes that the original contractual conditions underwent: the change in debt charges, promoted by Complementary Law No. 148 of 2014, and the extension of their terms and temporary suspension of payments, made possible by Complementary Law No. 156 of 2016.

Estimating the financial result of this renegotiation has already been done in other studies, such as Rigolon and Giambiaggi (1999), Silva *et al* (2013) and the one carried out by the Secretariat for Economic Policy (SPE, 2019). The calculations in this study complement the previous studies in some respects: with regard to the first two, in particular, the estimates made here have the advantage of using a greater amount of data; with regard to the last two, they present consolidated results for the entire contractual flow, rather than an accumulated position up to a given moment; and with regard to the first and last, the calculations are made individually by state, allowing distributive effects to be gauged.

The most recent of the three previous studies, prepared by SPE, made an initial analysis of the consolidated impact of the approval of Complementary Laws 148 and 156, which in this study will be done individually, by complementary law, which will allow us to assess the particular relevance of each one.

In the work by Rigolon and Giambiaggi (1999), the authors estimated that the refinancing of Law 9.496 would guarantee the states a subsidy of between R$109.2 billion and R$159.6 billion[1] in December 2021 values, depending on the hypothesis for the trajectory of the discount rate used, which was Selic. This rate was forecast to vary, in real terms, between 6% and 9% per year until the end of the contracts. The authors made this estimate by calculating the net present value of a contract representing the entire renegotiation, using a weighted average of the different contractual interest rates.

In Silva *et al* (2013), the authors made an individualized calculation by state, which made it possible to extract some information about the distributive effect of these debt renegotiations. The calculation was made using only realized data, updating to future value the realized financial flow of the contracts up to the end of 2011 using the Selic rate and then comparing the debit balances found with those in force in the contracts. The authors concluded that the

1 Between R$26 billion and R$38 billion in average 1998 values.

Union's subsidy to the states, accumulated up to the end of 2011, would be R$451.2 billion[2] in December 2021 values.

The third paper, by SPE (2019), measured the cost of this refinancing for the period from 1997 to 2018, comparing the interest and amortization paid by the Federal Government on its debt securities with the installments paid by the states to the Federal Government in the same period, concluding that the difference between the two flows was R$ 476.0 billion[3] in December 2021 values.

In this latest study, the authors also measured the impact of the changes made to contractual charges and terms, as well as the temporary suspension of payments. This impact was measured by simulating the flow of receipts for the Federal Government if the original conditions were maintained, and comparing it with what was observed as a result of the approval of both rules. As a result, they found that the contractual changes implied a reduction of R$92.9 billion [4], in December 2021 values, in the total payments from the states to the federal government between 2016 and 2018.

The advantage of revisiting these calculations after the second decade of the contracts has ended, even when calculating according to the original conditions, is evident in the seminal work by Rigolon and Giambiaggi (1999). In that study, the hypothesis used for the range of real interest rates, used to discount the financial flow to present values, was not verified for the first twenty years and the real interest rates in the economy seem to have changed structurally for the rest of the contract period.

In relation to the work by Silva *et al* (2013), the calculation made here will also be individualized by state, but will cover the entire contractual period, as done by Rigolon and Giambiaggi (1999), so it is not a calculation of accumulated results up to the moment of calculation, as was also the work of SPE (2019), but an estimate for the financial result of the entire contract. In addition, this study analyzes the effects of contractual changes made after the study by Silva *et al* (2013).

As for the work by SPE (2019), it was calculated using data up to the end of 2018, in an approach similar to that of Silva *et al* (2013), then correcting the flow of payments and receipts from the Union for inflation. The study carried out here, therefore, differs in that it makes estimates for the complete contractual flow, as well as individualizing the results by state. With regard to the financial effects of the approval of Complementary Laws 148 and 156, which in

2 R$249.7 billion in December 2011 values.
3 R$396.1 billion as of December 2018.
4 R$77.3 billion as of December 2018.

the study by this Secretariat were calculated jointly, in this study the impacts of each regulation could be distinguished.

Unlike the first two previous studies, which used only the Selic rate as the discount rate, we will present some of the arguments found in the literature to support the preference for using a discount rate that more appropriately reflects the Federal Government's financing cost, rather than the monetary policy rate. The calculations were then made using two measures of the Union's financing cost as the discount rate, in addition to the Selic rate. In this respect, the calculation is similar to that carried out by SPE (2019) which, by comparing the flow of receipts from the Federal Government with the flow of payments for servicing the bonds issued to take over the state debts, implicitly incorporated a discount factor closer to the Federal Government's funding cost into the calculation.

This paper also provides explanations of the main techniques used in the literature to estimate the financial result of credit operations, as well as a detailed description of the calculations made to calculate the financial results of the renegotiation of Law 9496.

The relevance of carrying out studies like this is based on the magnitude of the state liabilities managed by the Federal Government as a result of this renegotiation, as well as its vertical and horizontal distributive effects between the spheres and federal entities. It provides an up-to-date calculation of the financial results of these contracts, as well as an individualized assessment of the impacts on these results of the two main changes made to the original contractual conditions since they came into force.

The rest of the paper is divided as follows: section 1 summarizes the main characteristics of debt renegotiation promoted by Law 9496, as well as the main changes it has undergone over time; section 2 reviews the literature on estimating the financial results of credit operations, drawing on discussions about government credit subsidies and detailing some of the main techniques used; section 3 presents the methodology adopted; section 4 presents the results found and section 5 concludes the text.

2. THE DEBT RENEGOTIATION OF LAW 9.496 AND ITS MODIFICATIONS

On September 11, 1997, Law 9496 approved a renegotiation of regional government debts, which, despite being aimed only at the states, would become the largest renegotiation of subnational public debts to date.

This law authorized the federal government to take over and refinance securities debts

issued by the states, as long as they were issued by March 31, 1996, or, if issued after that date, only if they constituted a simple rollover of previous debts and had been placed on the market by December 31, 1998. Other debts, less significant than these, could also be included in the renegotiation, at the federal government's discretion.

The total debts taken on by the Union between May 1997 and October 1999 amounted to R$95.3 billion, representing 9.6% of GDP at the time, or R$401.7 billion in December 2021 values. Not all of this amount was collected from the states, as will be seen below, and over the course of the contracts the outstanding balances of various other debts were incorporated into those of Law 9,496. As a result, in December 2021 the outstanding balance of these contracts still represented 6.4% of GDP.

Within the scope of this renegotiation, the amounts to be paid by the states were divided into one installment to be paid in 360 monthly installments, calculated using a Price Table, and another to be amortized extraordinarily, even in the first years of the contract, through the sale of assets or offsetting of credits with the Union.

In the contracts signed between the parties, the charges varied according to the states' choice as to the percentage of the outstanding balance to be paid off extraordinarily. In all cases, the portion of the charges relating to monetary restatement would be indexed to the IGP-DI, but interest could vary between the minimum rate of 6% per year, reserved for states that agreed to pay off 20% of the outstanding balance early, and the maximum rate of 9% per year, for those that chose not to make any extraordinary payment. The majority of states agreed to pay off 20% of the outstanding balance, and only Alagoas, Minas Gerais and Pará signed contracts with annual interest of 7.5% per year, which resulted from their option for an extraordinary amortization of 10% of the outstanding balance.

The value of the debts assumed by the federal government did not correspond to the initial debit balance of the contracts signed with the states, since the law provided for a benefit for debtors by determining that, in order to calculate the amount to be refinanced in relation to the assumption of securities debts, the financial conditions of the refinancing contract had to be backdated to September 30, 1997, while for the other obligations these same conditions could be backdated by up to 120 days, and the federal government would be responsible for covering any difference between the charges of the debts assumed and those of the new refinancing contracts.

Thus, since the law was passed in September 1997, the charges in the refinancing contract immediately became valid for the eligible obligations of the states that subsequently opted for

renegotiation, and any delay in calculating the debit balance and signing the contracts would result in costs to be borne by the Union, since the debts being assumed invariably had higher charges than those provided for in the renegotiation. The differences between the amounts of the debts assumed by the Federal Government and the initial debit balances of the refinancing contracts amounted to R$7.2 billion at the time, which was equivalent to R$28.4 billion in December 2021 values.

Among the benefits of the refinancing contract, the aim was to ensure that its installments would not overly compromise state budgets, replicating for these contracts the limitation of the value of the monthly installments to a percentage of the concept of Real Net Revenue, which had been created in a previous renegotiation, promoted by Law 8.727 in 1993.

The monthly limits on the commitment of Real Net Revenue to service the new debt could vary between 11.5% and 15% of the monthly average of this reference measure and the amounts that exceeded this limit would have their payment postponed, with the financial charges for default being levied on them, and at the end of the originally planned 360-month term, they would be paid under the same conditions over a further 120 months. In this case, the installments could not be lower than the last installment of the original contract.

