Brazilian Pension Funds Stability Report

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TEAM

Brazilian Pension Funds Stability Report

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PREFACE

The Brazilian Pension Funds Stability Report (REP) is a semiannual publication of the National Pension Funds Authority (PREVIC), which presents the overview of Pension Funds (PF), their recent evolution and perspectives in Brazil, focusing on the main risks and the measures taken to mitigate them.

The REP works as a communication tool for PREVIC, including for matters dealt with by the Strategic Committee on Supervision (COES), especially those related to the evaluation of the industry's inherent risks that may cause systemic risk.

This edition presents data referring to the first half of 2017 and seeks to provide a prospective assessment of the main risks.

The stability of the pension funds industry is the ability to maintain the funding level, the soundness and the regular functioning of the system, understood as the management of the resources of the participants and the payment of the benefits due.

The REP presents general aspects to specific situations considered relevant, in order to provide an understanding of the risks from the existing macroeconomic environment. The analysis seeks to highlight the liquidity and solvency situation, as well as the profitability, focusing on the inherent risks of management activities of third-party pension resources, all under a prospective approach.

Chapter 1 named "Macroeconomic Environment" contemplates the analysis of the economic situation and its possible effects on the pension funds system. Chapter 2, "Pension Funds System Overview", analyzes the system solvency and liquidity, with details on the evolution of the technical equilibrium, as well as the inherent risks, with the use of specific solvency, liquidity and credit indicators. In addition, there is analysis of results focusing on the ability to meet the actuarial target rate of return.

This edition still contains three boxes, the first one related to the recent regulatory changes, implemented and under implementation, that seek to strengthen the defense lines of the pension funds industry, and two to explain the methodology used in calculating liquidity and credit risk indicators.

EXECUTIVE SUMMARY

The Pension Funds System (PFS) is in the process of structural and conjunctural changes. Regarding structure, the governance of entities, the strengthening of the lines of defense and the greater effectiveness of sanctions help increase the soundness of the system. Regarding aspects of conjuncture, we should highlight the improvement of the economic activity, the low liquidity risk and the expectation of better returns for the assets, and the implementation of recovery plans, concentrated on the main Systemically Important Pension Funds Entities (ESI). Combining these factors allows risk reduction and greater credibility to the pension system.

The international environment is quite favorable, with low inflation and growth, without any relevant risks. The risk would be in the eventual sudden change of this benign international situation.

In the domestic scenario, the risks are associated with low economic growth, lower interest rates, political uncertainty and the fiscal situation.

As for the pension funds system, in the long-term, solvency will depend on the success of the implementation of the recovery plans in defined benefit (DB) schemes on the following years. Significant deficits are concentrated on some ESI plans with federal public sponsors.

The liquidity risk of the system is low. The system holds sufficient volume of assets that are eligible to meet its liabilities in the short and medium terms. Specific problems may arise in plans with long-term liquidity ratio (ILA) lower than one. In these cases, the PF will need to adopt corrective measures, with the involvement of the respective sponsors and participants.

Analyzing potential losses of financial assets showed that credit risk is not systemically relevant. However, there are plans with higher expected losses, which suggest poor quality in asset selection, deficiencies in credit risk management or, in isolated cases, evidence of fraud in investment operations, cases under investigation by the responsible agencies.

The reduction of interest rates for DB plans, with fixed-income rate assets maturing in less than five-year bonds and actuarial rates above the expected reinvestment rates, implies a reinvestment risk that totals BRL 30 billion for the system in the next five years.

Regarding the results, the scenario will be more challenging as the reduction in interest rates will decrease the return on fixed income rate assets, as well as increase the actuarial liabilities. Low economic growth for a prolonged period, in turn, may increase credit risk and negatively affect equity investments.

Finally, the measures, both implemented and under implementation, that seek to strengthen the credibility of the PFS:

- Implementation of regulatory proportionality, that demands more from ESI without burden other pension funds;
- Determination of higher criteria to managers authorization;
- Modernization and simplification of the regulatory framework, with emphasis on investment rules;
- Strengthening of the lines of defense, focusing on improving the internal and external audit process and more effective participation of self-regulation; and
- Increase the effectiveness of the punitive process, with the adoption of more appropriate instruments and penalties.

1 Macroeconomic Environment

1.1 International Scenario[1]

Data on the global economy indicate that, despite concentrated geopolitical risks, in few countries, activity recovery remains at a comfortable level, benefiting from the positive combination of inflation under control, including emerging ones, and a monetary stimulus maintained at unconventional levels, especially in the Euro Zone and the United States of America. Under these conditions, the global economy forecasts growth of 3.5% in 2017 and 3.6% in 2018.

In advanced economies, with growth estimations of 2.0% in 2017 and 1.9% in 2018, there were signals both from the Federal Reserve (FED) and the European Central Bank (ECB) to change directions towards more severe policies, which would have an impact on the long-term income of these countries and consequently on the growth of emerging markets and developing economies. However, these risks are mitigated by the benign economic scenario of these countries, where the labor market and consumption recover without price pressures and, as consequence, inflation estimations are declining.

For emerging market countries and developing economies, there was upward revision in Mexico and Brazil's growth estimations (both for 2017) and China (in 2017 and 2018), the latter being influenced by the likely tax support of the Chinese government to productive activities. As a result, aggregate estimations for these countries grew 4.6% in 2017 and 4.8% in 2018, in line with the positive scenario of inflation control and growth in world trade.

1 Monthly Global Reports of the World Bank (July 2017) and World Economic Outlook Update of the International Monetary Fund (July 2017).

1.2 Domestic Scenario[2]

The estimations of 0.70% and 2.38% for the Gross Domestic Product (GDP) of 2017 and 2018, respectively, suggest the consolidation of the economic activity growth trend, supported by the industry indexes higher than market expectations, both for industrial production and for the restricted retail trade. Another highlight in the recovery scenario was the crop harvest of June 2017, 31.1% higher than in June 2016.

The labor market, on the other hand, shows improvements through successive declines in the unemployment rate since March 2017 (12.8% in July), as well as the growth observed in both average real income (+ 3% to 2016) and in the real income mass (+ 2.3% to March 2017).

The price level, measured by the Consumer Price Index (IPCA), continues with a strong trend, corresponding to 2.95% and 4.06% for the end of 2017 and 2018, respectively. This framework, anchored in the expectations of the agents, signs continuity for the policy of reducing nominal interest rates of the economy, projected around 7% for the same period. As a result, real interest rates are close to 3%, with a significant impact on the pension funds system.

Although these reductions in interest rates have contributed to the fiscal framework (lower interest expense and, consequently, nominal income), the achievement of positive primary results remains challenging, both because of the need to recover federal revenues and budgetary rigidity.

Regarding changes in legislation that affect tax revenues and expenditures, we highlight the budget ceiling on spending, the approval of new labor rules, the encouragement of the private sector through concessions and privatizations and the definition of the BNDES.

Finally, positive signs coming from the international economy and from some sectors of the Brazilian economy will contribute to increase market confidence.

2 Bulletin Focus of September 29, 2017, available on http://www.bcb.gov.br/pec/GCI /PORT/readout/R20170922.pdf and PNAD of IBGE of July 2017.

2 Pension Funds System Overview

2.1 Introduction

The Pension Funds' investments are long-term savings that seek to maintain consumption patterns in the post-employment phase.

To meet this goal, Pension Funds' (PF) managers must allocate resources with a focus on maximizing its risk management in order to provide, at least, for mutual plans, the accomplishment of actuarial assumptions that will guarantee the payment of the present and future obligations.

The risks identified as inherent to the activities of resources management for pension purposes are liquidity, market, credit, operational, actuarial and asset and liability management (ALM).

At the international level, there is a consensus in the literature that resources managed by pension funds are fundamental for the economic development of countries, especially for the capital markets. Thus, the future living standard of individuals and their capacity for growth rests largely on the existence of sustainable long-term savings. This understanding is consubstantiated by the significant amounts hold by pension funds around the world[3] .

