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ORIGINAL ARTICLE

Financial resilience of municipal civil servants' pension funds

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ABSTRACT

The objective of this study was to analyze the responses and the repetitive pattern of financial resilience which emerge within the civil servants' pension funds (RPPS, in Portuguese) of local governments in Brazil. The analysis extends the traditional financial resilience approach discussing the emergence of vulnerability from the sponsor and RPPS interaction, often stimulated by the lock-in effect from the federal regulation, which constrains the space for transformative responses. Financial resilience is a concern usually applied to governments' response to crises, but not for pension funds. However, the long-term objective of such funds when juxtaposed to short-term pressures conduce a paradoxical standpoint for fund's managers absorbing the pressures. The impact of this article to the pension funds and the regulatory field is the proposition that the growing vulnerability of RPPS regimes comes from the insufficient governance belt protecting them, which would be a necessary and applicable remedy to any pension funds reform the country decides to take . It was applied a sequential mixed-method approach, starting by interviews with fund managers, actuarial consultants and representatives of the Ministry of Finance's Pension Secretariat (SPREV), to identify the usual responses to emerging financial pressures which affect the funds' financial performance. Secondly, four from the identified typical responses were selected and analyzed through financial and accounting data to detect the response for about 1,8 thousand funds from 2014 to 2016. Based on the frequency of the adopted responses by each fund, it was proposed a recurrent financial resilience pattern, and how the managers' responses vary according to the vulnerability provoked by the City Hall's decisions. It was observed that the City Halls accommodate budgetary pressures failing to transfer or downsizing the contributions to the fund, increasing the fund's vulnerability. The managers consequently respond subjoining the reserves to pay pensioners, reinforcing the fund's vulnerability. Such response is a weak resilience pattern, which reinforces the funds' vulnerability due to governance gaps and the lock-in effect proposed by Pike, Dawley & Tomaney (2010), which constrains the local agents' capacity to perceive and find solutions more transformative and actives looking for financial sustainability.

Keywords: financial resilience, financial sustainability, civil servants' pension funds (RPPS), municipal pensions, actuarial.

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1. INTRODUCTION

Brazilian public pensions policy is standardized for the country and applies to all employment regimes, including the public sector at state and municipal levels. Besides maintaining two contributive public pension systems – general pension funds (RGPS in Portuguese) and civil servants' pension funds (RPPS) – the overall pensions policy includes specific rules for voluntarily taking out a private pension (complementary pension). The RPPS funds in Brazil (including those of states and municipalities) cover around 10 million beneficiaries and, in 2018, they capitalized more than R$ 200 billion (Pensions Secretariat [Sprev] of the Finance Ministry, 2017).

Pension systems, as complex social contracts, have a limited capacity to fulfill the rights of generations of future beneficiaries (Afonso & Zylberstajn, 2017). Parametric and structural reforms in various countries attempt to revive these systems, which are generally solutions that are difficult to negotiate socially (Holzmann et al., 2005). Despite the structural reforms carried out by various countries, including in Latin America (Mesa-Lago, 2001, 2006), pension funds continue to be vulnerable. In Europe, for example, some governments have backtracked on pension reforms and ended up drawing on university, state, and private pension fund balances to fulfill their short-term obligations, with the promise of meeting the future payment of beneficiaries, and in other countries funds have simply been closed (Casey, 2014).

In general, the debate in the international literature occurs at the level of the general central government system. A rare exception is the study by Foltin (2018), which shows the problems in state government pension funds in the United States of America. The focus of this article is on municipal public pension funds (RPPS), which cover tenured civil servants hired by municipal governments, which are the sponsors for these funds. Currently, there are more than two thousand municipalities with civil servants' pension funds in Brazil, which migrated their civil servants, until then covered by the RGPS system, to these locally formed and administered funds (Sprev, 2018). In the municipalities where there is no RPPS, civil servants continue to be covered by the RGPS system.

The parameters defined in the national legislation, as well as the local choices and the way the funds are administered, contribute to the actuarial deficit of the RPPS funds, which is greater than 10% of gross domestic product (GDP), with insufficient total assets to provide the system with financial sustainability (Nogueira, 2012). The weaknesses in the management of the RPPS funds, observed by the Brazilian Supreme Audit Institution (TCU in Portuguese) in larger municipalities (Tribunal de Contas da União [TCU], 2016), may be a generalized scenario in other municipalities. As they are organizations linked to municipal governments, RPPS funds are subject to the pressures that emerge locally regarding their tie with the city hall and involve the actions from the mayor, city councilors, fund managers, and their funds' councilors to solve such pressures without increasing the future vulnerability of the fund. These may originate, for example, from an economic crisis that creates budgetary and fiscal pressure on the fund holder or may even be due to the continuous detachment between the fund's capitalization and the demographic evolution of the group of beneficiaries. By offering solutions to these pressures, managers and holders of these funds may be enhancing even more the fund's vulnerability in the future.

The aim of this research is to analyze the responses to financial pressures that emerge in municipal RPPS funds and the predominant financial resilience pattern in these funds. It was analyzed and proposed that city halls have scarce space to offer responses to the financial pressures that emerge in these funds, which in a way constrains the resilience pattern that emerges. Since the general guidelines of the pensions policy are established by the national regulation, in practice, municipal managers can only make parametric adjustments in the pension plan without changing its funding central rules (Mascarenhas, Oliveira & Caetano, 2004).

The parametric adjustments, besides not being able to eliminate the deficit in the pension accounts, have a high political cost because, to some extent, will interfere on the interests of active and retired municipal civil servants, whose unions and associations are the main stakeholders. To avoid incurring political costs with these actors, councilors may transfer the responsibility of adopting the necessary measures to mayors. When they do not have the support of the local legislative branch, mayors, pressured by public servants and having to meet the fiscal ceilings imposed by the Law of Fiscal Responsibility (Complementary Law n. 101, of May 4th of 2000), offer even less effective responses and end up increasing the vulnerability of the pension funds.

To analyze the question, we applied the financial resilience framework from Barbera et al. (2017), in which city halls from different countries present resilience patterns that emerge from organizational conditions and from the vulnerabilities perceived by managers. We added to the framework the impact of the lock-in effect proposed in Pike et al. (2010), as such impact would limit the capacity of local agents to find solutions adequated to their local context, rather than follow stardardized and restricted alternatives.

A sequential mixed-methods approach (Mele & Belardinelli, 2018) was adopted. First, we analyzed the regulation and the interviews with managers, councilors, and consultants from these funds and Sprev technicians, and we identified the typical responses used by the funds. Next, we applied the theoretical framework to capture the fund managers and city halls responses, which were identified through financial and accounting data from the civil servants' funds from 2014 to 2016. Based on the same framework, the vulnerability scenarios caused by the city halls' responses were analyzed, as well as how these are associated with the fatalistic and powerless financial resilience pattern that recurrently emerges in municipal pension funds in Brazil.

The resilience patterns proposal is made by combining the typical responses identified in the case of the RPPS funds in question: (i) a reduction in pension contribution rates; (ii) an interruption of the pension benefit payments; (iii) an interruption of contributions and transfers; (iv) use of the investments portfolio; and (v) an increase in pension contribution rates.