Expenses incurred by the state in the previous month on servicing its debts refinanced on the basis of Law 7.976, art. 58 of Law 8.212, Law 8.620, as well as debts paid in installments to the FGTS resulting from the refinancing of Law 8.727, debts owed by its financial institutions to the Central Bank of Brazil or foreign debts contracted up to September 30, 1991 could also be deducted from the monthly commitment limits. When applicable, the deduction would also apply to indirect public administration debts that fall within this list. All of these debts, therefore, took precedence over the Law 9,496 contract, making the accumulation of residue, as the excess value of the installments over the commitment limit became known, common and detrimental to the amortization of the contracts.

Table 1 - Original Contractual Conditions of Law 9.496 by State

	UF	Data de Assinatura	Prazo (anos)	Limite de Comprometimento da RLR	Encargos	Valor Refinanciado (R$ 1,00)	Valor Assumido pela União (R$ 1,00)
Norte	AC	30/04/1998	30	12%	IGP-DI + 6,0% a.a.	18.226.892,53	19.252.285,34
	AM	11/03/1998	30	12%	IGP-DI + 6,0% a.a.	120.000.000,00	120.000.000,00
	PA	30/03/1998	30	15%	IGP-DI + 7,5% a.a.	261.160.017,16	274.495.064,33
	RO	12/02/1998	30	15%	IGP-DI + 6,0% a.a.	115.164.369,75	118.109.009,46
	AP						
	RR	25/03/1998	30	12%	IGP-DI + 6,0% a.a.	6.601.029,01	7.245.308,54
	TO						
Nordeste	MA	22/01/1998	30	13%	IGP-DI + 6,0% a.a.	236.502.145,31	244.312.662,72
	PI	20/01/1998	15	13%	IGP-DI + 6,0% a.a.	240.522.006,80	250.654.937,41
	CE	17/10/1997	15	11,5%	IGP-DI + 6,0% a.a.	102.916.824,76	102.916.824,76
	RN	26/11/1997	15	11,5% a 13%	IGP-DI + 6,0% a.a.	56.479.921,47	56.479.921,47
	PB	31/03/1998	30	11% a 13%	IGP-DI + 6,0% a.a.	244.255.759,02	265.472.243,61
	PE	23/12/1997	30	12%	IGP-DI + 6,0% a.a.	137.382.613,70	143.452.725,28
	AL	29/06/1998	30	15%	IGP-DI + 7,5% a.a.	648.241.932,87	677.887.265,64
	SE	27/11/1997	30	11,5% a 13%	IGP-DI + 6,0% a.a.	355.163.152,56	355.163.152,56
	BA	01/12/1997	30	11,5% a 13%	IGP-DI + 6,0% a.a.	883.010.307,88	935.848.442,31
Sudeste	MG	18/02/1998	30	6,79% a 13%	IGP-DI + 7,5% a.a.	10.184.651.441,68	11.776.439.733,97
	ES	24/03/1998	30	13%	IGP-DI + 6,0% a.a.	387.308.867,44	429.887.648,69
	RJ	29/10/1999	30	12% a 13%	IGP-DI + 6,0% a.a.	15.246.423.172,58	18.536.808.277,61
	SP	22/05/1997	30	8,86% a 13%	IGP-DI + 6,0% a.a.	46.585.141.741,68	46.585.141.741,68
Sul	PR	31/03/1998	30	12% a 13%	IGP-DI + 6,0% a.a.	462.339.013,75	519.944.406,98
	SC	31/03/1998	30	12% a 13%	IGP-DI + 6,0% a.a.	1.390.768.793,06	1.538.566.467,70
	RS	15/04/1998	30	12% a 13%	IGP-DI + 6,0% a.a.	7.782.423.448,28	9.427.324.980,43
Centro-Oeste	MT	11/07/1997	30	15%	IGP-DI + 6,0% a.a.	776.268.937,42	776.268.937,42
	MS	30/03/1998	30	14% a 15%	IGP-DI + 6,0% a.a.	83.188.582,36	180.705.419,40
	GO	25/03/1998	30	13% a 15%	IGP-DI + 6,0% a.a.	1.175.158.331,98	1.352.456.623,37
	DF	29/07/1999	30	13%	IGP-DI + 6,0% a.a.	642.272.367,31	647.983.876,23
Total						**88.141.571.670,36**	**95.342.817.956,91**

Source: Mora (2016) and Law 9496 refinancing contracts. Own elaboration.

Table 1, adapted from Mora (2016) with the addition of some information, shows the original contractual conditions signed between the states and the Union. It should be noted that only two states chose not to renegotiate their debts under the terms of Law 9.496. Amapá was one of them; however, it later had a debt, originally set up under the Program to Encourage the Reduction of the State Public Sector in Banking Activity (PROES), converted to a contract along the lines of Law 9,496. The last two columns show any differences between the amounts refinanced and the debts assumed by the Union.

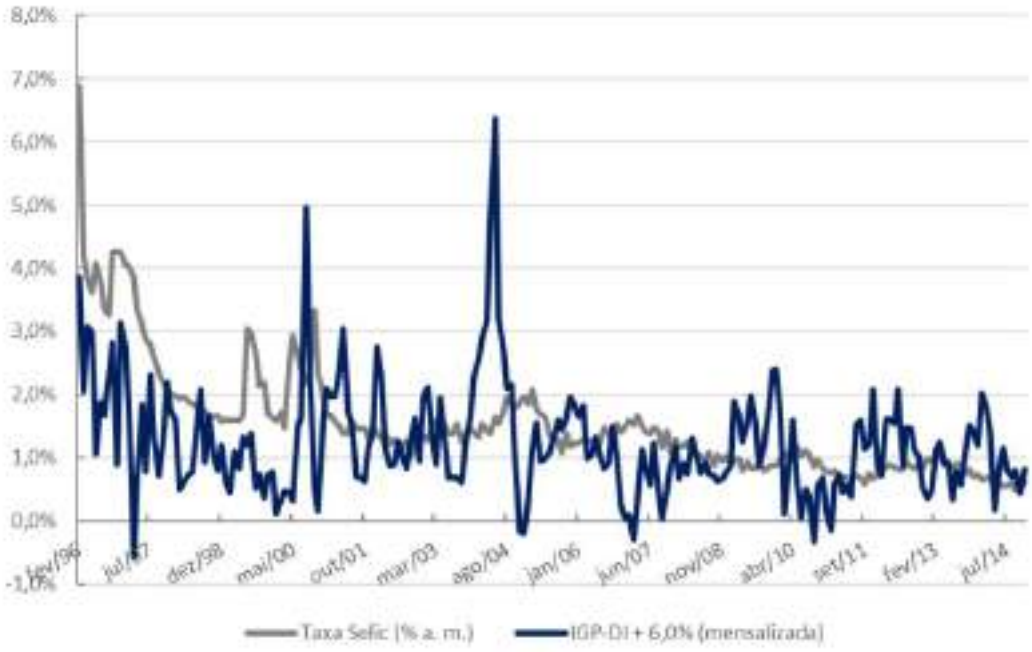
The debt conversion mentioned for Amapá was not a particular case. Shortly after the approval of Law 9,496, it was approved in 2001 that the credits constituted under PROES, which involved the disbursement of amounts by the Federal Government to finance the reorganization of state public banks, could be incorporated into the debit balances of Law 9,496 contracts, increasing the importance of this refinancing program in the balance sheets of state governments and the Federal Government.

2.1 First Significant Change: The New Charges

Towards the end of the 2000s, a structural change in the Brazilian economy's basic in-

terest rate began to take hold. The rate dropped significantly compared to the first years of the Real Plan, when the Law 9,496 contracts were signed and high real interest rates prevailed. The state governments, realizing that the monthly variation in the charges levied on their refinancing contracts was beginning to exceed the variation in the monetary policy rate, as can be seen in Figure 1, began to exert legislative pressure to modify these costs, and the federal government, fearful that the state governments would resort to foreign loans to pay off these refinancing contracts early, agreed to revise the contracts.