3 The Report on European private pension system: functioning, vulnerabilities and future challenges shows that the amount of resources of 184 private pension funds, in 22 European countries reached € 8.1 trillion in 2016, covering 193 million participants. Available on http://www.fsb.org/2017/10/report-on-european-private-pension-schemes-functioning-vulnerabilities-and-future-challenges/

2.2 System overview: June 2017

2.2.1 Big numbers

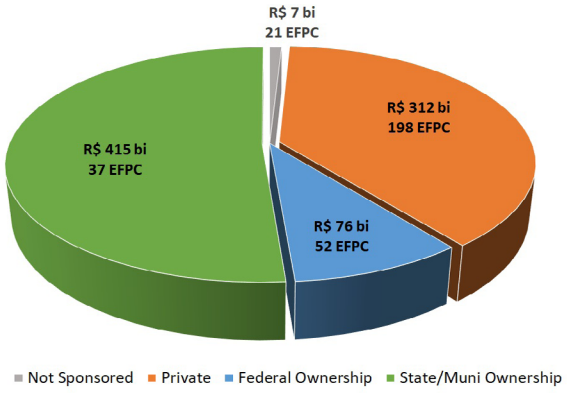
In Brazil, the resources managed by the 308 PF, distributed in 1,105 plans[4] , reached approximately BRL 810 billion, allocated to assets of various characteristics, maturities, rates of return and different levels of risks, highlighting among the possibilities the investments in assets that require to be financed at medium and long-term.

Regarding the type of the PF control, 60% of the total assets are managed by entities linked to federal, state and local public companies and institutions, 39% are tied to private companies and 1% maintained only by participants [5] (Graph 1).

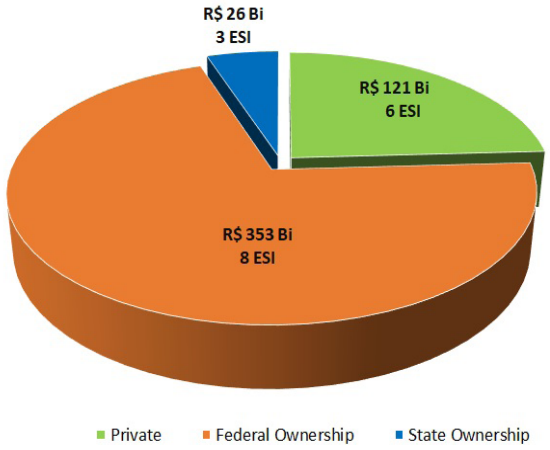
Of the 308 PF, seventeen are systemically important entities (ESI)[6], because they have size, relevance, risks, and operational complexity differences from the others. Overall, the ESI holds 62% of the system's total assets. Such differentiation allows the adoption of regulatory proportionality, promoting the enhancement of preventive actions and the improvement of risk management in PF, in line with Risk Based Supervision (SBR).

When it is restricted to ESI, the participation of entities tied to public owned companies reaches 76% of the group and 47% of the total, while the participation of those linked to private companies corresponds to 24% of the group and 15% of the total (Graph 2).

Graph 1 - PF: Assets and Ownership



Graph 2 ESI: Assets and Ownership



4 Pension benefit plans

5 Plans implements by class orders such as the Brazilian Bar Association (OAB), for example.

6 Instruction Previc nº 5, of May 29, 2017, that provides for the framing of complementary pension private entities such as Systemically Important Entities (ESI).

An increasing number of participants in the pension funds system is probable to occur by the following reasons:

i) There is a bill at the National Congress for the reform of the general pension system, with the adoption of clauses that will affect issues such as minimum age for eligibility for benefits and increase of terms of contributions.

ii) There are specific incentives for civil servants, such as the equalization of the benefits to the general regime. These facts represent incentives for the eligibility of new participants for the pension funds system, who aim to have complementary income after retirement.

Tabela 1: PF sponsored by states in activity

State	PF's name	Activities since	Nº Plans
Bahia	PREVBAHIA	March, 09th of 2016	1
Espírito Santo	PREVES	December, 19th of 2013	2
Minas Gerais	PREVCOM-MG	September, 19th of 2014	1
Rio de Janeiro	RJPREV	September 04th of 2013	1
Rio Grande do Sul	RS-PREV	April, 26th of 2016	1
São Paulo	SP-PREVCOM	March, 23 of 2012	3
Santa Catarina	SCPREV	May, 02 of 2016	1
Goiás	PREVCOM-GO	April, 05 of 2017	1

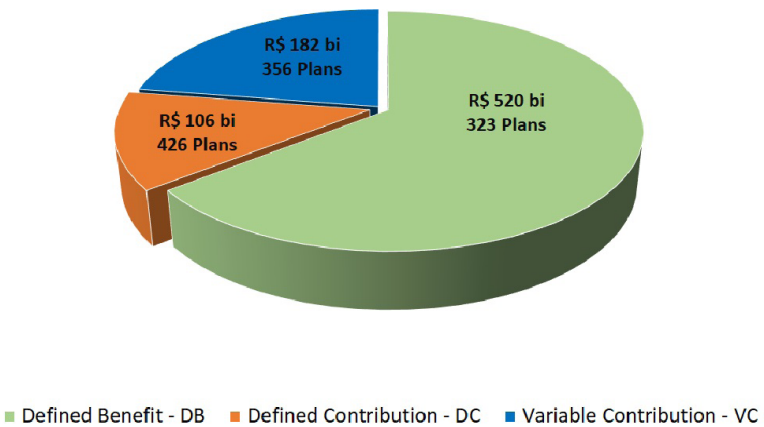
In this sense, there is a strong movement of public servants into newly created plans, such as the Funpresp of the Executive, Legislative, and Judiciary Branches at the federal level and eight benefit plans at the state level (Table 1).

In addition to those in operation, there are eleven plans requiring for authorization.

Regarding the distribution of resources by type of existing plans, Defined Benefit (DB) plans account for 64% of total system assets, followed by Variable Contribution (VC) plans, equivalent to 23% of total resources, complemented by the Defined Contribution (DC) plans, which add 13% to the system (Graph 3).

Considering the characteristics of each type of plan, the DC plans will probably expand more than others types, as they are less susceptible to the risks inherent in the plans with characteristics of DB and do not incur deficits, but require more proactive attitudes of participants towards the management of their resources.

Graph 3 - Types of Plans



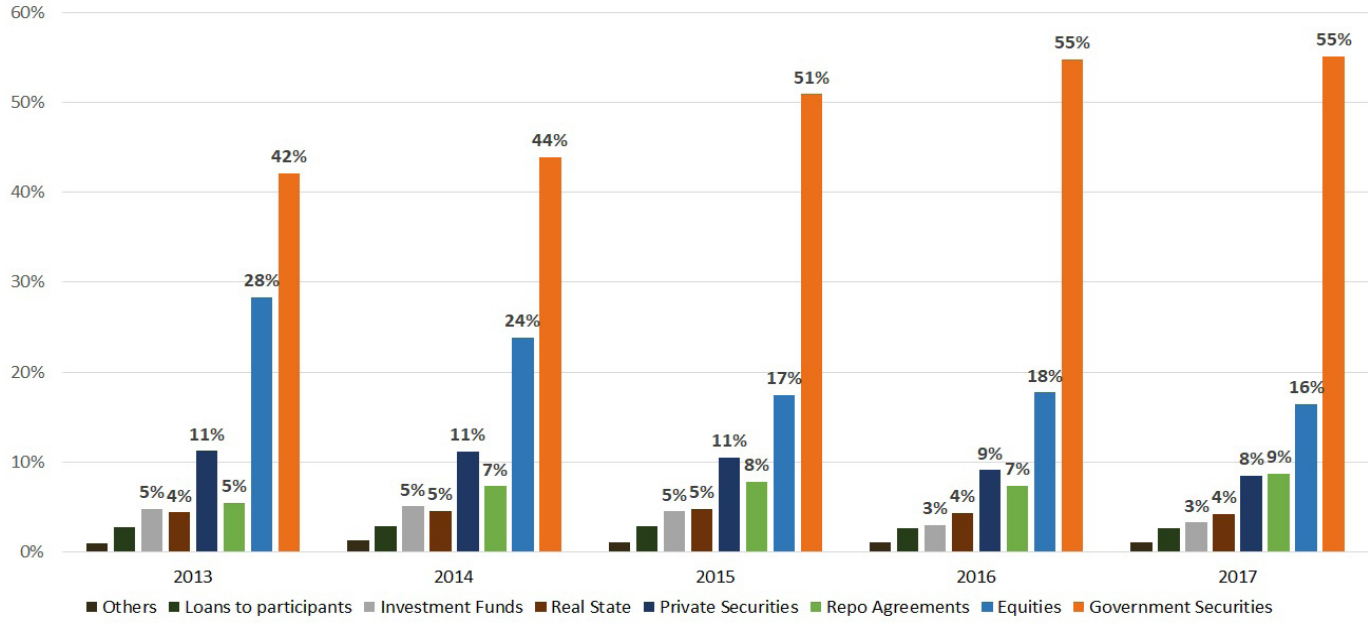
2.2.2 Investments

Compared to June 2016, the volume of assets of the PF increased 5.4%, due to the level of maturity of the plans and consequent amount of benefits payments higher than the contributions, as well as the low profitability, despite the context of the high interest rate level in the fixed income rate industry.