2. FINANCIAL RESILIENCE FRAMEWORK

The concept of resilience has different meanings and is normally portrayed in the literature as the result of a variety of dimensions (Barbera et al., 2017; Bhamra, Dani & Burnard, 2011; Darnhofer, 2014; Linnenluecke, 2017; Denhardt & Denhardt, 2010), as a comprehensive and multifaceted concept (Irigaray, Paiva & Goldschmidt, 2017).

This concept involves the capacity to reduce risks and quickly adapt to an external shock, such as an economic crisis, and continue operating even in adverse conditions (Hood, 1991). From an organizational perspective, resilient organizations can develop new capacities and abilities to explore the opportunities that arise (Coutu, 2002; Irigaray, Paiva & Goldschmidt, 2017). Such organizations recognize these windows of opportunity and alter or reinvent their strategies before circumstances force them to (Barbera et al., 2017; Gunderson & Holling, 2002; Hamel & Välikangas, 2003). One recurrent discussion is what forms or generates an organizational resilience pattern or its specific aspects, such as financial resilience.

Barbera et al. (2017) propose a framework that describes financial resilience patterns, defined as "the ability of organizations to anticipate, absorb, or react to shocks affecting their finances" (p. 675). The authors analyzed city halls in different countries and proposed factors that shape this ability. They inductively identified five resilience patterns among those governments: self-regulators, constrained adapters, reactive adapters, contented fatalists, and powerless fatalists. These patterns result from the interaction of organizational conditions that over time emerge from the organization's vulnerabilities and from the responses elaborated by it to assimilate financial pressures (Table 1).

The central point in the financial resilience question would be the relationship between perceived vulnerability, capacity to anticipate shocks or pressures, and capacity to cope with them. Perceived vulnerability is how much an organization perceives itself to be exposed to various shocks, crises, and tensions that would be threats to its normal performance, these threats existing in the interface between the environment and the organization (Barbera et al., 2017; Hendrick, 2011; McManus, Seville, Brunsdon & Vargo, 2007). Anticipatory capacity is the availability of tools, instruments, techniques, and abilities that enable the managers to better identify and manage their vulnerabilities in the face of the possible financial pressures before these appear. Coping capacity includes the resources and abilities to assimilate the consequences of the shocks (Barbera et al., 2017).

Table 1
Financial resilience patterns of city halls in Barbera, Jones, Korac, Saliterer, and Steccolini (2017)

Resilience pattern	Description of the behavior	Associated responses
Self-regulators	Although they use carefully formed reserves (buffering) to assimilate the impact of a crisis, they also take advantage of the opportunity to transform processes and standards (bouncing forward) to maintain self-sufficiency and reduce dependency on reserves. They aim to keep risks under control, maintaining systems for monitoring the environment and keeping the level of vulnerability under observation.	High anticipatory capacity and transforming capacity.
Constrained adapters	They perceive the environment and the financial shocks as being responsible for limiting their performance. They have a constrained capacity to cope with the challenges imposed by the external environment. They do not consider themselves as having the entire means to resolve their vulnerabilities, and they accept and adapt to shocks.	High anticipatory capacity and active coping capacity.
Reactive adapters	They adapt to the conditions imposed and do not perceive or resolve their high vulnerability. When they react to the crisis, they end up adapting their way of operating to that condition, adopting practices and solutions to resolve the issue at stake, but they may further institutionalize and deepen the vulnerabilities.	Low anticipatory capacity and reactive coping capacity.
Contented fatalists	They base their decisions on "past glories". They do not perceive or resolve the vulnerabilities and, as they do not anticipate shocks, they are even more vulnerable. Similarly, the reserves have not been planned to be a protection. Despite being fatalists, any possible reserves attenuate the impacts of the shock.	Low anticipatory capacity, constrained reaction, unsustainable use of reserves (buffering capacity).
Powerless fatalists	They consider themselves to be impotent in the face of the crises that arise. Surprised with the shock, they passively accept the impacts and the loss of performance and level of service.	Low anticipatory capacity, no reaction.

Source: *Translation and compilation of Barbera et al. (2017).*

Action or response capacities can take different forms: buffering capacities (the creation of reserves of resources or redundancies of processes that help to absorb the impact of a shock without altering the way the organization operates); adapting capacities, such as active coping capacities (adapting processes with incremental changes, but without altering the principles, culture, and underlying values) or reactive coping capacities (which dangerously perpetuate temporary solutions that increase vulnerability); and transforming capacities (transforming processes and the way of operating with radical changes, including structures, objectives, and values) (Barbera et al., 2017; Béné, Wood, Newsham & Davies, 2012; Darnhofer 2014; Davoudi, Brooks & Mehmood, 2013). Adaptive and transformative anticipatory capacities can reduce perceived vulnerabilities, but, in the end, they may be shown to be inadequate and increase vulnerability in other aspects over time (Barbera et al., 2017; Davoudi, Brooks & Mehmood, 2013; Meier & O'Toole, 2009; Wildavsky, 1988).

However, the framework from Barbera et al. (2017) does not address normative constraints on actors' responses. Following the geographical economics approach, Pike et al. (2010) propose that local agents are unable to adequately respond because they are subject to lock-in effects, involving locks originating from centrally developed national policies. Such policies would reduce the adaptability of agents to customize solutions to local conditions. These locks would take the form of reduced autonomy and resources for local agents to implement solutions. The influence would also reach the normative field, in which values and standardization of strategies would limit the solutions given by the local agents. Applying this concept in the context of municipal pension funds, fund managers, mayors, and councilors are normatively limited by the national pensions policy and by their legal mandates. Considering this space for action, they will design solutions to prepare for and cope with possible financial pressures.

Fund survival is based on the guarantee that the fund-holding government will cover any need for funds to pay beneficiaries. This involves significant implications, including negotiating agreements with civil servants' associations, city councilors, funds' managers and councilors, alleviate the pressures imposed by the local context. For this, in a more transformative and proactive response pattern, local agents would consider the policies determined nationally by Sprev and reflect on their sources of vulnerability and the level of risks to which they are exposed. This analysis would enable the managers to understand their capacities to anticipate and react to shocks, seeking the absorption of or recovery from the effects of the shock that affect their finances over time (Barbera et al., 2017).

3. METHODOLOGY

The analysis identifies the responses normally adopted in the RPPS context by city halls and fund managers to absorb financial or fiscal pressures and the recurrent financial resilience patterns of these funds, applying the theoretical framework of Barbera et al. (2017). The methodology proposed in a sequential mixed-methods approach (Mele & Belardinelli, 2018) is composed of two stages: (i) the inductive approach with interviews to identify the typical responses adopted by the RPPS funds; and (ii) the approach of applying the theoretical framework to identify the resilience pattern present in the RPPS funds, with the use of accounting and financial data from the funds.