Figure 1 - Selic Rate vs IGP-DI + 6% per Year (Monthly Variations)



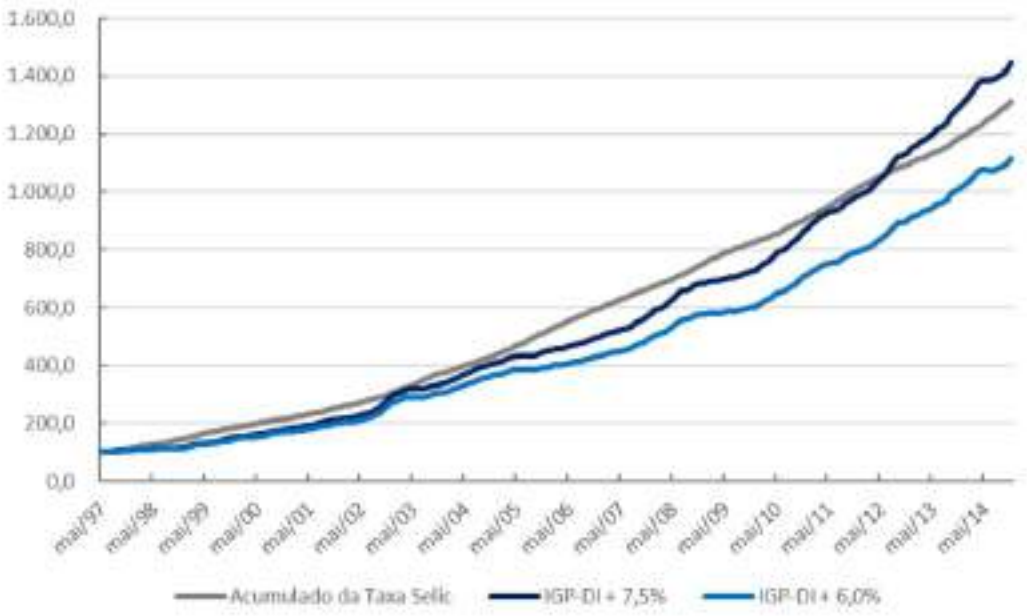
Source: IPEADATA. Own elaboration.

As a result of these new negotiations, Complementary Law 148 was approved on November 25, 2014, which determined that the Federal Government should adopt, retroactive to January 1, 2013, new financial conditions for Law 9496 contracts, whose charges would now be made up of interest of 4% per year applied to an outstanding balance monetarily restated by the IPCA, as long as these charges did not exceed the Selic rate.

In addition, it was stipulated that the Federal Government should grant discounts on the outstanding balances of the Law 9,496 contracts in an amount corresponding to the difference between the amount of the outstanding balance existing on January 1, 2013 and that calculated using the accumulated variation in the Selic rate since the signing of the respective contracts. In other words, the entire cash flow of the operations, including the payment of default interest,

should be updated by the Selic rate accumulated on that date, and the difference to the outstanding balance of the contract written off.

Figure 2 - Accumulated Variation of the Selic Rate and State Contractual Charges



Source: IPEADATA. Own elaboration.

It was thought that applying the Selic rate to contracts would result in a discount on the outstanding balance, but this was not the case. Only a few states actually received a discount, often not very substantial and reflecting the difference in *duration* between those who did or did not use the commitment limit and did or did not incur default interest. In most of the contracts, capitalization at the Selic rate would have resulted in higher debit balances on January 1, 2013. This can be inferred from Figure 2, which shows the evolution of three indices based on the date the first contract came into force (São Paulo's, in May 1997) and which evolve, up to the date of approval of the Supplementary Law in question, according to the Selic rate and the types of charges that were adopted in the states' contracts.

Only the IGP-DI + 7.5% charges levied on 3 of the 25 state contracts even exceeded the accumulated Selic rate, but only in July 2012, remaining above the monetary policy rate for a very brief period until the new charges came into effect (January 2013).

2.2 Second Significant Change: Longer Deadlines

At the end of 2016, the country was suffering from a second consecutive year of a substantial drop in economic activity, affecting families, companies and government revenue at all levels.

In this context, state governments were supported by the approval of Complementary Law 156, which once again altered the contractual conditions of the debt refinancing promoted by Law 9496. Under this complementary law, states that wished to could amend their contracts to extend payment terms by 240 months, with financial effects applied from July 1, 2016.

In addition to the reducing effect that the lengthening of the terms naturally has on the value of the installments, it was considered appropriate to also ensure more substantial cash relief for the states, albeit temporary, which consisted of an extraordinary 100% reduction in payments between July and December 2016, with this discount being progressively reduced, in a linear fashion, from January 2017, until in July 2018 the installments were paid in full again. The interest that was no longer paid each month was added to the outstanding balance.

Finally, Complementary Law 156 also extinguished the limit on the commitment of revenues to debt service, which was in force for the payment of installments under Law 9496 contracts, resulting in the consolidation of the original and residual debt balances. From then on, the states would have to pay the full amount of the installments, the impact of which would be softened by recalculating the installments based on the new, longer term.

3. CALCULATING FINANCIAL RESULTS IN GOVERNMENT LOANS

The work on measuring the results of government credit policies and their budgetary recording is largely derived from the economic and financial literature related to the pricing of credit operations and guarantees. Three main methodological alternatives can be identified: i) calculating the net present value of the operation's cash flow; ii) measuring the value of the operation using the fair value accounting criterion; and iii) estimating the value of the operation based on option pricing methods.

Among the texts dedicated to this subject, there is a predominance of works focused on analyzing US government credit operations. Among these, those involving public housing credit, extended through the nationalized mortgage companies *Fannie Mae* and *Freddie Mac*, as well as those related to student credit operations, and credit operations extended to large companies in financial difficulties, such as car manufacturers and financial institutions, predominate.

Since the approval of the *Federal Credit Reform Act* (FCRA) in 1990, the US federal government has adopted its own systematic methodology for measuring the financial results of these operations. Despite this, *the Congressional Budget Office* - CBO, the legislative body that inspired the creation of the Independent Fiscal Institution in Brazil, has presented criticisms and suggestions for improving this methodology, becoming an important player in research on the subject.

3.1 Net Present Value Method

With the approval of the FCRA, the US federal government adopted the first of the three methodologies mentioned above - based on the calculation of net present value - to enter the values of loans and guarantee concessions in its budget. Detailed explanations of this method can be found in the following two texts: CBO (2004 and 2012).

The general idea is to bring the entire financial flow of loan contracts to present value, using the yield curve of sovereign debt securities as the discount rate. As will be seen below, there is no consensus on the parameters adopted in the application of the method, with discussions mainly regarding the most appropriate discount rate to be used.

Prior to the approval of this regulation, the US federal government's loan and guarantee operations were accounted for on a cash basis, with only the financial flows expected to occur in the respective year being recorded in the budget. These flows would be those arising from both operations already underway and those that would be granted in the reference year.

After the FCRA was approved, financial flows, including disbursements and interest and amortization payments, were converted to present value and the net result posted in the year the operation materialized. In practice, this change implied replacing the cash criterion with the accrual criterion for the budgeting of these operations.

By making the budget intertemporal, this method made the financial result of the loan operations being extended clearer, indicating whether the government would incur gains or losses when carrying them out, and to what extent. Any credit subsidies would be shown in the budget whenever the net result of the operations was negative for the government.

It should be noted at this point that the subsidy implicit in a loan granted directly by the government, and that resulting from the granting of a guarantee by the government on a loan extended by a third party, are always the same if carried out under the same terms and with the same credit risk. CBO (2004) provides an example of this equivalence.

Since these two types of operations are essentially the same in terms of financial results for the government, one of the advantages of approving the FCRA is that it eliminated the favoring of the option of granting guarantees over direct loans. This was because, under the cash accounting criterion, granting a guarantee appeared to be less costly for the government, as it did not generate a large initial outlay, perceived in the budget as an expense.

Here in Brazil, the federal government also grants loans and guarantees as a way of reducing the cost and increasing the availability of credit for certain uses considered beneficial to society. Examples of these types of operations include certain BNDES financing lines, such as the Investment Sustainability Program - PSI, as well as government student and housing credit programs. Among these operations, the financial result of the PSI is calculated periodically by the National Treasury Secretariat[5] using a method similar to that recommended by the FCRA, a description of which can be found in SPE (2015).

Although the approval of the FCRA represented an advance in relation to the way credit operations had been accounted for in the US up to that point, the CBO has questioned the methodology (CBO, 2004 and 2012). The agency points out, among other things, that by discounting the future cash flow of the operations by the interest rate on US Treasury bonds, as recommended in the regulations, the financial result estimates would exclude the cost of the market risk inherent in the operations and, therefore, would be underestimating their real fiscal cost.

The justification for using risk-free rates to discount cash flows on public loans, according to the CBO, would derive from the conclusions of the work of Arrow and Lind (1970). In this study, the authors argued that the cost of assuming risks in public investments is insignificant when these risks are assumed by the general public, as a consequence of broad diversification. For this reason, the government should not take the problem of uncertainty into account when assessing the net present value of its investments, which would also imply using risk-independent discount rates.

Other arguments in favor of using risk-free rates are that offering public credit or a federal guarantee on loans would eliminate some market distortions, such as credit rationing. In addition, risk-free rates would ultimately be the government's cost of financing and, therefore, the use of this rate would result in a financially neutral operation, in which the government would only pass on its own borrowing costs to the borrower.