In this sense, we highlight the greater targeting for investments in federal public securities (TPF) over the last few years, which reached 55% of the total portfolio, motivated by the increase in interest rates from 2012 on. Repurchase agreements operations backed by TPF, which account for 9% in 2017, also stand out. On the other hand, equity investments, usually formed by shares, showed a decline in participation, with a reduction from 28% in 2013 to 16% in 2017 and such as private securities, with a reduction in the historical average from 11% to 8% in the same period (Graph 4).

Given the reduction of the interest rate, if not accompanied by a reduction in the actuarial goal, the perspective is to observe investments in higher risk assets to obtain better returns that those offered by TPF, especially equities, private debts (fixed income rate assets) and structured operations.

Graph 4 - Portfolio Composition



2.3 Solvency

In the long term, the solvency of the system depends on the efficiency of the recovery plans implementation for settling obligations in plans with DB characteristics. Significant deficits are concentrated in some ESI plans, especially those of federal public sponsorship.

The deficits resolution is through implementation of recovery plans, duly submitted to the respective deliberative councils of the PF[7] . The recovery plans generally increase the participants and sponsor contributions in order to recover funding level to meet plan's liabilities.

2.3.1 Solvency Index

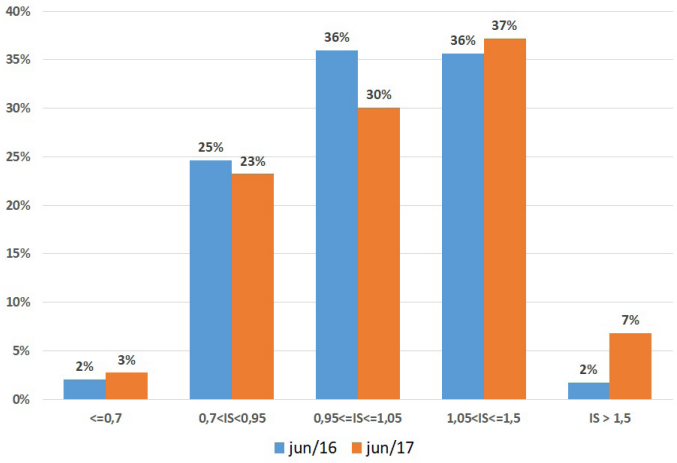
The solvency index (SI) of the system reached 0.93[8] in June 2017. The frequency distribution of the plans by quantity shows that only eight entities (3%) have IS below 0.7 (Graph 5), being just one ESI.

Strongly influenced by the deficits of some federal publicly sponsored ESI, the IS lower than one reveals that the resources available in the short and long term are below the actuarially required amount to meet the obligations due, evidencing the necessary adoption of recovery plans and other short-term corrective measures[9] (Graph 6).

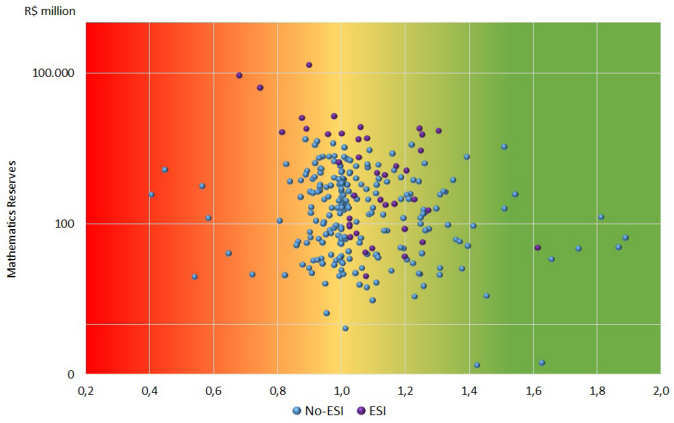
The satisfactory outcome of such recovery depends on:

- Sponsors' economic and financial capacity to make the necessary contributions;
- participants' wages capacity to support the increase of contributions; and
- approval of the recovery plan in all responsible instances.

Graph 5 - Solvency Index Distribution



Graph 6 - ESI: Solvency Index



7 For EPFC sponsored by federal government owned entities, the recovery plan needs previous approval from Secretaria de Coordenação e Governança de Empresas Estatais (SEST).

8 Solvency Index related the Coverage Equity (account 2310000000) of BRL 724 billion, with the Mathematical Provisions (account 2311000000) of BRL 731 billion. The difference between the Coverage Equity and the Mathematical Provisions is the Funding Level.

9 Recovery plans are in progress for most cases in this group.

2.3.2 Funding Level: deficits and surpluses

In recent years, as of 2013, deficits have surpassed the system's surpluses. In June 2017, the sum of the deficits reached BRL 78 billion, which represents 10% of the total assets of the system, while the surpluses reached BRL 21 billion. The expectation for the end of the year, confirming GDP growth above 0.5%, is to reduce the net deficit (Graph 7).

Recent deficits were due to three main factors:

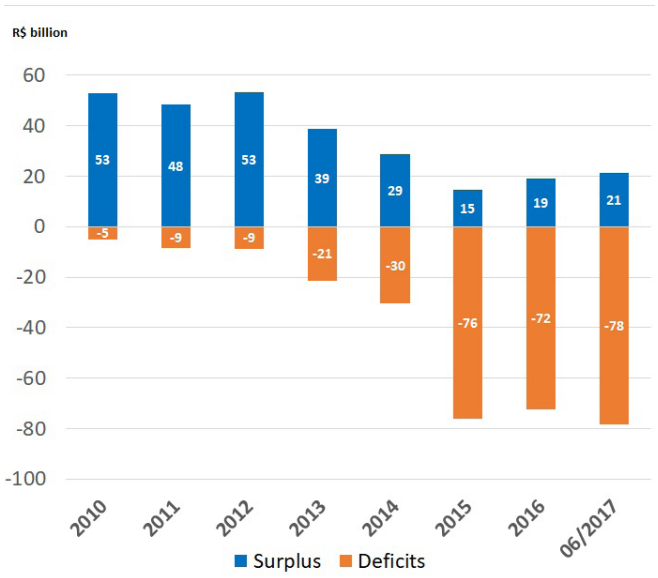
- Profitability lower than the actuarial target, given the low economic activity growth, and the inflationary dynamics that increased the required nominal interest rate, especially in 2015;
- changes in actuarial assumptions that impacted mathematical provisions, especially those related to longevity; and
- investments that did not provide the expected return, including those with signs of fraud.

2.3.3 Sponsor's Dependency

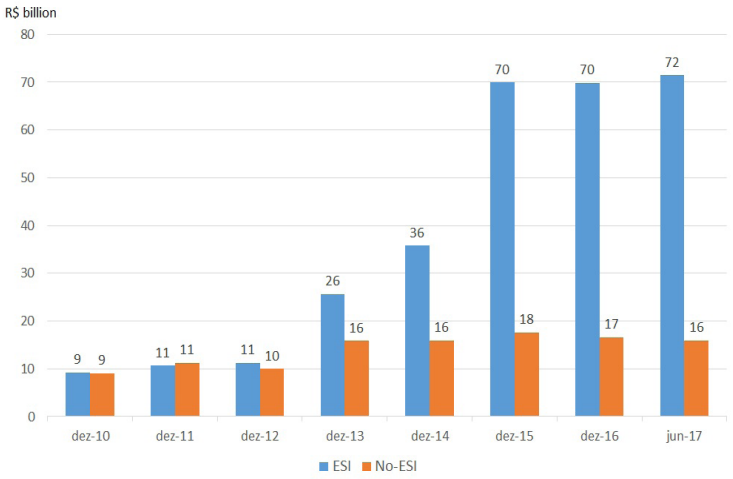
The dependence of the PF on their respective sponsors[10] has grown since 2012, reaching its maximum in 2015, when it totaled BRL 88 billion in the consolidated system. In June 2017, the amount of sponsor debt with PF remains at the same level of 2016, BRL 72 billion, which the majority is owed by ESI's sponsors (Graph 8).

With regard to ESI, the significant amount is resulted of accrued deficits from 2015 (Graph 9)[11].