Interviews were carried out with 35 RPPS managers and funds' councilors, from various sized funds and regions of the country, as well as consultants and representatives from Sprev. The interviews were carried out between the months of January and April of 2018, when the pension reform was being discussed by Michel Temer's government. The protocol for the interviews with fund managers included questions such as "what actions can managers and the RPPS board take to maintain the financial and actuarial equilibrium of the RPPS fund?", "what are the main challenges faced?", and "how are the tensions and financial pressures resolved?". The interviews were recorded with the permission of all the managers. Based on the interviews with managers, funds' councilors, consultants, and representatives of the regulatory body, and with the experience of one of the authors, who has worked with the federal government on the topic for 15 years, we elaborated the table of typical responses applied by the RPPS funds to cope with budgetary pressures (Table 2). Next, we selected four of the typical responses that could be captured with the financial and accounting data from the funds. The presence of each response was identified based on was based on the financial and accounting database of more than two thousand municipal pension funds existing in 2017, obtained from Sprev. The number of RPPS funds analyzed in the 2014-2016 period varies from 1,556 to 1,889 funds. The variation in the number of RPPS funds, depending on the responses analyzed, was due to the availability of data related to this information in Sprev's own database.

Only pension funds operating in the period were considered. Financial funds were ignored for this analysis. Through so-called "mass segregation" (response #3, Table 3), the RPPS funds divided their beneficiaries into two types of funds: pension and financial. In financial funds, monthly contributions must be enough to pay the benefits of those already retired, and there is no capitalization. In pension funds, the resources are capitalized to pay future benefits when those covered retired. The focus here was on pension funds, which should be less susceptible to short-term pressures in relation to financial funds. The analysis period covers the last three years with complete data available and the last three years of the 2013-2016 mandate of mayors framing the fiscal pressure caused by the economic crisis originating in 2014. Some analyses use monthly data, others bimonthly, depending on the frequency of the RPPS fund's accountability for that information to the regulatory and monitoring federal agency (Sprev).

The responses chosen for quantitative analysis coincide with the following types proposed by the framework in Barbera et al. (2017) (in parenthesis): (i) interruption of contributions and transfers (powerless coping); (ii) reduction in the pension contribution rates (powerless coping); (iii) increase in the pension contribution rates (active coping); (iv) use of the investments portfolio (powerless coping); and (v) delay in the payment of pension benefits (fatalist). For each response we built two types of measures: one of intensity (continuous scale) and another of presence of the response (binary scale).

3.1. Intensity of the Responses (Continuous Scales)

3.1.1 Interruption of contributions and transfers (#6, Table 2)

Only the employer contributions paid from 2014 to 2016 were analyzed and those discounted from the civil servants' payslips were not considered. The data are monthly, therefore no significant variations were expected, since this value should fluctuate with an organic balance of civil servants leaving and subscriptions to the portfolio. The measure was built by calculating the variation in the contribution in the month in relation to the value of the contribution deposited by the city hall in the previous month (in percentage variation). The indicator of interruption of the contribution is presented in three ranges: variations above 10%; above 25%; or above 50%. The cases above 50% show extreme cases. The 36-month period was covered in 1,889 RPPS funds

with available data from 2013 to 2016. The frequency of interruptions was observed by case, with a minimum of zero and maximum of 36 monthly interruptions in the period, for each RPPS fund.

3.1.2 Increase or reduction in pension contribution rates

The variation in the contribution rates was calculated based on the rate informed by the RPPS fund in relation to the previous one (in percentage variation). The rates of 1,559 funds were compared with available data on rates practiced in the last quarter of 2016 and of 2015, for each pension contribution group: retired individuals; active servants; employer; and pensioners. The increase (#11) and reduction in the rates (#7) were measured by the percentage variation, respectively positive and negative in relation to 2015.

3.1.3 Use of the investments portfolio to pay benefits (#2)

The variation in the bimonthly balance informed by the fund was captured in relation to the previous period (in percentage variation). Again, the changes and fluctuations should be smooth, with no impressive jumps, especially with no high-value withdrawals, given that the payment of pension benefits is normally carried out based on the inflow of funds in the current year. Cases in which the previous balance was greater than the current balance (reserves downfall) were indicated as "untimely use of the portfolio". The frequency of use of the portfolio in the same 36-month period was analyzed bimonthly. Thus, the fund's portfolio was withdrawn between zero and 18 bimesters in each one of the 1,878 RPPS funds with available data.

3.1.4 Delay in the payments of retirement benefits (#1)

The retirement payment for the month was compared with that of the previous month (percentage variation). No fall is expected from one month to the other, except in the case of an eventual changing on the benefit category or in the case of the civil servant's death. The months of January were not considered, since if compared to December they would be greater due to the 13th wage paid in December, which would give the false idea of a payment delay in January. Again, the indicator of delayed payment in the month is presented in three ranges: variations above 10%; above 25%; and above 50%. The 36-month period was covered in 1,880 RPPS funds with data available from 2013 to 2016. The frequency of delays, varying from zero to 36 monthly delays for each RPPS fund, was observed.

3.2 Presence of the Responses (Binary Scale)

To analyze which municipalities (city halls and RPPS funds) presented regular use of the five measures observed, the variables of each response were transformed into a binary scale. It was considered that both the RPPS fund and city hall regularly use one response in relation to the other cases if the number of periods in which the response is used is in the upper two quartiles in relation to the others observed (for all responses #1, #2, #6). If the case in question is in the upper quartiles of that response, the variable takes the value 1 for that RPPS fund or city hall, and 0 otherwise. Thus, the use of a response by an RPPS fund or city hall is relative to the use of the same response by the other municipalities. Specifically for the adjustment in contribution rates (#7 and #11), the presence of the response takes the value 1 for those city halls that altered the employer rate informed for 2016 in relation to the one informed for 2015. In this analysis, only the employer contribution was considered, as it is the one that directly affects the city hall's cash flow without affecting the civil servants' or retirees' payslip.

3.3 Analyses

For all the responses, it is presented in graphical form how the observed intensity varied with the age of the fund and with the size of the municipality. It is observed that the responses are similar for various sizes and ages of funds, which was subsequently confirmed through tests of mean (not presented here). The size of the municipalities was analyzed by segregating the cases of up to 10 thousand inhabitants, between 10 and 50 thousand inhabitants, between 50 and 100 thousand inhabitants, and more than 100 thousand inhabitants.

Next, it was compared how the presence of responses in the various RPPS funds is associated with the vulnerability created by the two city hall responses (interruption of transfers and reduction of contribution rates). For this, four vulnerability scenarios that emerge from the city hall's response were configured: an increase in the short or long-term vulnerability, a reduction in the long-term vulnerability, or the level of vulnerability is not affected, given that the city hall did not take any action. The RPPS funds were distributed in a matrix of vulnerability scenarios according to the fund managers' responses. The recurrence of the patterns that appear in the 2014-2016 period was analyzed. Finally, mean tests were carried out to analyze the effects of the vulnerability scenarios created by the city hall responses and how the two responses available to the fund managers are associated with these scenarios.