According to the CBO, however, these arguments would ignore the fact that the reason for the government's prerogative to issue debt on the market at a cheaper rate than other institu-

5 See the bimonthly publication of the National Treasury Subsidies Bulletin on the PSI and BNDES loans.

tions stems from its power to tax and issue currency to meet its financial obligations, eliminating market risk. Taking this into account, by discounting the cash flows of public loans extended to companies and individuals using risk-free interest rates, the methodology present in the FCRA would be equating the credit risk of these entities with that of a sovereign government and issuer of its own currency, therefore attributing a subsidy to the beneficiaries of the credit that would not be correctly evidenced in the budget.

The government, therefore, would not be eliminating market risk in its loans and guarantees by diversifying them extensively, but only transferring this risk to its stakeholders (taxpayers and beneficiaries of government programs), and incurring an opportunity cost on behalf of these stakeholders by providing credit below the market price.

The American legislative body also lists a second reason for not adopting the risk-free rate to measure the net present value of these operations, which would be the fact that the costs of other public programs and policies included in the budget are based on market prices. This would tend to distort the analysis of the benefits of government programs in favor of those based on the provision of credit, to the detriment of the direct provision of goods and services, due to the fact that the former are priced below market values.

In practical terms, the CBO cites, as evidence of the systematic underestimation of the costs of US public credit policy, the losses normally incurred by the US government when it decides to sell public credit operations that are part of its assets. It is common in the US for the government to sell portfolios of student loans or real estate to private investors, who usually pay less for these assets than they did on the government's balance sheet. The legislative body attributes these losses to the different discount rates used by the government and the buyers to assess the net present value of the operations.

As a final criticism, the CBO argues that using risk-free rates to price public credit operations would also be economically inconsistent. The reasons for this would lie in the fact that this practice could ultimately lead to the possibility of the government enriching itself by financing itself at the risk-free rate and investing in a set of assets with an expected return higher than this rate, or by indefinitely buying loan portfolios at market prices in order to later record accounting profits by converting the discount rates to its own financing costs.

From the CBO's perspective, the best alternative would be to make it explicit that the operations eventually have a negative net present value when discounted at interest rates consistent with the risk involved. The real magnitude of the subsidy, therefore, would not be the size of the negative net present value when the cash flow is discounted at the federal government's cost

of financing, but rather when it is discounted at market interest rates, since this would be the alternative available to those not benefiting from the policy.

This body suggests, as a way of improving the FCRA methodology, the adoption of risk--adjusted discount rates, adding a *spread* to the risk-free rate that corresponds to the cost of the market risk that is being eliminated.

As a way of implementing this, the CBO suggests identifying in the interest rates in force on the market, for operations similar to those the government is offering, the portion of this remuneration that refers to covering market risk. This, however, is not a simple thing to do, because the *spreads* of market interest rates over risk-free rates include a variety of factors, such as: the profit margin, the higher marketing expenses incurred by financial institutions compared to the government, the lower liquidity of private debt compared to sovereign debt and the administrative costs of managing loans, something that is not directly contained in the risk-free interest rate.

It can be seen, therefore, that in relation to the discount rate used in the works by Rigolon and Giambiaggi (1999) and Silva *et al* (2013), which was the Selic rate, the FCRA methodology, currently used by the US government to price public credit operations in the budget, already recommends using a rate that more appropriately reflects the government's financing cost, based on the yield curve of government bonds, rather than the monetary policy interest rate. Even so, the CBO argues that this would not be enough, insisting on the need to revise the FCRA methodology so that it reveals what it considers to be more realistic values for government credit subsidies, incorporating the credit risk of the borrower rather than the lender into the discount rate.

3.2 Fair Value Method

The second methodological alternative that is widely used to evaluate credit operations, and which allows for the calculation of their financial results, stems from the accounting recommendation that the value of loans granted, recorded in institutions' assets, be periodically revalued based on their fair value. This technique is called *fair-value accounting* and the CBO mentions it as an option to improve the calculation currently used in the FCRA.

The methodology consists of evaluating how much these assets could be traded for on the market under normal conditions. The application of this method therefore requires price research or a survey of offers. A credit subsidy, in this case, would be calculated if there was a

difference between the value of the loan on the government's balance sheet and its market price.

This is a method that could potentially also require many adaptations, as it is common for there to be no credit operations on the market with conditions similar to those extended by the government. In addition, as with the proposal to adapt the net present value method to incorporate discount rates adjusted for market risk, many modifications and assumptions may be necessary to take into account the peculiar characteristics of private financial institutions compared to public authorities.

Finally, this method may not differ significantly from the previous one either. The reason for this is that, since credit operations granted by the government are recorded on its balance sheet at net present value discounted at risk-free rates, if market institutions also value their operations by this method, but using market rates as a discount factor, then the discrepancy between the pricing done by the government and the market would boil down to the substitution of risk-free discount rates for market rates in the net present value method.

3.3 Options Pricing Method

The third method originated in the work of Merton (1977) and stems from the possibility of equating loan and guarantee operations, in terms of the nature of their expected cash flow, with asset purchase and sale options. Given this equivalence, known option pricing methodologies can be used to arrive at the value of credit operations. This seems to be a technique used in the financial market for publicly traded companies and its use is recommended by the CBO whenever the necessary data is available.

The description of this method here is based on the works of CBO (2004) and Lucas *et al* (2004). Given the possibility of making the analogy between credit operations and options contracts in different ways, in Pizzutilo and Caló (2015) it is possible to find an alternative to the interpretation found here, as well as a discussion on the role of guarantees in imperfect credit markets and the benefits of granting guarantees by public authorities[6].

The central idea of this third method is based on the fact that, whether in the case of a loan granted with a guarantee on a certain asset, or in the granting of a guarantee with the same asset given as counter-guarantee, the borrower's position is similar to that of the holder of a put option. In other words, they have the option of selling the asset to the lender, or guarantor, for

6 As the focus here is on credit operations under Law 9496, granted directly by the federal government to state governments, it would be beyond the scope of this work to delve into the techniques used to price guarantees.

the amount of the outstanding loan balance. If the value of the asset falls below the outstanding balance, the borrower exercises his put option by handing over the asset to pay off the debt.

On the other hand, the creditor (or guarantor) is in the opposite position, as the issuer of the put option. Their possible losses, therefore, are the same as those of the issuer of an option of this type on the asset pledged as collateral, with an exercise price equal to the face value of the loan (CBO, 2004).

The fundamental principle behind measuring the value of loans using the option pricing method is that assets with the same payment flow should also have the same price. In this sense, the method basically consists of obtaining a portfolio of government bonds and the debtor company's assets that result in the same expected cash flow as the loan.

Among the option pricing methods, the CBO suggests using the binomial method, as it is applicable to more general cases than the popular Black and Scholes (1973) method. The use of the latter would be restricted to specific cases in which: the government has priority in receiving payment in the event of liquidation, the debtor cannot pay off the operation early and the reference value for default, i.e. the value of the assets at which it is preferable for the debtor to default and hand over the asset pledged as collateral, does not change over time.

The binomial method, on the other hand, is more flexible. It creates a binomial tree in which each node represents the market value of the debtor's assets on a given date and economic scenario. Each node opens up into two possibilities selected in such a way as to capture the average and variance of the return on assets over a new period, using probabilities for each of the alternatives.

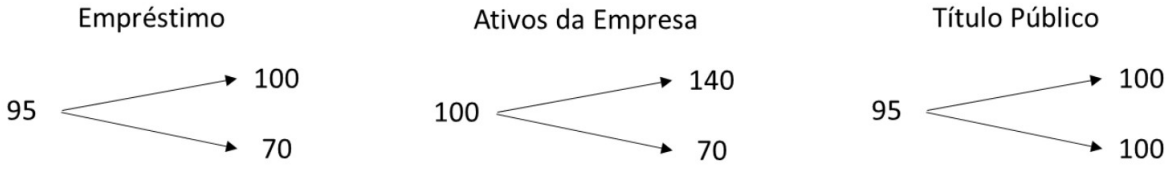
Based on this information, the cash flow for the creditor at each node of the tree is identified and then a portfolio made up of the debtor's assets and risk-free securities that replicates the same flow is identified. Market risk, in this case, is incorporated indirectly via the portfolio with a portion of its investments in the debtor's assets.

The following example of a loan valued using the binominal method is an adaptation of the example for a guarantee concession in CBO (2004). As a simplification, the term of the loan is a single period and the probabilities of either economic scenario occurring are equal.