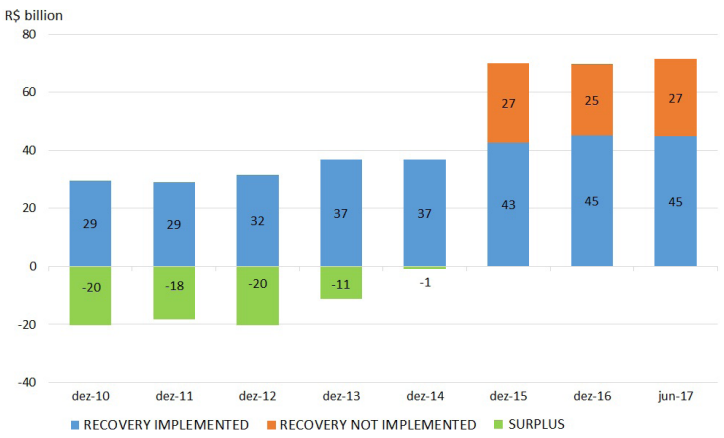
Graph 7 - Surplus and Deficits



Graph 8 - Sponsored Dependency



Graph 9 - ESI : Sponsored Dependency



10 Dependence on the sponsor is expressed as the sum of the hired debt (account 1211040000), the past due contributions (account 1211040000), past services – contributions to be made (account 2311030101), equaled deficits (account 2311030201), recoverys to extraordinary contributions (account 2311030301) and accrued deficit (account 232000000).

11 The amount of recovery corresponds to the accrued deficit (account 2320000000).

For the non-ESI, there is a much lower amount of deficits, around BRL 2 billion in 2017 (Graph 10).

Regarding the total assets, the average percentage of commitment of the system with the sponsors increased from 3% in 2012 to approximately 11% in 2016 and 2017. On average, the dependence on sponsors of ESI and non-ESI corresponds to 14.3% and 5.2% of assets, respectively (Graph 11).

This greater dependence on the plans, especially of some ESI, requires closer attention to the amount and to thefinancial conditions of the respective sponsors.

2.4 Liquidity Risk

The liquidity risk of the system is low. The aggregated system holds sufficient volume of assets that are eligible to meet its obligations in the short and medium term.

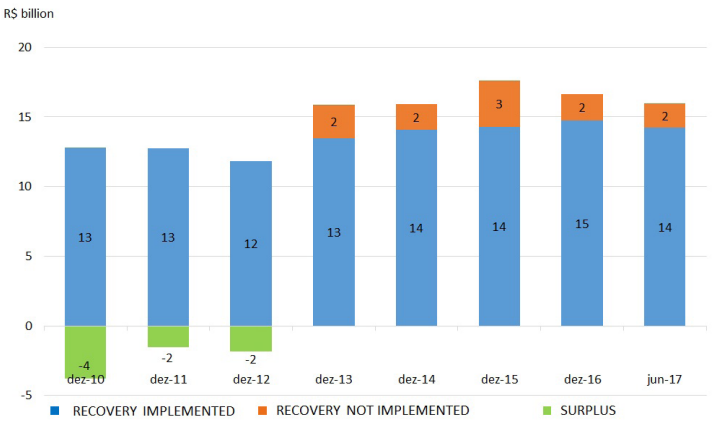
Specific problems may arise in plans with long-term liquidity index (ILA) lower than one, if the PF neglects corrective measures, including those with the involvement of the respective sponsors and participants.

The analysis of the liquidity risk of the benefit plans involved the evaluation of potential financial losses arising from eligible assets at prices below those practiced in the market, made to fulfill payment of benefits to the participants.

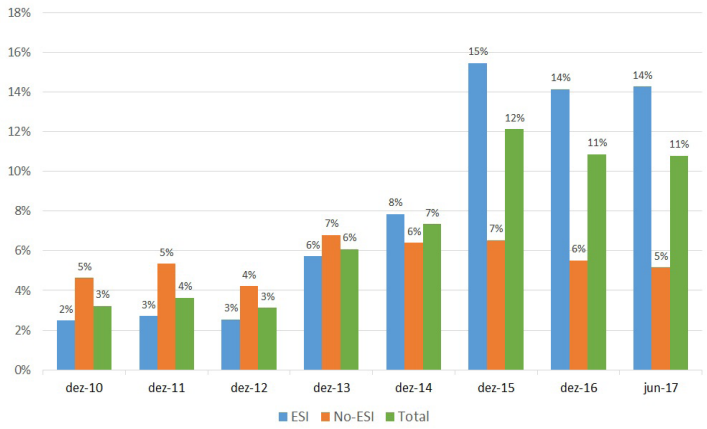
For the purposes of measuring and analyzing liquidity risk more thoroughly, three indicators were developed with the purpose of demonstrating the ability of the plans to meet obligations with participants in the short and medium term, considering assets with higher and lower liquidity, as well as showing the term mismatch between the assets and liabilities of the plans. They are[12]:

- Long-term Liquidity Index (ILA);
- Short-term Liquidity Index (ILR); and
- Duration Gap (DD).

Graph 10 - Não-ESI: Sponsored Dependency



Graph 11 - Sponsored Dependency to Total Assets



12 The methods description for calculation liquidity indexes are in Box 2.

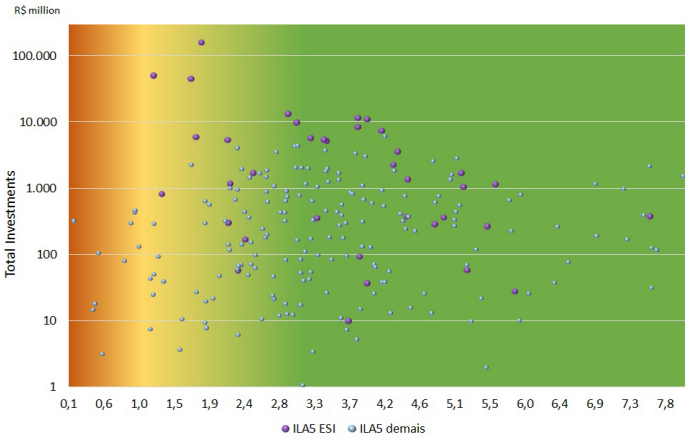
2.4.1 Long-term Liquidity ratio

The Long-term Liquidity Index (ILA) measures the availability of liquid assets, regardless of their maturity or volatility, to meet obligations with participants projected for five years.

The consolidated index value for the DB plans, in June 2017, was 2.36. Considering only the DB plans managed by ESI, the index was 2.07 (Graph 12).

Therefore, net assets correspond to more than twice the cash requirement to fulfill the obligations with benefits payments to the participants, even if it were necessary to sell assets at lower prices than expected due to abrupt swings at assets' market prices.

Graph 12 - Long Term Liquidity Index



2.4.2 Short-term Liquidity ratio

The Short-term Liquidity Index (ILR) considers only fixed-income rate flows in relation to actuarial liabilities up to five years.

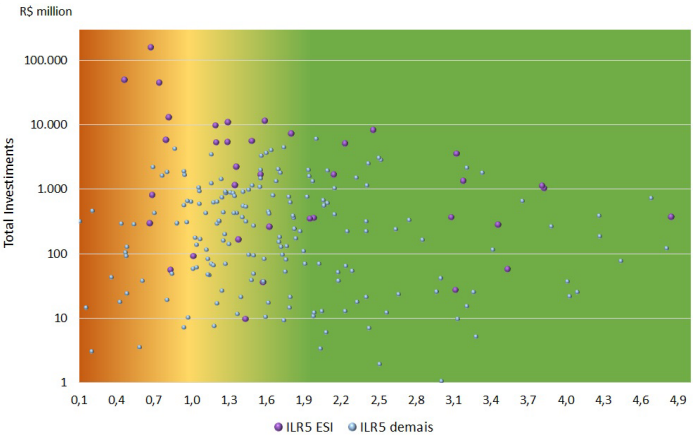
The consolidated ILR for all DB plans was 0.75, while for the DB plans managed by ESI it was 0.72. This shows that the restricted liquidity of the ESI and non-ESI are at close levels, despite the greater maturity of the plans run out by ESI.

The ILR lower than one found in some benefit plans (Graph 13) suggests the need to anticipate selling fixed income rate assets or other assets to meet cash requirements for the next five years.

The obligation to sell assets, imposed by short-term actuarial commitments, tends to expose the plan to greater market risk, to the extent that the sell-off will be under adverse market conditions, at prices lower than those set when target.

On the other hand, based on the premise that the plan runs with surplus, the ILR much higher than one may indicate excess liquidity and consequent risk of reinvestment.

Graph 13 - Short Term Liquidity Index



2.4.3 Duration Gap

The Duration Gap (DD) between assets and liabilities reflects the mismatch between the average maturities of receipts relative to fixed income rate assets (including coupon flows and amortization) and the flows of benefit payments deducted from the flows of contributions from retired participants.

The liability duration of all DB plans was 11.3 years, using 5.66% per year[13] at a discount rate. Regarding the BD plans administered by ESI, the liability duration was 11.5 years, at a discount rate of 5.43% per year[14] . The average duration reflects that the DB plans are mature.