4. FEDERAL REGULATION AND THE ROOM FOR LOCAL MANAGEMENT

Social security and pension systems are reformed through two types and scopes of changes: structural reforms and parametric reforms (Mesa-Lago, 2001). Parametric reforms cause alterations in the pension benefits plan, seeking to improve the long-term financial sustainability of public pensions, by altering the retirement age and contribution rates. Structural reforms alter the way pension benefits are financed (for example, by changing the simple distribution system to a capitalization one), and they are therefore more radical, such as those carried out in Chile, in Argentina, and in Uruguay (Mesa-Lago, 2006). In the case of parametric reforms, which are usually adopted in Brazil (Mesa-Lago, 2001, 2006), most of the parameters are defined at a federal level, leaving fine-tuning to local-level schemes. Despite the right of states and municipalities to simultaneously legislate over social welfare (Constitution of the Federative Republic of Brazil of 1988, line XII, art. 24), the federal regulation ultimately restricts the autonomy of municipal managers and configures the lock-in effect proposed in Pike et al. (2010), since it constrains and conditions the capacity to adapt solutions to the local context, which affects th resilience pattern.

The laws and rules that regulate the RPPS funds are edited by Sprev and by other federal agencies, and are obligatory for all RPPS funds. These laws delegate some specific points to be decided locally, such as defining the contribution rate within its minimum and maximum federal limits.

The federal regulation defines that the creation of a municipal RPPS fund originates with a project initiated by the mayor, approved by local law, and that such a project must be supported by an actuarial viability study (art. 1, line I, Law n. 9,717, of November 27th of 1998), demonstrating whether the municipality has the means to guarantee the benefits payments foreseen in the pension plan. It also defines that the RPPS fund be administered by a single "RPPS management unit", constituted under the form of a special fund, autarchy, or public foundation. This RPPS unit is registered in the National Registry of Legal Persons (CNPJ in Portuguese) at the Federal Treasury of Brazil (art. 2, V, MPS Ordinance n. 402, of December 10th of 2008, and MPS/SPS Normative Guideline n. 2, of March 31st of 2009). The regulation presents two types of performance to monitor the funds' sustainability: financial result and actuarial result. In capitalized funds, such as those that will be analyzed here, basically the revenues from the various contributions, such as employer (paid by the employer – the city hall), that of the civil servant (discounted from the payslip), and those from investment of the reserves, are accumulated to pay future benefits when these civil servants retire (for more details see the applied pensions legislation). The long term is captured by the actuarial surplus, and balanced funds are those that manage to compose, over the years, reserves to cover the future flow of retirement payments for those beneficiaries. The short term is captured by the financial result, which shows whether current revenues are sufficient to pay for current expenditures in the year or whether the Municipal Treasury must cover the difference. Actuarial deficit will imply additional payments to the fund in the future or the plan's parameters adjustment. Consequently, in the dynamics of capitalized funds, the financial pressure originates from (i) interruption of the fund's revenues and consequent use of reserves and (ii) growth in expenditures without the proper adjustment of revenues from contributions, which will be insufficient to cover expenditures.

To maintain this fine-tuning, the federal regulation prescribes, among other points: (i) the form of RPPS setting up and types of benefits to be granted; (ii) the minimum and maximum limits and proportions between the types of contribution rates; (iii) the alternatives for investment of the fund's resources; (iv) the form of accountability; and (v) sanctions for non-compliance with the legislation. Regarding benefits, the list of possibilities is determined by the RGPS, since municipal RPPS funds cannot grant different benefits from those foreseen in the general system, only if the Federal Constitution itself allows it (art. 5 of Law n. 9,717, of November 27th of 1998 and updates).

The law determines a series of parameters in relation to the proportions of contribution rates, such as that the pension contribution rate of municipal public servants cannot be lower than the contribution rate of permanent public servants of the Union (art. 3 of Law n. 9,717, of November 27th of 1998 and updates). The employer's contribution also cannot be lower than the value of the active servant's contribution, or higher than double this contribution (art. 2 of Law n. 9,717, of November 27th of 1998 and updates). Currently, the contribution rate of public servants can vary from 11 to 14% and the employer's rate from 11 to 28%.

The federal regulation also determines in which financial assets the fund can invest any excess contributions and pension transfers. The allocation of resources must

follow the possibilities given by Brazilian Central Bank Resolution n. 3,992/2011 and its updates, which leads to a concentration in low risk and return federal government bonds (Roriz, 2018).

In terms of accountability, RPPS fund managers must periodically send information to the Public Pensions Information System (CADPREV). Irregularities in relation to the legislation and management of the funds or failure in the accountability lead to a temporary loss of the pension regularity certificate (CRP).

In terms of sanctions, the measure available to the regulator Sprev is to withdraw the CRP, inscribing the municipality holding the RPPS fund in the Auxiliary Information Service for Voluntary Transfers (CAUC) and, thus, reducing the chances of the city hall get additional and discritionary funds (non-formula based grants) from the federal government. As most municipalities have budgetary pressures and are prone to count on these additional and discritionary grants from the federal government, losing a CRP can lead to considerable implications in terms of balancing municipal accounts. However, it is common for local managers to maintain their certificate under judicial relief, which reduces the coercive strength of the regulator (TCU, 2015).

Sprev also completes the federal regulation via second order rules, as Sprev's ordinances. One example of a complementary regulation was the permission for segregate groups of beneficiaries, which were adopted by 10% of the RPPS funds. In this measure, actuarial liabilities were divided into two plans – pension and financial – based on a defined cut-off date. While the financial plan is composed of the oldest civil servants and financed by the Municipal Treasury, the pension plan includes the youngest servants and their contributions are accumulated in the form of financial assets (capitalization) to pay future retirement benefits. This measure would, from that date onwards, protect the pensions portfolio, however it created short-term pressure on the financial plan, which no longer enjoyed the resources of the pension plan to pay benefits, since the contributions of the pension plan, from then onwards, were segregated, as were their reserves, for payment only of the future benefits of those inscribed in that plan. In practice, some funds inappropriately revert the capitalized resources for payment of the benefits in the financial plan.

Another example of the complementary regulation was the installment plan for pension debits launched in 2017 by Sprev. In this installment plan, the city hall could transfer delayed contributions in up to 200 installments (Law n. 13,485, of October 2nd of 2017). In practice, this measure may have encouraged the interruption of pension contributions and transfers and subjected the RPPS funds to recurrent installment plans. Finally, Sprev also has initiatives, such as the requirement for re-registration of active servants, retirees, and pensioners, seeking to improve the mapping of the profile of the corpus of beneficiaries and reduce the risk of undue payments.

As the federal regulation is complementary, Sprev aims to guarantee a minimum standard of performance for these funds via standardization and monitoring. However, the same federal regulation reduces the alternatives for action at the local level – the city council, mayor, and fund managers have little room to negotiate sufficient responses to the financial pressures. In the presence of financial and political crises in city halls, mayors end up depending on some help from the federal government to maintain operations (Gerigk & Clemente, 2011) and the RPPS funds of these municipalities are susceptible to responses that increase of the fund's vulnerability.

5. TYPICAL MUNICIPAL PENSION RESPONSES

Based on the interviews, 12 typical responses were identified that emerge from the interaction between the city hall and the RPPS fund (Table 2).