In the example, it is assumed that 95 monetary units (m.u.) are lent by the government to a certain company, and this loan can generate two *payoffs* for the government after a single period has elapsed: it can be repaid in full with interest, generating a cash flow of 100 m.u., or it can be defaulted on, in which case the government receives 70 m.u. after the company's assets have been liquidated, which is represented in the first figure on the left of the set of figures

below. The company's assets at the time of taking out the loan are worth 100 u.m. and, given the expected rate of return on them, and the volatility of their value, it is expected that, after a period, these assets could be worth 140 u.m. or 70 u.m., depending on the economic scenario. Finally, a government bond with a face value of 95 u.m. pays 100 u.m. after a single period, regardless of the economic scenario.

Figure 3 - Possible Values for the Loan, Company Assets and Public Bond



Source: own elaboration, based on CBO (2004).

From this data, you can find a portfolio available on the market that replicates the cash flow of the loan and then price it. The system of equations below allows you to find the proportion of investments in government bonds (X) and in company assets (Y) that results in the same cash flow as the loan:

$$\frac{100X+140Y=100}{100X+70Y=70} \quad (1)$$

Solving the system for X e Y we obtain that X=0,4 e Y=0,4286. The market price of this portfolio can then be found by multiplying these weightings by the acquisition price of each asset:

$$0{,}4 \cdot 95 + 0{,}4286 \cdot 100 = 80{,}86 \quad (2)$$

Given the market value of the portfolio, the financial result of the loan granted by the government in this example will therefore be equal to the difference between the prices of these two assets, i.e., 80,86-95=-14,14. Under market conditions, a future cash flow equal to that of the loan can be purchased for 80.86 u.m., but the government is investing 95 u.m. in it, which constitutes a subsidy for the borrower.

The binomial method seeks to approximate, through its tree of possibilities, the future distribution of the value of the debtor's assets, starting from the initial value of these assets and taking into account information on their historical volatility and expected returns. This infor-

mation, however, is not available for all private companies and is practically non-existent for families or individuals, which limits the applicability of this method.

4. METHODOLOGY ADOPTED FOR CALCULATING THE FINANCIAL RESULTS OF LAW 9.496

In order to estimate the financial results resulting from the original version of the debt renegotiation promoted by Law 9.496, as well as to quantify the changes in these results that followed the alterations promoted by Complementary Laws 148 and 156, we opted to adopt the first of the methodologies presented above. In other words, the net present value of the complete financial flow of the contracts was calculated, in a similar way to what is done in the American budget process and as Rigolon and Giambiaggi (1999) did to estimate the results of this same renegotiation when the contracts were still being signed.

Firstly, the justifications for adopting this methodology will be presented. Among the possible justifications, accounting via fair value would require the existence of similar credit operations being negotiated on the market, which, given the characteristics of the credit operations of Law 9.496, which are long term (currently the contracts provide for a term of 50 years), low cost and high value, would not be easily found. In addition, the fact that these operations are carried out between governments makes it difficult to define an appropriate risk rate, due to all the reasons listed in the previous section regarding the components of the *spread* that the market interest rate presents in relation to the risk-free rate.

The second possible alternative, based on option pricing techniques, would be unlikely to return reliable results, due to the need for information on the value and volatility of the assets and net worth of the state governments involved, the latter often being negative and, in all cases, not priced by the market.

Having clarified this choice, we now move on to detailing the technique used. Operating the net present value method to measure the value of a credit agreement first requires projecting the future cash flow of the operation, taking into account disbursements, interest payments and amortization, as well as the expected probabilities of default and early repayment. Subsequently, the flow of cash inflows and outflows must be brought to present value using a discount rate.

The first step, which involves projecting the operation's cash flow, is not trivial, and one of the difficulties is the fact that the probability of default on the payment flow varies according to the length of time that has passed since the start of the contract. In addition, defaults do not

occur randomly, but are intrinsically linked to the macroeconomic situation and especially to the existence or not of collateral on the loan. Debtors without liquidity restrictions are unlikely to stop paying their debts as long as the value of the assets pledged as collateral exceeds the outstanding balance. Consequently, the probability of default, at each moment in time, will be a function of the probability distribution of the price of the assets pledged as collateral, and this function can be predicted from three pieces of information: the initial price of the assets pledged as collateral, the historical volatility of their price and their expected rate of return.

A second possibility that should be taken into account is the debtor's decision to pay off the loan early, which is highly influenced by variations in interest rates. In this case, falls in interest rates serve as an incentive for early repayments, as borrowers take advantage of the economic climate to replace more expensive liabilities with lower-cost ones.

To take these factors into account, it is common, as a way of simplifying calculations, to use historical default and early repayment rates for similar operations.

The net present value method, in its most comprehensive version, can be represented by the equation below for a credit operation with collateral on a given asset:

$$VPL = \sum_{t=0}^{T} \frac{\left[1-P\left(q|i_t\right)\right]\bullet\left\{FC_t\bullet\left[1-P\left(d|A_t\right)\right]+VR_t\cdot P\left(d|A_t\right)\right\}+P\left(q|i_t\right)\cdot SD_t - D_t}{\prod_{j=0}^{t}\left(1+i_j\right)} \quad (3)$$

where $P(q|i_t)$ is the probability of early repayment, conditional on the risk-free interest rate prevailing in the period t, FC_t is the cash flow of interest and amortization payments, $P(d|A_t)$ is the probability of default, conditional on the value of the assets pledged as collateral, VR_t is the recoverable value of the loan in the event of default, SD_t is the outstanding balance of the contract, D_t the contractual disbursements and T the term of the contract.

Like Rigolon and Giambiaggi (1999), it was decided, at least at this initial stage, not to take into account the probability of default or early repayment when calculating the net present value of Law 9.496 contracts.

The decision not to take into account a probability of default stems from the fact that Brazilian legislation does not provide for the judicial liquidation of a federal entity. It will therefore be assumed that the risk of default on these refinancings is zero, as the state governments are entitled to collect taxes indefinitely until they settle their debts. An additional assumption, however, is that the federal government will not forgive these debts or part of their outstanding balance in the future.

It's worth saying that these assumptions aren't too far off the mark, as defaults on refi-

nancing contracts with the federal government have always been recorded in graphical accounts, which have subsequently been incorporated into the outstanding balance, with default or non-payment charges, depending on legal negotiations, or have been incorporated into new refinancing contracts.

If these debts were to be forgiven, or if it were prudent to predict a probability of default, in both cases the calculations presented here would need to be revised and their results would change in the direction of a lower net present value of the operations.

The possibility of early repayment was also not considered, both because of the rarity of similar episodes in the past and because of the lack of incentives for states to do so under the current conditions. In the past, when the initial contractual conditions, with charges equal to IGP-DI + 6% or 7.5% per year, began to become onerous compared to the lower interest rates prevailing in the market after 2010, the contracts were amended to provide for new lower charges, equal to IPCA + 4% per year and limited to the Selic rate. The Law 9.496 contracts, therefore, tend to be the cheapest domestic debts in the states' liabilities, and there is an incentive to pay off all the others early. In addition, the exchange rate risk involved in replacing these charges with possibly lower ones prevailing abroad discourages this possibility, which would also be faced with a limited supply of credit.

It was therefore assumed that both the probability of default and the probability of early repayment would be equal to zero when drawing up the future financial flow of Law 9496 credit operations. For the period of data collected, however, any defaults or early repayments that occurred were taken into account as part of the flow already established.

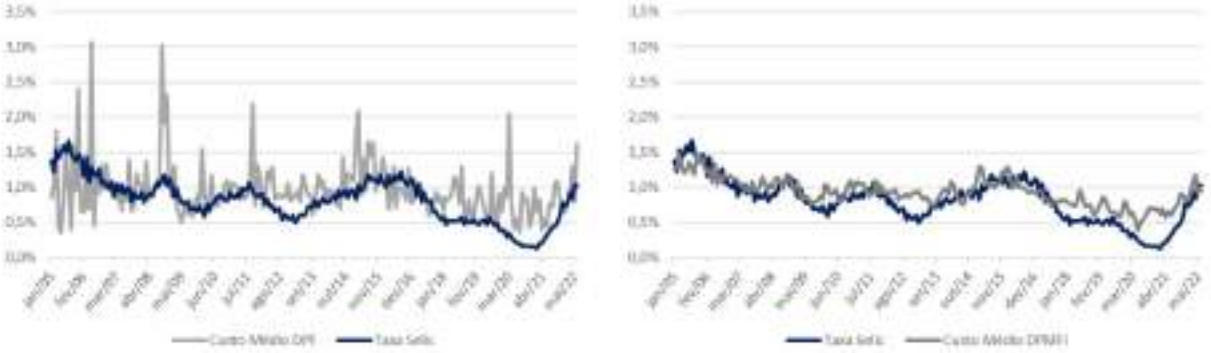
The option was also made to apply three different discount rates to the financial flows. Firstly, the Selic rate, the basic monetary policy rate of the Brazilian economy and the cost limit for the charges of the contracts of Law 9.496, also used in the works of Rigolon and Giambiaggi (1999) and Silva *et al* (2013), which allows for greater comparability between the calculations of the three works. However, the calculations were made using the National Treasury Secretariat's estimates for the average cost of the Federal Public Debt (DPF) and the domestic Federal Public Securities Debt (DPMFi) as the discount rate, as it is believed that these two measures may more adequately reflect the federal government's cost of financing. In this respect, the method used in SPE (2019) is close to this idea, since the flow of installment payments made by the states was compared to the flow of debt payments issued by the federal government to take over the debts and refinance them.