In relation to negative mismatching, when the liability duration is significantly higher than the duration of fixed income rate investments, there are 86 plans with gap over six years, totaling BRL 44 billion in assets in this situation. In the ESI group, there are 15 plans in this situation, which total BRL 15 billion (Table 2).

Tabela 2: Time Gap between assets and liabilities

	AGGREGATED		ESI	
YEARS GAP	**Nº PLANS**	**AMOUNT (R$ billion)**	**Nº PLANS**	**AMOUNT (R$ billion)**
<-9	42	16	3	7
>=-9 e <-6	44	28	12	18
>=-6 e <-3	74	264	12	224
>=-3 e <0	74	122	11	86
>=0 e <3	58	44	14	24
>=3 e <6	7	2	-	-
>=6	14	8	1	7

13 In this case, the average actuarial rate of DB plans was based on the actuarial rates informed in the Actuarial Statements of December 31, 2016, weighted by the respective mathematical provisions for the same period.

14 Same method as the previous footnote, applied to DB plans managed by ESI.

2.5 Credit Risk

The analysis of the potential losses of financial assets showed that credit risk is not systemically relevant. However, there are plans with higher expected loss, which suggest poor quality in asset selection, deficiencies in the management of credit risk or, in isolated cases, evidence of fraud in investment operations, cases under investigation by responsible agencies.

The credit risk assessment based on the portfolio expected loss (PE), inferred from the issuers credit risk assessments made by rating agencies, estimates the probability of default of private securities (PD).

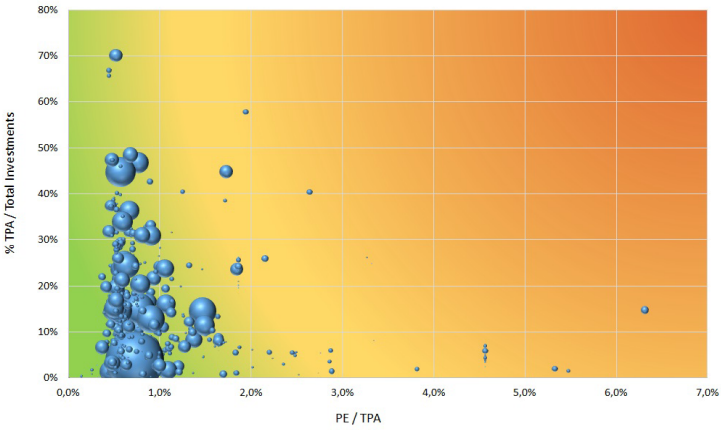
For assets with no valuations available, around 10% of total private securities held by the benefit plans, a discretionary method assigns PD value. The PE of the evaluated securities added to the loss of the securities without available valuation is denominated an aggravated expected loss (PEA).

The data show that the PE in relation to the total of private securities rated (TPA) is low, less than 1% in the average, both in a consolidated form (0.78%) and in the ESI (0.77%). With that, the TPA compared to total private securities reaches 2.19% in average for the consolidated and 2.60% for the ESI (Graph 14).

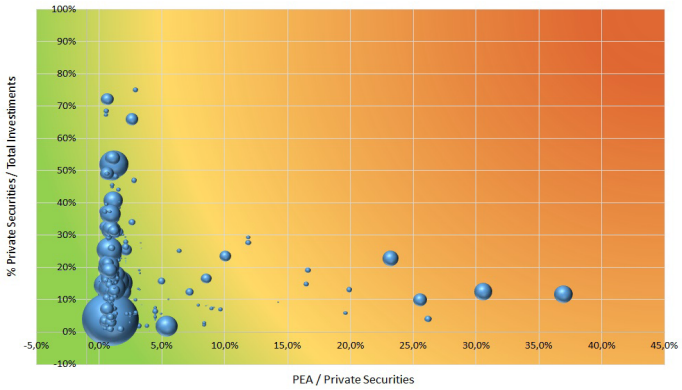
Considering the low participation of private credit securities in relation to total investments, the expected losses, even when aggravated, do not reach 0.2% of the total.

However, there are isolated cases of plans with higher expected loss, which accounted for more than 30% of the private securities portfolio and 4% of total investments (Graph 15).

Graph 14: Expected Loss (PE)



Graph 15 - Aggravated Expected Loss (PEA)



2.6 Actuarial Risk: Interest rates

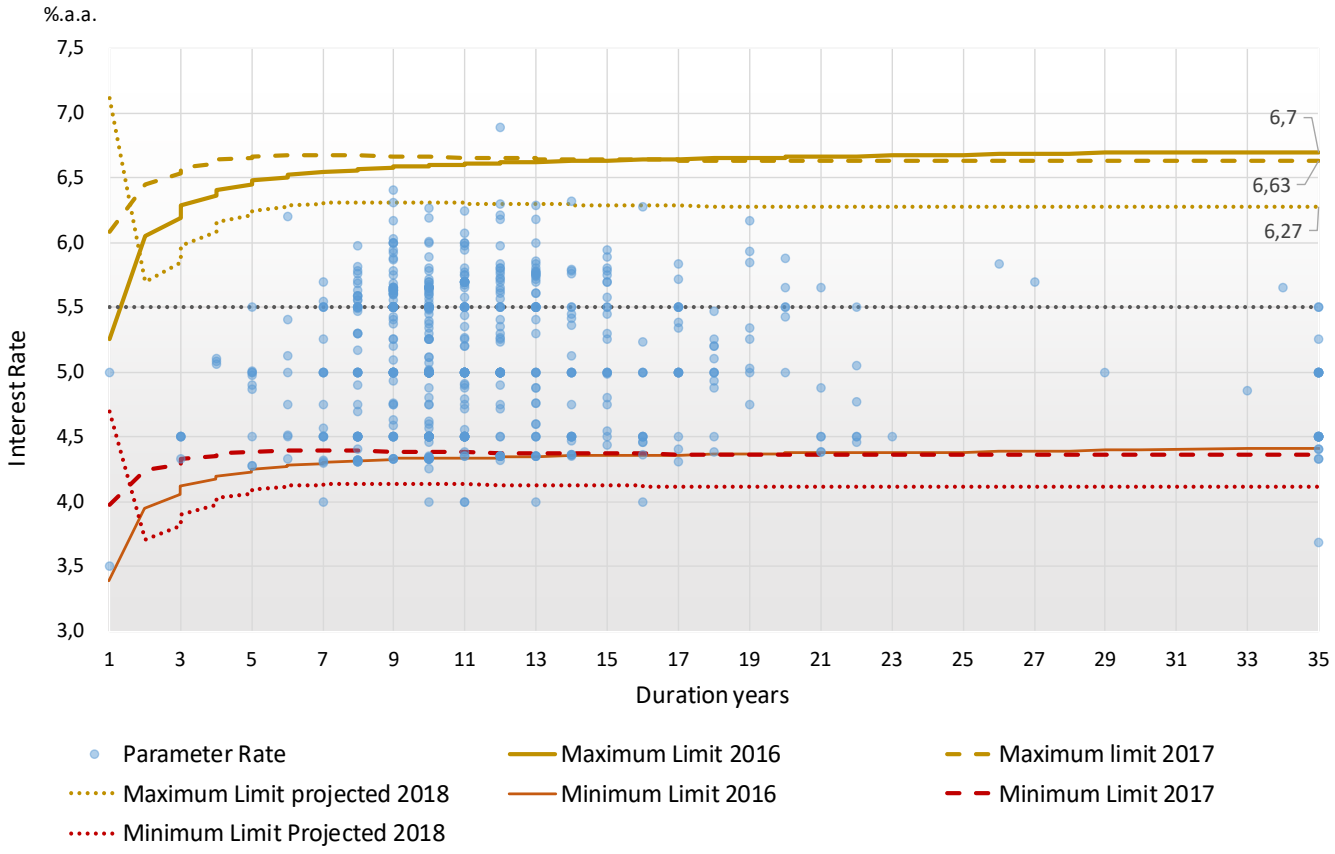
2.6.1 Parameter Rate

In line with real interest rates, downward trend lower parameter rates are expected[15], which are limits references disclosed by PREVIC as assumptions for actuarial discount rates. Based on the projected interest rates for the coming months, the upper limits of the intervals tend to reduce from 6.70% to 6.63% in 2017 and to 6.27% in 2018 (Graph 16).

With the current NTN-B real interest rate constant, the upper limit of the interval for the longest durations will be close to 5.5% per year over the next two years.

However, despite the expectation of a reduction in the SELIC interest rate, long-term rates have not been decreasing with the same intensity. If they behave similarly to changes in short rates, the cap for actuarial interest rates could easily reach below 5.5% in the short-term.