As the funds are linked to city halls, in some cases there is almost no separation between the city hall and the RPPS fund, even if this is organized in the form of an autarchy (Aquino & Lima, 2018). Loyalty and friendship between mayors and fund managers politically nominated for the role and RPPS board's apathy are some of the reasons that favor the mayor's influence on the fund's management (Aquino & Lima, 2018). In these conditions, the city hall would use (improperly) the RPPS fund's reserves as a source of funds to pay current benefits expenses and temporarily cease to collect contributions to resolve its own cash flow. Thus, the city hall does not transfer the contribution and the RPPS fund assimilates the delay in revenue, accessing its reserves to pay benefits. This short and long-term cash flow disequilibrium creates financial pressure and requires responses to ease such pressures, such as paying benefits with financial investments.

Table 2

Responses for financial pressures in municipalities from the interaction between civil servants' pension funds (RPPS) and the city hall

#	Response	Origin of the response	Details	Stakeholders affected	Type of response
1	Delay in the payment of retirement benefits	RPPS fund	Suspends the payment of benefits, such as retirement benefits, because there are not enough resources at that time.	Retirees and pensioners	Fatalist (no reaction)
2	Use of the investments portfolio to pay benefits	RPPS fund	The capitalized resources are untimely used to pay benefits.	RPPS fund, active servants, and society	Powerless coping
3	Segregating groups of beneficiaries	RPPS fund	Divides the beneficiaries into two groups, enabling management of the contribution rates.	RPPS fund	Reactive coping
4	Re-registry of active and inactive beneficiaries	RPPS fund	Accuracy of the actuarial calculation and possible identification of ghost retirees and pensioners.	RPPS fund	Active coping
5	Pension compensation	RPPS fund	Requests the contributions of transferred servants from RGPS to compensate their payments.	RPPS fund and beneficiaries in general	Active coping
6	Interruptions of transfers and contributions	City hall	Reduces the fund's capacity to manage cash flow and accumulate funds over time.	RPPS fund and beneficiaries in general	Powerless coping
7	Reduction of contribution rates	City hall	Reducing various contribution rates enables the reduction of the employer rate and creates fiscal space in the city hall's cash flow, but also reduces the fund's capacity to generate cash and accumulate resources in the long-term. Except in rare exceptions, it creates long-term vulnerability.	RPPS fund, active servants, and society	Powerless coping
8	Sale/transfer of assets	City hall	Increases the fund's cash in the short term, but may not resolve the balance of contributions versus pension benefits in the long run. If done to pay current benefits, it is non-anticipatory reaction; if it is to compose reserves for the future, it may be seen as reactive coping, due to the anticipation.	Municipal Treasury	Powerless coping
9	Installment plan for pension deficits	City hall	Enables the resources not transferred by the municipality in the same period to be returned to the funds, even if in postponed, but it may encourage the interruption of contributions and pension transfers.	RPPS fund	Reactive coping
10	RPPS fund's lay off	City hall	Transfer to the RGPS due to the RPPS fund having become unviable.	RPPS fund, beneficiaries in general, and Municipal Treasury	Reactive coping
11	Increase in the contribution rates	City hall	The rates are increased to balance the fund, requiring political effort, and the effect is mid to long-term.	RPPS fund, active servants, and society	Active coping
12	Establishment of complementary pension system	City hall	Helps the intergenerational renegotiation of the pension contract with the beneficiaries, but is restricted to servants who earn salaries above the RGPS ceiling.	RPPS fund and active servants	Transformative action

RGPS = general pension system.

** following Barbera, Jones, Korac, Saliterer, and Steccolini (2017).*

Source: *Own elaboration, based on the interviews.*

In Table 2, the "origin" column indicates who has a legal mandate to implement the response, whether it is the RPPS fund or the city hall. Some responses need approval in the legislative branch, but once approved, the financial pressure originating from the adoption of the response will emerge. Of the 12 listed responses, only five depend exclusively on the RPPS fund manager's decision, and the only transformative one (#12) could even by proposed by the RPPS fund, but essentially depends on the mayor liaising with the City Council.

The responses were segregated by origin to identify how the financial pressure is transferred from the city hall to the RPPS fund or how the city hall may be using the RPPS fund as part of its crisis reaction strategy. Our

respondents listed seven typical responses adopted by the city halls that have implications for the RPPS. Given their reduced space for acting, local managers from the city hall and from the RPPS fund may adopt responses to the financial pressure that are more a short-term, palliative adaptation (e.g. reactive adapters, contented fatalists, and powerless fatalists), with a low anticipatory capacity to definitively solve the problem. Given that the pensions policy design is drawn up in the Federal Government, local managers have to access the National Congress to alter the regulation of the national policy or use the maximum space for action, which is delegated to the local level, to try to recover the fund's financial equilibrium.

Some responses only attenuate the financial pressures of the current government, creating vulnerability for future governments and for public servants who will fund or retire through the system. One single transformative measure is under the city hall's responsibility, to propose and get support from City Council to the complementary pension system, which may have a high political cost for mayors and councilors in relation to unions and public servants. In this measure, the corpus of beneficiaries would resort to the private initiative and financial equilibrium would be achieved, avoiding an increase in the participation of the Municipal Treasury in the system.

The other responses coming from the city hall are meant to ease the financial pressure on their own cash flow (powerless coping), and end up directly affecting the RPPS fund and transferring the financial pressure to it, as is the case of interrupting contributions (#6) and reducing contribution rates (#7). By interrupting transfers and contributions, two expenditures are temporarily reduced, but the fund is pressured to use reserves improperly. The city hall can also defend a reduction in the employer's contribution rate to reduce the impact on the city hall's cash flow, increasing the fund's vulnerability, which ceases to capitalize the resources needed to pay pension benefits in the long run. Another weak response of the city hall is the sale/transfer of assets to capitalize the RPPS fund (#8), but this does not necessarily resolve the long-term balance of the fund.

The city hall may also have responses that require a certain mobilization to ease the pressure, but without anticipating the new pressures that are arising (reactive coping). These include an installment plan for pension debits and laying off the RPPS fund. An installment plan for pension deficits (#9) may initially be revealed to be a good measure, as it enables some of the amounts that have not been timely paid by the city hall to enter into the RPPS fund's cash flow. But, in practice, the city hall is unable to keep up the transfers and contributions of the current year together with the payment of the installment from previous years, which ultimately encourages new delays. Finally, the most traumatic measure is laying off the RPPS fund (#10). Besides not regaining the financial and actuarial equilibrium of the system, it also leaves the city hall vulnerable to pressure of paying to transfer its beneficiaries to RGPS, which would take responsibility for the payment of the benefits of these civil servants. All these measures depend on the approval of the local legislative branch.

In terms of proactive responses (active coping), which anticipate measures without implying vulnerability and an onus on other stakeholders, the city hall can act to increase the pension contribution rates (#11), aiming to financially and actuarially rebalance the RPPS fund. Its effect is mid and long-term and generally involves the need for political negotiation. Thus, this action is not part of a fatalist position, since it involves a certain capacity to anticipate and reflect on future scenarios.

In turn, the RPPS fund receives pressures derived from facts that are exogenous to the public administration, such as an alteration in the demographic characteristics of the current and future beneficiaries, which alters the actuarial calculation and, therefore, creates future vulnerability of the fund, but also endogenous ones, originating from the local public administration itself (e.g. responses #6, #7). The RPPS fund manager can adopt some measures, such as using the portfolio to pay benefits (#2), leading to the decapitalization of the fund, or, also, delaying pension benefit payments (#1), the most fatalistic of the responses.