The historical series for the estimates of the average cost of the DPF and DPMFi are cur-

rently only available from January 2005 onwards, so for the months prior to that, and up to the start of the contracts, the Selic rate values were used to complete the series.

Figure 4 compares the evolution of the three discount rates used in this study for the period from 2005 onwards. It can be seen that the average cost of the DPF is strongly affected by the external portion of federal indebtedness, which explains the spikes in cost increases observed throughout the series as a result of exchange rate shocks. The average cost of the DPMFi, on the other hand, is closer to the results of the Selic rate, but usually with a small premium, especially at times when the Selic rate is low, when it is common for post-fixed Treasury bond issues to be placed on the market with an additional premium over the basic rate.

Figure 4 - Selic Rate and Average DPF and DPMFi Costs (% a.m.)



Source: IPEADATA and National Treasury Secretariat. Own elaboration.

There were also other options for the discount rate, which, however, did not prove adequate. For example, it could be proposed to use the implicit interest rates on the Federal Government's Net Debt or on the Central Government's Gross Debt. However, it was decided not to do this because the former is influenced by the differential between domestic and foreign interest rates, and is subject to both the Central Bank's exchange rate policy and decisions on the management of international reserves, while the latter is influenced by the cost of the Central Bank's repo operations, which serve as an instrument of monetary policy and have high liquidity and low risk. In addition, using the yield curve of Brazilian government bonds would require a historical series with the evolution of this curve, which unfortunately is not available under the necessary conditions.

It was also decided not to use risk-adjusted interest rates, as proposed by the CBO to improve the FCRA methodology, for two reasons in particular: firstly, because the debtors in these contracts are federal entities that are not subject to judicial liquidation and have the power to tax; and secondly, because of the practical difficulties mentioned earlier in identifying exactly

what portion of the interest *spread* represents non-diversifiable risk. It should be borne in mind, however, that, just as in the case of introducing a probability of default, any additions to the discount rates, to simulate the costs of these operations if done on the market, would also contribute to reducing the net present value of the operations.

Having discussed the main aspects of the methodology to be adopted, we will now describe how the calculations were made for the three configurations that the Law 9496 contracts have undergone over time, i.e. the original contractual conditions, those following the approval of Complementary Law 148 and those resulting from the approval of Complementary Law 156.

In all cases, the initial debit balance used was the amount actually assumed by the federal government at the time of contracting, so the amounts resulting from the federal government's absorption of the cost differentials between the approval of the law and the signing of the contracts were added to the initial debit balances of the contracts. This was done in order to measure the real financial result of this renegotiation for the Union and each state, since not all states benefited from this possibility.

From the initial debit balances, the debts incorporated into the Law 9.496 contracts over time were equated to new disbursements, increasing the debit balance. On the other hand, the amounts paid off early with privatization funds were incorporated into the calculations as extraordinary amortizations.

For each calculation, we tried to use as much data as possible. Thus, to calculate the financial results based on the original version of the contracts, we used data on disbursements and payments up until the moment when the financial agent managing the contracts implemented the change in charges introduced by Complementary Law 148. The time at which this occurred varied from state to state, but although the complementary law was approved in 2014, the changes only took place over the following years, with rebates on the outstanding balance corresponding to the retroactive application of the new charges. Therefore, the data used to calculate the net present value based on the original conditions of the contracts, for example, is available at least until 2015, and projections need to be made from then on in order to simulate what the financial flow would be if the original conditions were maintained.

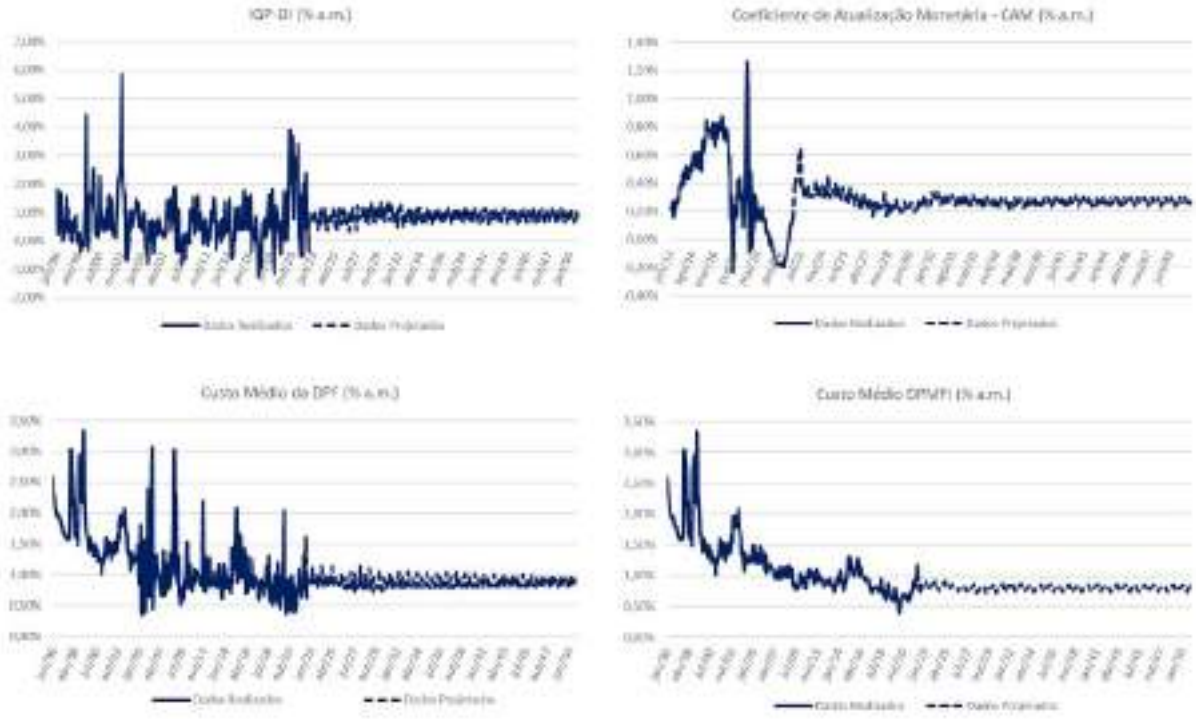
The forecasts for the future financial flow were based on the forecasts for the relevant parameters for determining the value of the installments of the contracts, such as the rate of monetary restatement and the limit on the commitment of Real Net Income, while the calculation of the present value required forecasting the discount rates.

Whenever possible, these projections were made using the average year-on-year percen-

tage change over the last ten years for each parameter as a standard. This was done to dispel doubts about the methodology used to make the projections, employing a simple method that is easy to understand and replicate, and which is expected to be effective in capturing at least one complete economic and monetary policy cycle, as well as appropriately reflecting the structural trend for these parameters to be in force for the remainder of the contract terms.

Figure 5 puts into perspective the realized and projected values for the monthly percentage changes in some of the parameters used to generate the future financial flow (IGP-DI and Monetary Update Coefficient) and then bring it to present value (average cost of DPF and DPMFi). It can be seen that the use of the average rate of change over the last ten years has made it possible, as far as possible, to generate projections that are compatible with the recent past, although their volatility has been softened by the use of the average of past changes.

Figure 5 - Realized and Projected Values for Parameters and Discount Rates



Source: IPEADATA and National Treasury Secretariat. Own elaboration.

In order to project the financial flow according to the original contractual conditions[7] , the historical series of IGP-DI and Real Net Revenue data for the states was used, then the forecast

7 In other words, a Price table with 360 monthly installments, IGP-DI charges + 6% or 7.5% per year, depending on the contractual provisions for each state, and installments limited to the percentage of Real Net Revenue provided for in the contract, with any outstanding balance at the end of the 360 months being paid off in up to 120 months using the same interest rate and amortization system, but with installments no lower than the last installment of the original term.

values for the rest of the contracts were generated in the manner indicated above. The monthly installments were then calculated based on the standard Price table formula, shown below, using the interest rate specific to each state's contract:

$$Pr = SDA \cdot \frac{(1+i)^n \cdot i}{(1+i)^n - 1} \quad (4)$$

where *Pr* is the amount of the installment, *SDA* represents the updated debit balance, *i* the monthly interest rate, calculated as the annual interest rate of the contract divided by twelve, as provided for in the contract, and *n* the number of periods remaining in the contract. The installment values were then compared with the Actual Net Revenue values, to check whether the payment would be full or only partial.