Gráfico16 - Actuarial Risk: Interest Rate



15 Resolution CGPC 18, of March 28, 2006.

Few plans will exceed the authorized actuarial rate ceiling for both the 2017 and 2018. However, if the reduction of the upper limit occurs, the number of plans will increase significantly if the PF does not adjust the actuarial target rate of return. Currently, 91 plans have actuarial rates above 5.5%, which may indicate the need for recovery in the near future.

In this regard, it is important to understand that the process of interest rate reduction should reflect the expected profitability of the assets, requiring reality in the definition of the actuarial target, based on the technical evaluation of the actuary and the governance body.

If the plans adjust their actuarial interest rates down, the mathematical provisions tend to increase, as well as the accumulated deficits, considering everything more constant.

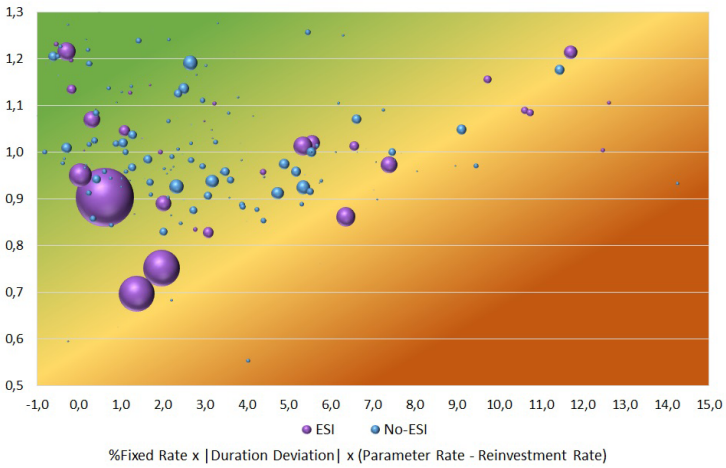
2.6.2 Reinvestment Risk

The existence of fixed income rate investments with maturity lower than five years and actuarial rates above the expected reinvestment rates, in a scenario of lower interest rates, implies a potential number of short-term reinvestments worth BRL 30 billion[16] , considering only the DB plans.

Therefore, the risk of reinvestment is not negligible. In specific cases, there are plans that discount their liabilities at rates above 6% per year and have a duration of assets three times lower than that of liabilities, a fact that deserves attention by the managers.

Managers of plans with high reinvestment risk[17] and solvency ratio lower than one will tend to implement more timely actions to re-evaluate the composition of investments against the challenges posed (Graph 17).

Gráfico 17: Reinvestiment Risk



16 Present value of five-year fixed income rate flows of DB plans with ILR greater than one, which exceed the present value of the expected actuarial liability flows for the same period.

17 The reinvestment risk was estimated based on the percentage of government securities, private securities and repo operations in relation to total investments, multiplied by the duration gap (DD) module, as defined in Box 2, and multiplied by the difference between the actuarial rate of the plan and a reinvestment rate defined at 4.5% per year. The formula applies for plans with fixed income rate assets less than the duration of the liability and with an actuarial rate higher than 4.5% per year.

2.7 Profitability

The managers of benefit plans must make investments that maximize returns at certain risk levels, in order to provide, at least for mutual plans, the fulfillment of established actuarial goals that will guarantee the payment of present and future obligations.

In 2017, the average actuarial rate of the system is 5.26% plus the variation of the National Consumer Price Index (INPC). For the ESI group and the non-ESI group, the average actuarial rate is 5.46% and 5.19%, respectively.

As shown in Graph 18, the system and the ESI were not able to achieve, on average, the actuarial rates established for the first half of 2017, with consequent deficits generation for the administered plans.

As of 2013, the results of the plans have been constantly lower than the actuarial targets, which may mean unappropriated discount rates used by PF to evaluate liabilities present value, a fact that will require more attention by the managers.

The most significant losses outcome from equities investments, especially in 2014 and 2015, when the stock prices fell down sharply. ESI results were significantly lower than non-ESI due to the higher equity volume in the asset portfolio.

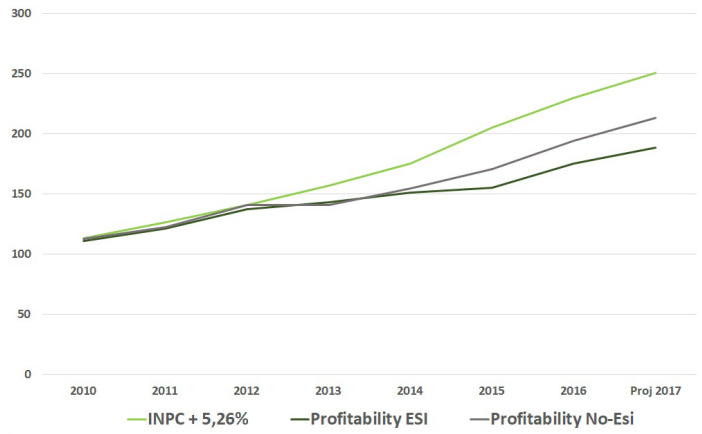
In 2016 and through June 2017, the profitability of the ESI did not meet the actuarial targets. Differently, non-ESI presented better proceeds and met their actuarial targets.

For the second half of 2017, in view of the recent behavior of the stock market, there is expectation of improvement of ESI's profitability, at least to meet actuarial targets (Graph 19).

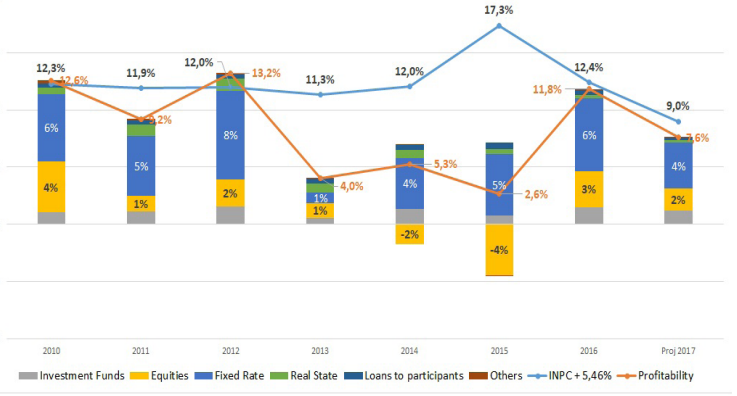
Likewise, non-ESI should show a profitability slightly above the actuarial target of the group (Graph 20).

Forward looking, lower interest rates implies higher liabilities and the origination of short-term deficits if the investments do not present returns at the same level of liabilities increase.

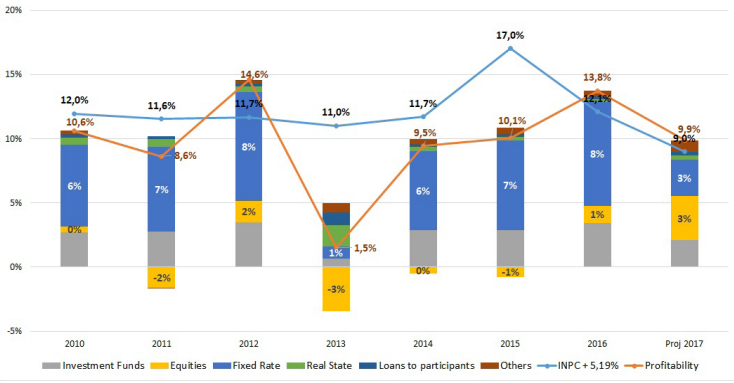
Graph 18 - Profitability vs Parameter Rate Average



Graph19 - ESI: Profitability by Asset Class



Graph 20 - No-ESI: Profitability by Asset Class



2.8 Final remarks

Finally, the pension funds system is in the process of structural and conjunctural changes that seek a system more sound and reliable system, less susceptible to market vulnerabilities.

In the structural aspect, there is expectation for a general reform in the Brazilian pension system, with the adoption of clauses that will affect issues such as the minimum age to become eligible for benefits and the increase of the periods for collecting contributions.

Regulations recently issued by CNPC and PREVIC are also important and deal with the following subjects:

- Implementation of regulatory proportionality, which demands more for ESI without burdening other pension funds;
- establishment of more strict criteria in terms of qualification to authorize directors and members of the board of directors;
- modernization and simplification of the regulatory framework, with emphasis on investment rules;
- improvement of governance, emphasizing the importance of professional experience and education for management and accountability in the decision-making process;
- strengthening the lines of defense, through internal and external auditing process enhancement and a more effective participation of self-regulation; and
- increase the effectiveness of the sanctioning and punitive process, with the adoption of more appropriate instruments.

Regarding conjunctural aspects:

- The gradual increase of economic activity;
- low liquidity risk;
- the expectation of obtaining better returns for the assets; and
- the implementation of recovery plans to cover deficits, concentrated in the main ESI.