The RPPS fund also had the chance to opt for segregate the beneficiaries into groups (capitalized and non-capitalized) (#3), which initially brought relief to the municipal accounts, enabling the employer's contribution rate to be kept within the minimum percentage defined by the pensions legislation. But, over the years, the division of plans carried out in segregation of groups resulted in greater amounts of resources going from the city hall to the RPPS fund, which has led these municipalities to revert the procedure (Sprev, 2015). Finally, the RPPS fund has two proactive responses (active coping) that anticipate solutions without implying vulnerability and an onus on other stakeholders, such as the re-registration of active and inactive workers (#4) and pension compensation (#5).

6. RESPONSES ADOPTED AND RESILIENCE PATTERNS OF THE FUNDS

Next, five typical responses were analyzed, two originating from the RPPS fund manager: (#1) interruption of the benefits payment; (#2) use of the portfolio to pay benefits; and another three originating from the city hall: (#6) interruption of transfers and contributions; (#7) reduction of the contribution rates; and (#11) increase in the contribution rates.

Table 3 refers to the responses measured in their intensity (continuous scale) and in the presence of the responses (binary scale) in each case.

Table 3

Description of the responses and cases

	n	Mean	Standard deviation	Maximum	Minimum
Age of the fund (years)	1,888	24.52	11.623	108.95	1.62
Size of the holding municipality (1 to 4)	1,888	2.02	0.9842	4	1
Observed intensity of each response					
Delay in the payment of retirement benefits (#1)	1,888	0.5524	0.9313	8	0
Use of the portfolio to pay benefits (#2)	1,888	2.6693	2.8019	17	0
Interruption of transfers and contributions (#6)	1,888	2.7574	4.0546	36	0
Reduction in the contribution rates (#7)	291	-2.2187	2.4787	-0.01	-24.41
Increase in the contribution rates (#11)	235	2.2360	2.2646	14.66	0.01
Presence of the responses in each case (0/1)					
Delay in the payment of retirement benefits (#1)	1,888	0.3686	0.4825	1	0
Use of the portfolio to pay benefits (#2)	1,888	0.3585	0.4797	1	0
Interruption of transfers and contributions (#6)	1,888	0.4337	0.4957	1	0
Reduction in the contribution rates (#7)	1,888	0.1541	0.4668	1	0
Increase in the contribution rates (#11)	1,888	0.3204	0.3612	1	0
Total RPPS fund responses	1,888	0.7272	0.6784	2	0
Total city hall responses	1,888	0.9084	0.7356	2	0
Total responses	1,888	1.6355	1.0697	4	0

Note: *The size of the municipality is classified from 1 to 4, respectively: fewer than 10 thousand; from 10 to 50 thousand; from 50 to 100 thousand; more than 100 thousand inhabitants. The total responses of each case varies from 0 to 4, since two of the five responses, increasing and reducing contribution rates (#11 and #7), do not occur simultaneously in the cases. Positive and negative variations in the rates practiced in 2016 in relation to 2015, that is, negative values are cases of a reduction in contribution rates from 2015 to 2016. The presence of the responses has a binary scale (see Methodology for more details on the conversion of the scale);*

RPPS = civil servants' pension funds.

Source: *Elaborated by the authors.*

Beginning with the city hall responses, the "interruption of contributions and transfers" (powerless coping) was analyzed. These responses, as discussed below, will affect the fund's level of vulnerability. Even if the city hall foresees a minimum contribution rate of 11% (employer and employee), as according to the federal legislation

defined and approved in local law, the rates are not always transferred in whole to the RPPS fund coffers. In Figure 1, each dot is a fund, according to the fund's age and in how many periods (zero to 36 months) there was some interruption of transfers by the city hall to the fund. The interruption was captured in levels of variation of the monthly values (10, 25, and 50%) (see Methodology).

In Figure 1, a significant presence of interruptions on about 50% of the value transferred monthly is noted, in which city halls interrupt the contribution with a frequency of 20 of the 36 months (vertical axis). From the financial resilience perspective, the variability in the flow of transfers of 50% of expected monthly payments creates much instability in the cash flow of the RPPS funds.

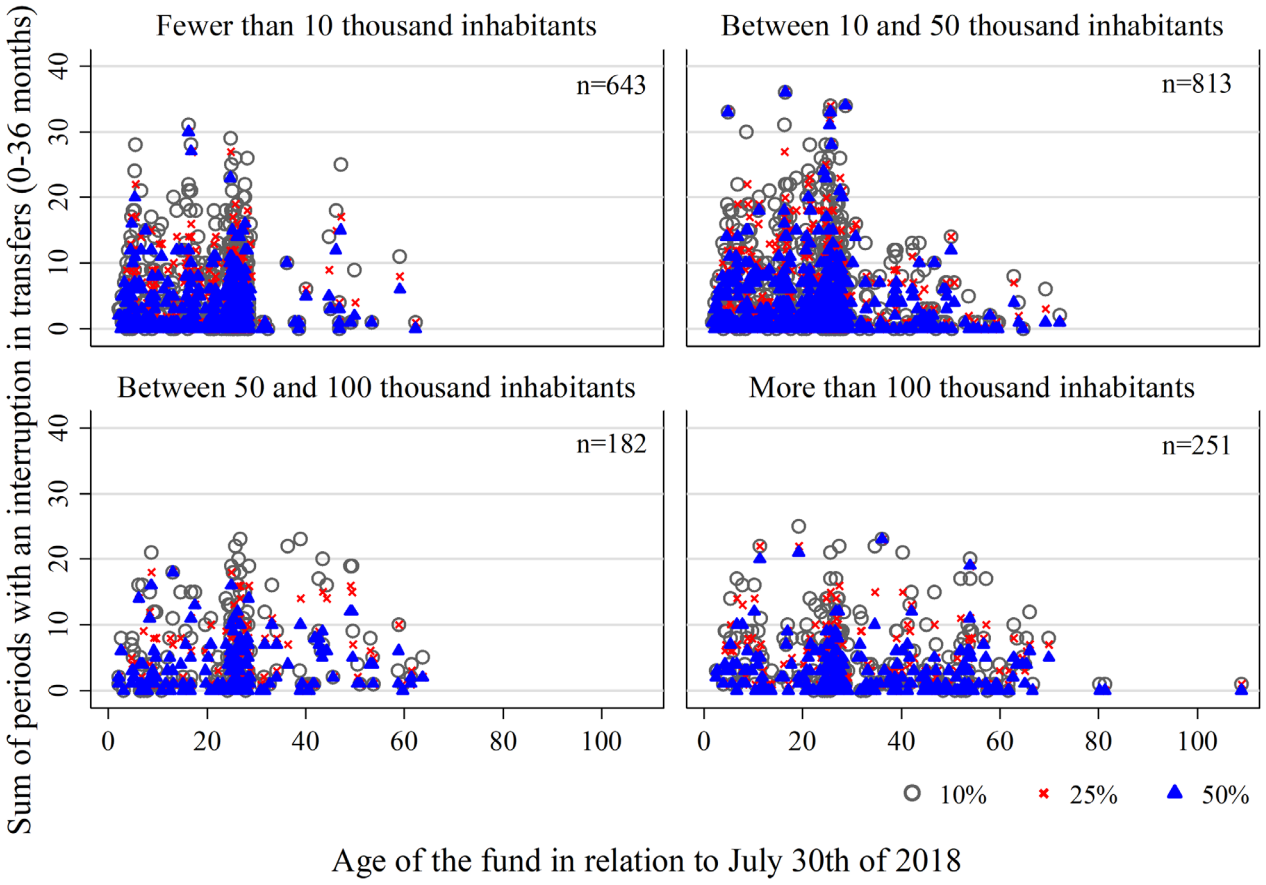

Figure 1 *Number of interrupted transfers to the pension funds for variations of 10, 25, and 50%*
Source *Elaborated by the authors based on the data analyzed for 1,889 funds.*