Once the financial flow had been forecast up to the settlement of the outstanding balance, it was discounted to reflect the present value in the month the contract began, using the three discount rates mentioned above: the Selic rate and the estimated average costs for the DPF and DPMFi. The net present values calculated for each operation were then updated to December 2021 values based on the IPCA.

In cases where the contracts had a negative net present value, the magnitude of this loss for the federal government corresponds to the credit subsidy extended to the debtor state. In cases where positive results were observed, the amount corresponds to the profit earned by the federal government when renegotiating the state's debt, considering the difference between its cost of raising funds and the remuneration received in the operation.

Secondly, the net present values of the contracts were calculated taking into account the changes brought about by Supplementary Law 148. To do this, the new interest rate of 4% per year was incorporated into the Price table and monetary updating was now done using the Monetary Updating Coefficient (CAM). In this case, the term of the contracts, as well as the provision to be able to pay off within 120 months of the end of the contract any remaining debit balance resulting from the use of the Real Net Revenue commitment limit, were maintained.

In addition, the calculations made by the financial agent were used to incorporate the financial impacts of the changes brought about by Complementary Law 148 into the contracts, with the financial flow forecasts starting only from the date on which Complementary Law 156 came into effect. From this point onwards, therefore, the contractual financial flow was forecast if the conditions established by Complementary Law 148 were maintained.

It is worth noting that the CAM calculation in these contracts is made by comparing the

accumulated rates of the IPCA + 4% per year and the Selic rate since January 2013. When the accumulated value of one index becomes lower than the other, the monthly variations are used to monetarily update the outstanding balance. As a result, it is not a question of applying the lowest percentage variation each month, but rather the monthly percentage variation of the index with the lowest accumulated value since January 2013.

Attention was also drawn to the change in the reference month for monetary restatement, which after the implementation of the changes brought in by Complementary Law 148 became the second month prior to its application. In the original contract, the reference for the application of the IGP-DI variation was the immediately preceding month.

Finally, the net present values resulting from the changes introduced by Complementary Law 156 were calculated. To do this, the additional 240-month term was incorporated into the contracts, the limit on the commitment of Real Net Income on the value of the installments was extinguished and they were now required to be paid in full, and, depending on the case, the effects of a total suspension of payments during the six-month period were incorporated, followed by a progressive resumption of payments over the following eighteen months. In these cases, the monthly interest defaulted in each period was incorporated into the outstanding balance.

5. RESULTS

The results for calculating the net present value of Law 9496 contracts, according to their original conditions and those resulting from the approval of Complementary Laws 148 and 156, can be seen in Table 2. It is made up of three main columns, which refer to the contractual conditions, which are subdivided into another three columns, where it is possible to see the financial result considering the different discount rates used.

Table 2 - Net Present Value of Law 9496 Contracts (Dec/21 values)

Estado	Lei 9.496			LC 148			LC 156		
	Selic	*DPF*	*DPMFi*	*Selic*	*DPF*	*DPMFi*	*Selic*	*DPF*	*DPMFi*
Acre	72,5	20,6	30,4	10,4	-20,7	-15,8	2,8	-41,3	-34,4
Alagoas	7.204,1	3.335,9	4.123,2	846,5	184,7	311,6	825,1	-133,6	39,3
Amapá	22,7	7,6	10,8	3,1	-6,0	-4,2	3,1	-6,0	-4,2
Amazonas	112,7	26,0	42,3	6,9	-44,1	-36,0	6,9	-44,1	-36,0
Bahia	-467,5	-1.035,8	-967,3	-1.210,8	-1.543,0	-1.529,2	-1.273,0	-1.777,2	-1.737,9
Ceará	167,0	58,9	70,9	22,0	-37,1	-36,4	20,8	-66,4	-61,5
Distrito Federal	484,5	203,3	257,7	121,8	-22,4	0,9	121,8	-22,4	0,9
Espírito Santo	-110,2	-293,1	-258,8	-333,3	-447,3	-429,1	-355,4	-522,0	-496,1
Goiás	-220,4	-964,2	-812,6	-1.149,1	-1.516,6	-1.452,3	-1.154,4	-1.672,2	-1.584,6
Maranhão	112,9	-76,9	-43,4	-94,2	-215,3	-197,6	-94,2	-215,3	-197,6
Mato Grosso	-253,2	-511,7	-469,7	-535,0	-704,2	-683,0	-564,2	-804,8	-772,9
Mato Grosso do Sul	326,6	-521,2	-335,2	-602,3	-1.146,0	-1.030,6	-713,3	-1.470,4	-1.323,5
Minas Gerais	64.317,3	20.030,5	29.153,2	-9.213,8	-17.073,1	-15.453,0	-9.312,6	-19.085,7	-17.202,8
Pará	216,9	60,5	90,0	-1,4	-87,0	-73,9	-6,2	-129,2	-110,4
Paraíba	-37,1	-144,9	-127,1	-178,2	-239,1	-232,1	-179,3	-271,3	-259,5
Paraná	1.815,9	373,8	643,6	45,6	-809,2	-675,3	31,0	-1.261,6	-1.059,5
Pernambuco	268,4	-117,4	-59,1	-228,6	-455,1	-433,8	-282,1	-624,7	-586,2
Piauí	-229,0	-231,4	-242,6	-229,0	-231,4	-242,6	-229,0	-231,4	-242,6
Rio de Janeiro	45.288,5	1.752,5	10.533,9	-21.529,5	-32.712,2	-30.513,8	-21.564,9	-32.633,4	-30.512,6
Rio Grande do Norte	14,8	-20,0	-14,8	-32,6	-51,8	-50,2	-32,6	-51,8	-50,2
Rio Grande do Sul	26.855,2	4.387,0	9.011,1	-7.412,2	-12.784,7	-11.669,4	-7.488,4	-14.308,8	-12.995,7
Rondônia	301,8	-34,0	32,7	-192,9	-373,4	-342,8	-196,8	-466,5	-422,5
Roraima	20,5	4,0	7,1	1,3	-9,0	-7,3	1,3	-9,0	-7,3
Santa Catarina	849,6	-562,4	-290,1	-795,9	-1.680,8	-1.530,4	-850,9	-2.115,1	-1.907,3
São Paulo	80.190,4	6.633,7	21.851,6	-32.207,1	-51.074,3	-47.200,4	-33.444,1	-57.659,4	-53.029,2
Sergipe	-59,0	-177,0	-155,0	-200,6	-273,7	-262,1	-200,5	-314,2	-296,2
Tocantins	-	-	-	-	-	-	-	-	-
Total	**227.265,7**	**32.204,4**	**72.083,0**	**-75.089,0**	**-123.372,9**	**-113.789,0**	**-76.929,0**	**-135.937,8**	**-124.890,5**

Source: Own elaboration.

Note: values in R$ million.

It can be seen that under the original contractual conditions, the renegotiation of Law 9.496 would eventually prove profitable for the federal government. This would result from the application, over the entire term of the contracts, of real interest rates of 6% to 7.5% per year, adjusted by an inflation index that is particularly volatile and sensitive to exchange rate shocks (IGP-DI). This level of real interest, set at a time when the annualized Selic rate exceeded 40%, from 2010 onwards would coincide, at least until the writing of this text, only with the peaks of high interest rates.

The table also shows that the contractual changes in Complementary Laws 148 and 156 were both aimed at making the renegotiations more beneficial to the states. In this respect, the impact of the change in charges brought about by the first complementary law was more significant, reversing a positive financial result into a negative one. The extension of deadlines, with a brief suspension of payments, promoted by the second law, had only a marginal impact.

Under the original contractual conditions, when using the Selic rate as the discount factor for the financial flow, the refinancing profit for the Federal Government would have been R$ 227.3 billion, at December 2021 values, decreasing to R$ 32.2 billion, or R$ 72.1 billion, if the

costs of the Federal Government's total indebtedness or internal furniture were adopted as the discount rates, respectively. These differences show the sensitivity of the results to the choice of discount rate. Even though the differences between the average cost of the DPMFi and the basic interest rate are small in one-off comparisons, they have a significant impact on the results of operations when applied to a financial flow as extensive as the contractual terms of Law 9,496.

With the approval of Complementary Law 148, the profits that would have been calculated under the original contractual conditions gave way to negative results of R$75.1 billion, R$123.4 billion or R$113.8 billion, depending on the discount rate used. In this case, the figures are close to those calculated by Rigolon and Giambiaggi (1999), and it can be inferred that the change in charges was successful in re-establishing the original financial result that the parties were aiming for.