The combination of all these factors will allow risk reduction and greater credibility to the pension funds system.

box 1

Strengthening Defense Lines: recent regulatory measures

1.1 Systemically Important Entities (ESI)

In order to implement regulatory proportionality to apply preventive actions and improve risk management in PF, in line with Risk Based Supervision (RBS), PREVIC issued Instruction nº 5, dated May 29, 2017 (ESI), which establishes classification criteria that consider the size and relevance of the PF to the Pension Funds System (PFS).

Previc will consider as ESI:

- Operating PF whose sum of the mathematical provisions of their benefit plans exceed 1% (one percent) of the total mathematical provisions of the whole system; and
- PF created on the basis of Article 40, §§ 14 and 15 of the Federal Constitution, whose sum of the mathematical reserves of its benefit plans exceed five percent (5%) of the total mathematical reserves of the PF that belong to this industry.

This way, the Autarchy can dimension the regulatory load with greater accuracy considering the systemic risk of each entity, in order to strengthen the solidity of the private complementary pension system without allocating unnecessary costs to the supervised ones, as well as to optimize the use of the own resources in the process of supervision.

In this sense, starting in 2018, ESI will be subject to the permanent supervision of PREVIC, without prejudice to other criteria established in the PREVIC's monitoring and supervision program.

1.2 Resolution CMN nº 3792: improvement, modernization and simplification

The proposal to amend CMN Resolution 3,792, dated September 24, 2009, is part of the action to strengthen PF's defense lines and aims to improve, modernize and simplify investment rules, observing the regulatory proportionality and the dynamics of the financial market.

The amendments seek to align the private pension system regulation with the other applicable rules to the market[18] .

In this direction, the proposal emphasizes the importance of professional management, with focus on governance and accountability rules in the investment decision-making process, including potential conflicts of interest, improvement of internal controls and risk management, establishment requirements for assets, especially with regard to deposit, register process, and to update the investment rules for existing financial assets in the market.

18 Resolution CMN nº 4,444/2015 and Instructions CVM nº 555/2014, no. 558/2016 and 579/2016.

1.3 External Auditors and Auditing Committee

PREVIC forwarded a resolution provisioning independent auditing services to the National Complementary Pension Committee (CNPC). Among the proposed measures, is highlighted the implementation of auditors' certification, the audit team periodic replacement, the creation of a new report focused on internal controls and governance, and the Audit Committee's requirement for ESI.

The proposed resolution is in line with the best practices of the National Financial System (SFN) and aims to provide greater reliability to accounting information, require constant updating and greater professionalism of service providers, and observe regulatory proportionality by making specific requirements for PF classified as systemically important.

The Audit Committee will play a relevant role as an agent of good governance, exercising functions such as, for example, evaluation of the independent audit, the effectiveness of PF internal controls and the quality of the financial statements. Considering the heterogeneity of the system and the need to focus supervisory efforts on the larger entities that represent a greater risk, the Audit Committee will be required only for ESI, avoiding the encumbrance of small and medium-sized entities.

1.4 Prudential Preventive Measures

The proposed regulation seeks to strengthen the process of preventive action within the context of Risk Based Supervision (RBS), approaching regulatory models found in other supervisory bodies of the National Financial System, such as the Brazilian Central Bank.

In this sense, a draft regulation is under discussion to provide PREVIC with the possibility of adopting precautionary measures when checking occurrences that compromise or could compromise the liquidity, solvency and balance of benefit plans, and especially the regular functioning of the Pension Funds System.

The regulation will allow PREVIC to act preventively whenever it identifies the exposure of the benefits plans to risks incompatible with the management structures and internal controls, lack of sufficient elements to evaluate the economic and financial situation, inadequate application of resources or, situations that could pose a serious risk to the benefit plans.

box 2 Liquidity Risk Indicators

The following indicators built upon the information provided by the industry make possible a more detailed assessment of the pension funds' liquidity risk:

2.1 Restricted Liquidity Index (ILR)

Description:

ILR relates the present value (PV) of fixed income rate securities (public bonds, private bonds and repurchase agreements) to short-term maturities (up to five years) with the actuarial liabilities, net of contributions, within the same period (up to five years).

Data sources:

• Investment Statement (DI) of the index reference date.

• Actuarial Statement (DA) of the nearest available index or prior reference date.

• Liability Duration and Pricing Adjustment Worksheet (DPAP) of the nearest available reference date or earlier.

Calculation Method:

$$ILR = \frac{\mathrm{VP}_{RF5}}{\mathrm{VP}_{PA5}}$$

$$\mathrm{VP}_{RF5} = \mathrm{VP}_{TPinflação5} + \mathrm{VP}_{TPpré5} + \text{Others RF}_5 \quad ,$$

$$\mathrm{VP}_{TPinflation5} = \sum_{t=1}^{5} \frac{inflation\ flows_t}{(TA+1)^{t-0,5}} \quad ,$$

$$\mathrm{VP}_{TPpré5} = \sum_{t=1}^{5} \frac{Pre\ flows_{\ t}}{[\prod_{i=0}^{t-1}(inflaton_i + 1)](inflation_t + 1)^{0,5}(TA+1)^{t-0,5}} \quad \text{and}$$

$$\mathrm{VP}_{PA5} = \sum_{t=1}^{5} \frac{net\ liabilities\ flows_t}{(TA+1)^{t-0,5}}$$

Where:

- $Inflation_i$ is the annual inflation rate projected for the i-th year.
- $Inflation\ flows_t$ is the sum of the NTN-B and NTN-C principal and coupon flows occurring in the t-th year. Fluxos pré$_t$ é o somatório dos fluxos de cupons e principal de LTN e NTN-F ocorridos no t-ésimo ano.
- Pre $flows_t$ is the sum of LTN and NTN-F coupon and LTN principal flows in the i-th year.
- LFT is the sum of the value applied in LFT on the index reference date.
- Other RF_5 is the sum of the book value of the income securities not considered in the variables $VP_{inflation5}$ and $VP_{pré5}$ according to the amount recorded in the investment statement at the reference date of the index.
- *TA* is the annual real interest rate reported in the last available actuarial valuation in relation to the index reference date.
- *Net liability flows*$_t$ correspond to the total of the benefit streams subtracted from the asset and liability contribution flows occurring in the t-th year.

Interpretation:

ILR expresses the relationship between the expected flows and the actuarial obligations within five years. When higher than one, the index informs the existence of fixed income rate flows in an amount higher than the net actuarial liabilities, indicating a lower need to carry out other assets to cover the obligations in the reference period. Therefore, the larger ILR tends to reduce exposure to market risk.

2.2 Long Term Liquidity Index (ILA)

Description:

ILA relates the high liquidity assets, defined by liquid assets "level 1", to the PV of actuarial obligations, net of contributions, up to five years.

Data sources:

- Investment statement (DI) of the index reference date.
- Actuarial statement (DA) of the nearest available index or prior reference date.
- Liability Duration and Pricing Adjustment Worksheet (DPAP) of the nearest available reference date or earlier

Calculation Method:

$$ILA = \frac{Liquid\ assets\ "level\ 1"}{VP_{PA5}}$$

$$\mathrm{VP}_{PA5} = \sum_{t=1}^{5} \frac{Net\ liability\ flows_t}{(TA+1)^{t-0,5}} \quad \text{e}$$

Where:

- *Liquid assets "level 1"* corresponds to the sum of the fixed income assets (RF) and liquid shares "level 1"..
- *Net liability flow*$_t$ correspond to the total of the benefit streams subtracted from the asset and retired participants' contribution flows occurring in the t-th year.

- *RF* is the total fixed income rate of the portfolio of the indexed position indexed as public securities, private securities and repurchase agreements.
- *Liquid shares "level 1"*. Means the shares that do not to exceed one percent of the average daily trading volume of the share in the market. In the calculation, the daily average traded over the last two years projected for five years. The premise for classification as high liquidity is that the plan will be able to trade up to one percent of the value projected for the next five years with little or no effect on market prices.
- *TA* is the annual real interest rate reported in the last actuarial valuation available in relation to the index reference date.

Interpretation:

ILA expresses the relationship between the total expected cash flows of the assets and the actuarial liabilities within five years. When it exceeds one, the index informs the existence of flows of assets with "level 1" liquidity in an amount higher than the net actuarial liabilities, indicating that there are sufficient assets to cover the obligations.

The higher the ILA, the greater the flexibility for the realization of assets and avoid losses arising from the need to negotiate under adverse market conditions, at prices lower than those set as a target when acquired.