Interrupting the transfers is not associated with the fund's age or with the size of the fundholding municipality. In addition, for some funds, this is not an isolated occurrence, given the high frequency. This practice, in these municipalities, might be being considered, by the mayor, by managers, and by councilors of the fund, to be an adequate, possible, and justifiable alternative for make up the city hall's cash flow.

The city hall may also alter rates, increasing (active coping) or reducing (powerless coping) contribution rates. Figure 2 presents how the rates varied from 2015 to 2016 (horizontal axis) and the value of the 2016 rate (vertical axis). Each one of the quadrants presents the same analysis of the contribution rate for each one of the rate groups: employer (paid by the fund holder), retirees, active servants, and pensioners. The minimum rate defined by the legislation is 11%. Despite there being few cases of a rate lower than 11% for retirees, active servants, and pensioners in 2016, the variation is low in this group of rates.

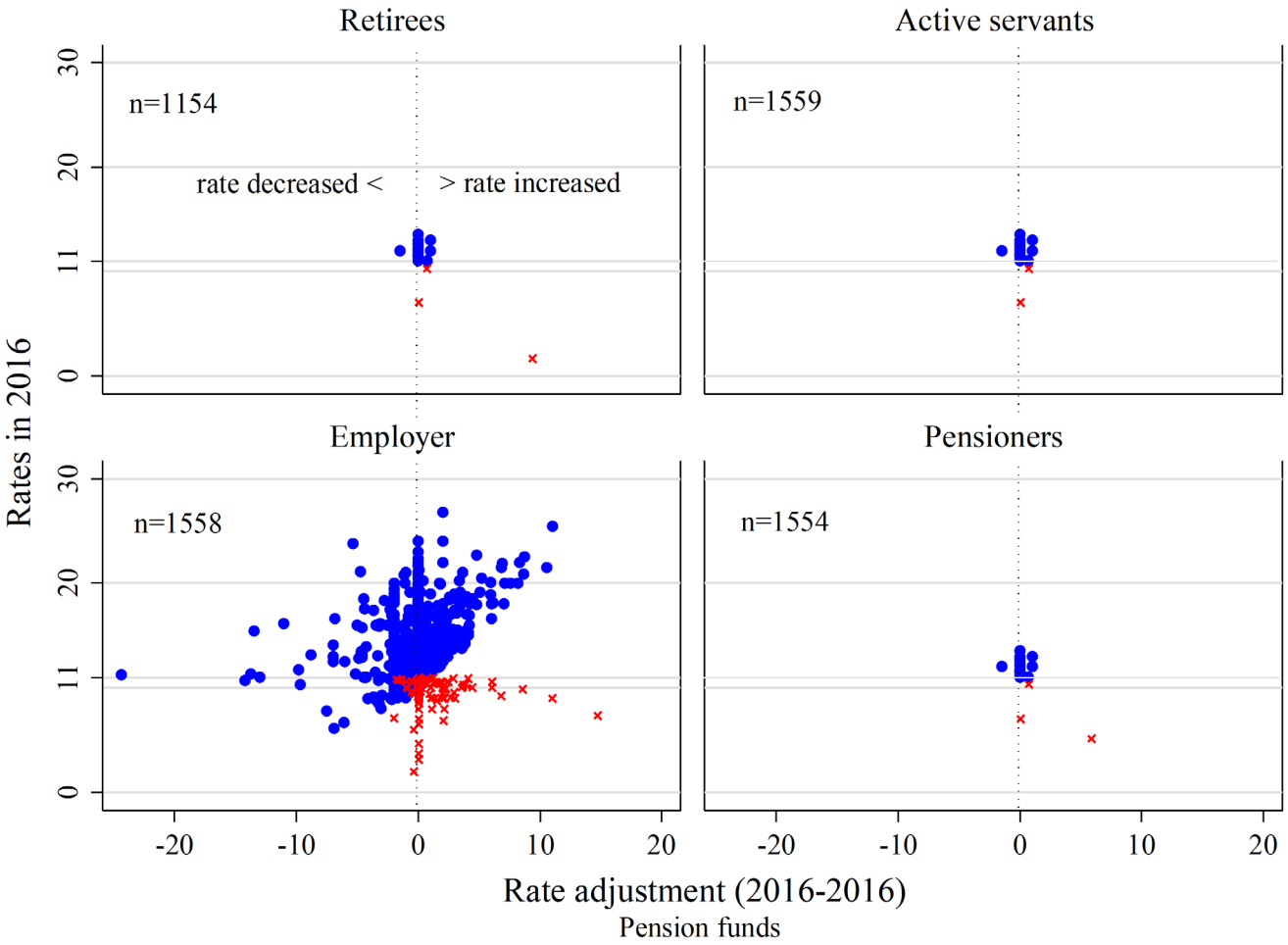

Figure 2 *Rate adjustments by contribution type, 2016-2015*
Note: *The number of civil servants' pension funds (RPPS) varies in each analysis, since as they are young funds, some have no pensioners or retirees.*
Source: *Elaborated by the authors based on data analyzed for 1,559 funds.*

However, for the employer contribution rate, it is observed that the presence of practiced rates below 11% is not a rare exception and, also, that there is a significant variation in these rates. The horizontal axis varies from a reduction of 20 percentage points in relation to the rate practiced in 2015 (-20) to an increase of 20 percentage points (+20). There are cases of rates increase but also rates reduction in the period.

For the 1,559 pension funds analyzed, 238 had their employer contribution rate increased in the period (with a mean of a 2-point increase) and nine of these funds went from contribution rates of 11% to more than 20% (an increase of more than 9%) (included in "All the RPPS funds" in Table 4). This adaptive action (active coping) shows that both the mayor and the city councilors invested political capital to correct the contributions. The increase in pension contribution rates (employer and employee) is also a measure that can contribute to the formation of reserves and help in the intergenerational renegotiation of the pensions contract with the beneficiaries. This reaction shows a certain responsiveness to correct any loss of financial sustainability, balancing the fund in the mid and long term.