The changes brought about by Complementary Law 156, on the other hand, were only subtle in that they had two offsetting effects. The extension of the contractual terms by 20 years resulted, on the one hand, in a higher nominal interest payment, but also in a longer *duration* of the contracts, which, combined with a higher discount rate for the financial flows than for the contractual charges, made the net present values slightly more negative for the Federal Government. This difference is especially small in the case where the Selic rate is used as the discount rate, due to its similarity to the contractual charges, which are now limited to it, i.e. the terms were extended by charging almost the same as the discount rate, generating an almost neutral effect.

An individual analysis of the states shows that the net present values of the contracts of some of them did not change with the approval of Complementary Law 156. This was because not all of them opted to extend the terms, which was associated with the need to institute a temporary spending ceiling, which was perceived as inopportune for states whose installments did not represent a very onerous expense in their budgets. The case of Piauí, however, is particular, as the state's original contract provided for a term of only 15 years, which was not changed afterwards and was paid off in 2012, therefore before the changes introduced by the two complementary laws discussed here.

The individualized analysis shows that, although the contractual conditions extended to the states were similar, the net present values calculated for each varied significantly. This is the result of a number of factors, the main ones being: the magnitude of the difference between the debt assumed by the Union and that renegotiated with the state when the contracts were signed; the real interest rate that made up the charges; the use or not of the Real Net Revenue commit-

ment limit; the prevailing interest rates in the economy at the time of signing and incorporation of new debt balances; the incurrence of interest on late payments and the payment of fines; the occurrence of payment suspensions as a result of individual injunctions; compliance with financial penalties in the form of temporarily increased charges or extraordinary amortizations for non-compliance with obligations assumed in the fiscal monitoring program with the Federal Government, which states wishing to renegotiate their debts had to adhere to; and the decision to pay off portions of the contracts early.

An example of these differences is the case of Alagoas and Bahia. Although both states signed contracts with similar outstanding balances, the net present values shown in Table 7 differ significantly.

In the case of Bahia, the difference between the debt assumed and renegotiated was greater, both in absolute and proportional terms, and the state did not make use of the Real Net Revenue commitment limit throughout the period of data realized, nor would it do so during the projected period, both in the case of the original contractual conditions and those after Complementary Law 148. The state would therefore pay off the contract without the need for the additional 10-year term, the use of which would result in higher total interest payments, contributing to a positive financial result for the creditor. In addition, the state was one of the few that carried out a voluntary extraordinary amortization of its contract, having done so in 2013 and for just under 15% of the outstanding balance.

Alagoas, on the other hand, signed a contract whose original charges provided for real interest of 7.5% per year, compared to 6% in the Bahia contract and most other states. In addition, the state made extensive use of the commitment limit and incurred default interest between 2000 and 2007. In addition, over the course of the contract, it also incorporated debit balances that were proportionally higher in relation to the original debit balance compared to the state of Bahia.

The case of Rio de Janeiro, with regard to the impacts of the approval of Complementary Law 156, is particular in relation to the other states, as it was the only one in which, as a result of the approval of this law, and depending on the discount rate used, there was a decrease in the negative result of the net present value. This was because Complementary Law 156, as amended by Complementary Law 178, made it possible for this state to incorporate the amount owed as a result of the Banerj settlement into the outstanding balance of the Law 9496 contract (art. 1-B), as well as waiving late payment charges on the suspension of payments due to court decisions (art. 1-A).

As a result, there was a slight reduction in the outstanding balance of the Law 9,496 contract, which acted as an extraordinary amortization. This amortization, in turn, compensated the creditor for the loss resulting from extending the debt with charges lower than the discount rate. The fact that this compensation outweighed the loss resulting from the extension only in the case of using higher discount rates (average cost of DPF and DPMFi) is due to the fact that they implied a higher valuation of this amortization, which took place in the first half of the contractual term.

The results also show that the refinancing under Law 9496 had important distributive effects among the states, as Silva *et al* (2013) had already pointed out. If we consider the calculation made based on the contractual conditions of Complementary Law 156, which were the conditions in force at the time this study was prepared, and use the average cost of the Federal Public Debt as the discount rate, which implies the most negative net results, we see that all the signatory states were subsidized to some extent, but four of them: São Paulo, Rio de Janeiro, Minas Gerais and Rio Grande do Sul, accounted for 91% of this vertical transfer of values between the federal government and the states.

These distributive effects certainly distorted the federal government's equalizing efforts to ensure homogeneous regional development, since the credit subsidies were mostly extended to states with per capita incomes higher than the national average. Despite this, it should be noted that they have not compromised equalization to the point of nullifying its effects, but have contributed to reducing them to some extent.

If we take the case of São Paulo as an example, whose total subsidy would reach R$57.7 billion in December 2021 values, this amount represented just over 5.5 times the difference between the State Participation Fund (FPE) transfers to this state and Bahia in 2021[8].

The calculations made here do not take into account the effects of legislative changes approved after Complementary Law 156 and which may have affected the contracts in question. For example, the effects of the Fiscal Recovery Regime (RRF), instituted by Complementary Law No. 159 , were not taken into account, nor were the suspensions in the payment of debts with the Union implemented to combat the effects of the coronavirus pandemic, through Complementary Law No. 173, nor were the compensations, via debt service, for the revenue losses resulting from the limitation of ICMS rates instituted by Complementary Law No. 194.

8 In 2021, Bahia received R$11.6 billion from the State Participation Fund, while São Paulo received R$1.2 billion. This fund is distributed based on a population criterion and another proportional to the inverse of the ratio between the state's per capita income and the national per capita income.

6. CONCLUSION

Analysis of the net present value of the Law 9.496 contracts made it possible to see how, if the original contractual conditions were maintained, the renegotiation of these debts would eventually have become a source of positive financial returns for the Federal Government. This would be because the charges initially agreed in the contracts, set at a time of extremely high interest rates, would prove to be higher than the Union's financing cost for most of their term.

This result differed significantly from that originally found by Rigolon and Giambiaggi (1999), who shared the expectation, prevalent at the time, that real interest rates would remain high over the following decades. These authors estimated that the financial result of the renegotiation would be a loss for the Federal Government of between R$109.2 billion and R$159.6 billion, at December 2021 values, depending on whether the real interest rates in the economy over the course of the contracts were between 6% or 9% per year. In this study, considering data from two decades ago and updated expectations for the remaining term of the contracts, it was estimated that the results would be positive for the Federal Government, between R$32.2 billion and R$223.3 billion, depending on the discount rate used.

In this respect, it was possible to observe the importance of the change in charges promoted by Complementary Law 148, which inverted the result of the aggregate net present value of the renegotiation. With this change, the renegotiation once again became a net transfer of resources from the federal government to the debtor states, in the form of subsidized credit. The financial results that followed were similar to those found by Rigolon and Giambiaggi (1999).

The approval of Complementary Law 156, with its extension of terms and temporary suspension of installment payments, only had an incremental impact on financial results. Its effect acted in the same direction as the change in charges, i.e. to increase the advantage of the contracts for debtors, and this effect was greater the higher the discount rate applied to the new, longer financial flow. As a result of the approval of these two complementary laws, it was estimated that the financial results of the renegotiation would be negative for the Federal Government by between R$76.9 billion and R$135.9 billion, depending on the discount rate.

The methodology adopted in this study was similar to that used in the work by Rigolon and Giambiaggi (1999), so their results are comparable. The other two studies on the subject, by Silva *et al* (2013) and SPE (2019), were based on data up to 2011 and 2018, respectively, without considering the entire contractual period. In this case, the results between them were close: the first estimated an accumulated credit subsidy from the Union to the states of R$451.2

billion, while the second estimated a value of R$476.0 billion, all at December 2021 prices.

One lesson that can be drawn from the results of this study may be the preference that should be given to the use of flexible interest rates in the case of long-term contracts, such as those under Law 9,496. The contractual setting of interest rates compatible with the economic situation at the time of signing, in these cases, will most likely give rise to the need to promote economic and financial rebalancing.

It was also possible to observe that the financial benefits of renegotiation are being received heterogeneously among the states. As these are advantageous contracts for debtors, the states with the most substantial debts are the ones that benefit most. In this respect, it was seen that 91% of the subsidy implicit in the refinancing of Law 9.496 is being appropriated by four states (São Paulo, Rio de Janeiro, Minas Gerais and Rio Grande do Sul), most of which have a per capita income higher than the national average. The renegotiation has therefore acted contrary to federal efforts to reduce regional inequalities, but not to the point of compromising them.

The definitive financial results will only be known when the contracts expire and their financial flows are made up entirely of realized data. Until then, only prospective exercises are possible, and they are subject to revisions, such as this study and others carried out previously. Despite this limitation, this type of analysis helps to clarify the evolution of expectations regarding financial results and the impacts of the changes made so far.

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