The joint evaluation of the ILA with the ILR makes it possible to infer the level of exposure to market risk in the short term. Although a plan presents low short-term liquidity risk assessed from the ILA result, it may be exposed to an undesirable market risk if the ILR indicates the short-term fixed income rate insufficiency and consequent need to realize these assets outside their respective maturities or other assets.

2.3 Duration Gap (DD)

Description:

DD shows the difference between the duration of investments applied in fixed income rate and the duration of actuarial liabilities..

Sources of data:

- Investment Statement (DI) of the index reference date.
- Actuarial Statement (DA) of the nearest available index or prior reference date.
- Liability Duration and Pricing Adjustment Worksheet (DPAP) of the nearest available reference date or earlier.

Calculation method[19]:

Duration deviation = Fixed income rate duration – liability duration (net benefits)

19 The liability duration is according the formula expressed in the Resolution CGPC nº 18/2006.

$$Duration\ deviation\ = \frac{\sum_{t=1}^{N} \frac{Net\ benefits_t}{(TA+1)^{t-0,5}} \cdot (t-0,5)}{\sum_{t=1}^{N} \frac{Net\ benefits_t}{(TA+1)^{t-0,5}}}$$

Similarly, the fixed income rate is:

$$= \frac{\sum_{t=1}^{N} \left[\frac{inflatio\ flows\ TP_t + real\ flows\ TP\ pré_t}{(TA+1)^{t-0,5}} + Other\ flows\ RF_t \right] (t-0,5)}{\sum_{t=1}^{N} \frac{fluxos\ TP\ inflation_t + real\ flows\ TP\ pré_t + Other\ flows\ RF}{(TA+1)^{t-0,5}} + LFT}$$

Sendo:

$$Real\ flows\ TP\ pré_t = \frac{TP\ flows\ pré_t}{[\prod_{i=0}^{t-1}(inflation_i + 1)](inflation_t + 1)^{0,5}}$$

Where:

- *Net benefits*$_t$ are the sum of the net benefit payments of contributions levied on these benefits over the t-th term.
- *TA* is the annual real interest rate reported in the last available actuarial valuation in relation to the index reference date.
- *Other flows RF*$_t$ is the sum of the book value of fixed income rate securities maturing in the t-th year.
- The other variables have the same meanings as those described in the ILR calculation.

Interpretation:

DD allows evaluation of the immunization level of investments indexed to the fixed income rate in the portfolio of benefit plans, that is, the sensitivity of this portfolio to changes in interest rates.

Negative deviations suggest the existence of a risk of reinvestment, in which the plan would have a tendency to present losses and deficits (surpluses) if there were a reduction (increase) in the expected interest rates.

The lower the maturity difference between the maturity of the assets and the payment of the obligations (mathematical provisions), the lower the susceptibility of the plan to changes in interest rates.

box 3 Credit Risk Indicators

The following indicators built upon the information provided by the industry permit the assessment of the pension funds' credit risk more thoroughly:

3.1 Expected Loss Indices (PE% and $PE\%_{overall}$)

Description:

The first indicator (*PE%*) is the ratio between the expected loss *(PE)* for the period of one year and the total of private securities23 that have a credit risk classification (rated), called TPA.

The second *(PE%)* is the ratio between the expected loss *(PE)* for the period of one year and total investments *(TOI)*.

Data sources:

- Investment statement (DI) of the reference date of the index.
- Index reference date balance.

Calculation method: Assessed private securities

$$PE\% = \frac{PE}{TPA}$$

$$TPA = \sum_{i=1}^{n} private\ securities\ ranked_i \quad \text{e}$$

$$PE = \sum_{i=1}^{n} PD_i . private\ securities\ ranked_{i_i}$$

While $PE\%_{overall}$ is calculated:

$$PE\%_{geral} = \frac{PE}{TOI}$$

Where:

- PD_i is the one-year default probability of the i-th private debt security of the portfolio estimated from credit bureaus information.
- *Private debt rated* (TPA) is the value of the i-th private debt security for which credit information is available.
- *Total Investments* (TOI) is the total value of investments (count 1230000000).
- *Total private securities* (TTP) corresponds to the amount of private debt securities in portfolio, evaluated or not.

Interpretation:

The higher the *PE%,* the greater the credit risk of the private debt securities.

The analyses of expected loss and profitability should be together to verify if the greater risk offsets the higher return.

The overall *PE%* assesses the significance of the expected loss of the private debt securities rated in relation to the total investment portfolio and, therefore, the relevance of the total credit risk of the plan portfolio.

3.2 Aggravated Expected Loss Indices (PEA% and PEA% $_{overall}$)

Description:

In addition to the previous indicators, which measure the credit risk only of publicly rated private debt securities, two other indicators evaluate the risk of private debt securities without evaluation of external sources in the calculation.

Therefore, in order to assign a risk measure to the rest of the private debt securities portfolio, a methodology was applied to define a risk coefficient for the assets without available valuation, called the aggravation factor (FA), as the PD for the debt securities evaluated.

The FA_j's method of calculation is over the empirical perception that the losses in assets without valuation are inversely associated with the amount of PF that they apply to the issuers of these assets without evaluation.

The first indicator, *PEA%*, is calculated by the ratio between the *PEA*, which results from the addition of *PE* to the sum of the FA_i product by the values of private debt securities without valuation available, and total private debt securities *(TTP)*. The second, $PEA_{\%overall}$, is calculated by the ratio of *PEA* to total investment *(TOI)*.

Data Sources:

- Investment Statement (DI) of the reference date of the index.
- Index reference date balance.

Calculation method: Unassessed private securities

$$PEA\% = \frac{PEA}{TTP}$$

$$PEA = PE + \sum_{j=1}^{n} FA_j . private\ securities\ not\ ranked_i \quad ,$$

$$FA_j = \frac{1}{2Qj} \qquad e$$

$$TPT = TPA + \sum_{j=1}^{n} private\ securities\ not\ ranked_i$$

While $PEA\%_{geral}$ is calculated:

$$PEA\%_{geral} = \frac{PEA}{total\ investiments}$$

Where:

• Q_j is the amount of PF that applies to assets of the issuer of asset j;

• *Private unrated title*$_j$ is the value of the j-th private title for which no credit information is available.

• The other variables are the same as those used in the calculation indicators of *PE%* and $PE_{\%overall.}$

• *Total Investments (TOI)* is the total value of investments (count 1230000000).

• *Total private debt securities (TTP)* correspond to the amount of private debt securities in portfolio, assessed or not.

Interpretation:

The losses measured by the FA_i coefficients are not necessarily linked to the credit risk factor. It is not rare at the pension funds industry that assets with this characteristic are also associated with lack of governance or evidence of fraud. Therefore, the risks measured by the *PEA%* and $PEA_{\%overall}$ indicators are not limited to credit risk.

List of acronyms and abbreviations

BCB	Brazilian Central Bank
BD	Defined Benefit Plan
BNDES	*Banco Nacional de Desenvolvimento Econômico Social*
CD	Defined Contribution Plan
CGPC	Pension Funds Management Council
CMN	National Monetary Council
CNPC	Pension Funds National Council
COES	Supervision Strategic Committee
CV	Variable Contribution Plan
CVM	Securities Exchange Committee
DA	Actuarial Statement
DD	Duration Gap
DI	Investment Statement
DPAP	Liability Duration and Price Adjustment
ECB	European Central Bank
ESI	Systemically Important Entities
FA	Aggravation Factor
FED	Federal Reserve – US Central Bank
FIDC	Investment Fund in Loans
FIM	Multimarket Investment Fund
FIP	Investment Fund in Finance Projects
IBGE	Instituto Brasileiro de Geografia e Estatística
ILA	Long-term Liquidity Index
ILR	Short-term Liquidity Index
INPC	National Consumer Price Index
IPCA	Consumer Price Index
IS	Solvency Index
LFT	Treasury National Letter
NTN-B	National Treasury Note - series B
NTN-C	National Treasury Note- series C
NTN-F	National Treasury Note- series F
PD	Probability of Default in Private Securities
PE	Expected Loss
PEA	Aggravated Expected Loss
PF	Pension Funds
PFS	Pension Funds System
PIB	Gross Domestic Product
PNAD	National Research for Domicile Sample
PREVIC	National Pension Funds Authority
REP	Pension Funds Stability Report
RF	Fixed Income Rate
SBR	Risk-Based Supervision
SELIC	Brazilian benchmark interest rate
SEST	State Company Governance and Coordination Department
SPCF	Private Complementary Pension System
SUSEP	Private Insurance Superintendence
TA	Actuarial Target
TOI	Total Investments
TPA	Assessed Private Security
TPF	Federal Public Security
TTP	Total Private Securities
VP	Present Value