In contrast, some of the municipalities adopted a weak response (powerless), reducing the employer contribution rate. As a pension fund is concerned, this may have been motivated by the decrease in the monthly payment from the city hall. More than 290 funds had their employer contribution rate reduced without there being a reduction in the other rates (Table 4). With this, the city hall transfers its current cash flow difficulty to the fund's financial result in future periods. From the financial resilience perspective, such action hampers both the financial capacity of the RPPS fund itself (which stops receiving the contributions needed to maintain financial and actuarial equilibrium or stops building reserves) as well as the financial resilience of the city hall (whose future mayors will assume higher employer contributions in the long run).

Table 4
Contribution rates and variations in them

	All the RPPS funds				Rate reduction			
	n	Mean	Maximum	Minimum	n	Mean	Maximum	Minimum
Retirees								
2016	1,701	11.02	13.5	1.66	1	13.5	13.5	13.5
2015	1,613	11.03	13.5	7.00	1	12.0	12.0	12.0
Variation	1,554	0.008	9.34	-1.50	1	-1.5	-1.5	-1.5
Civil servants								
2016	1,706	11.02	13.5	7.00	1	13.5	13.5	13.5
2015	1,614	11.02	13.5	7.00	1	12.0	12.0	12.0
Variation	1,559	0.001	1.00	-1.50	1	-1.5	-1.5	-1.5
Employer								
2016	1,706	13.70	35.65	1.98	297	14.94	35.65	1.98
2015	1,615	13.68	26.79	1.61	297	12.72	23.77	1.61
Variation	1,558	-0.085	14.66	-24.41	297	-2.22	-0.01	-24.41
Pensioners								
2016	1,701	11.02	13.5	5.14	1	13.5	13.5	13.5
2015	1,613	11.03	13.5	7.00	1	12.0	12.0	12.0
Variation	1,554	0.006	5.86	-1.50	1	-1.5	-1.5	-1.5

Note: *The variation in contribution rates is measured by the rate practiced in 2016 minus the one practiced in 2015. Negative values indicate a reduction in the rate in the period.*
RPPS = civil servants' pension funds.
Source: *Elaborated by the authors.*

Moving on to the RPPS fund manager's responses, the "improper use of the investments portfolio" (powerless coping) was analyzed. In order to compensate for the insufficiency of contributions revenue due to insufficient contribution rates (generated by response #7 or by a lack of response #11) or due to the interruption of contributions (generated by response #6), the fund manager has no choice but to withdraw values from the investment accounts to pay benefits. However, as a pension fund is concerned, these values should be reserved for future payments.

Reducing the portfolio balance would not be a normal situation in pension funds (except if the fund is being canceled). If the fund is balanced, the contribution revenues would somehow recover the portfolio balance used to pay pensions and retirement benefits paid, and there would not be an abrupt fall in the balance.

In Figure 3, each dot is a fund, according to its age and in how many periods (zero to 18 bimesters) there was some potential withdrawal from the investments portfolio. Of about 1,900 funds analyzed, only 283 did not withdraw values from the portfolio at any time, 1,240 used it at least once to four times, and 355 withdrew from it in five or more bimesters (in 15 bimesters, that is, a withdrawal every six months) (Figure 3). From the financial resilience perspective, the improper and anticipatory use of the reserves increases the fund's vulnerability, by creating uncertainty regarding the capacity to meet future obligations and by institutionalizing short-term practices, reducing the capacity of these organizations to build protections and competences to deal with future financial adversities.

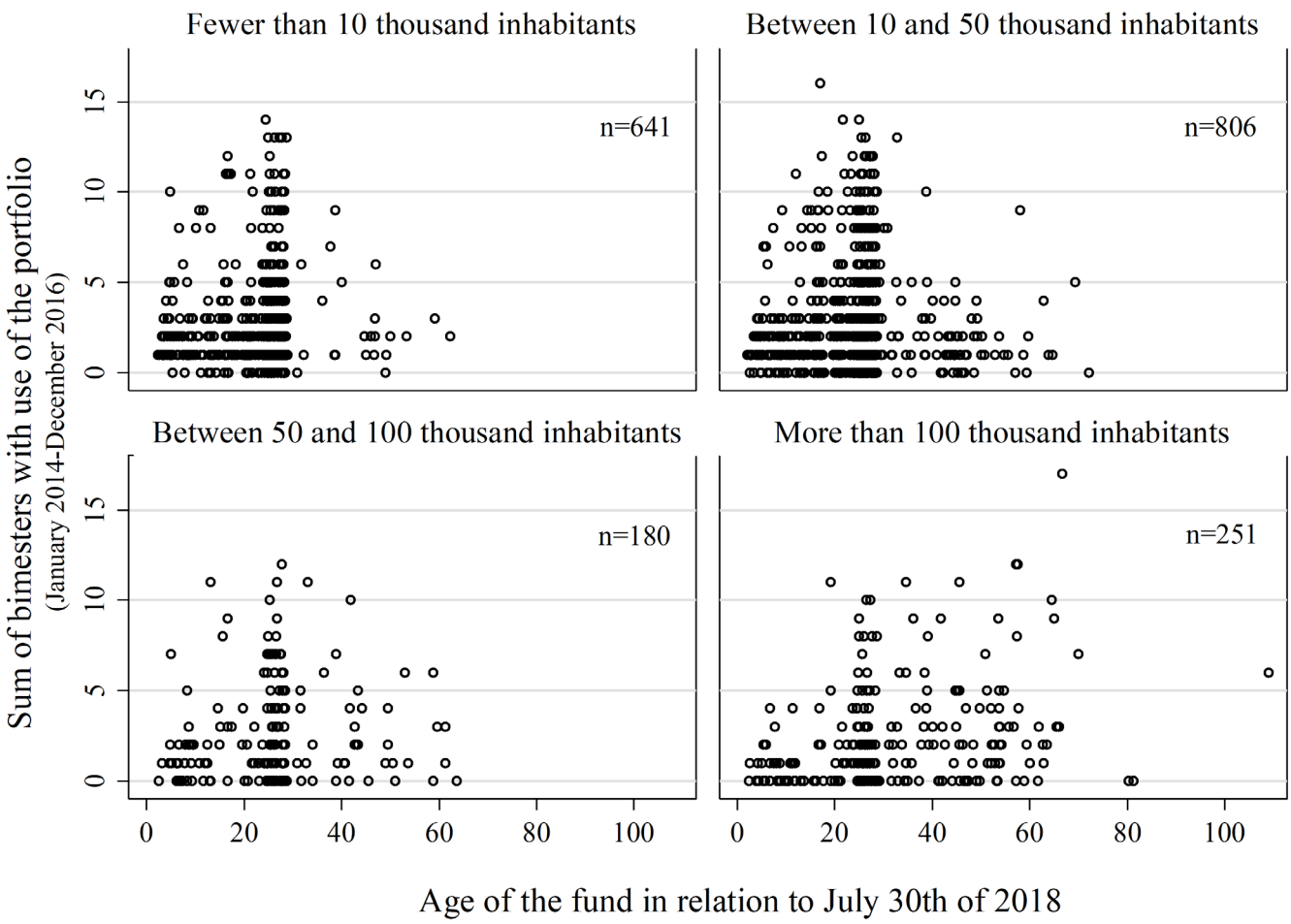

Figure 3 *Use of the investments portfolio of pension funds*
Source: *Elaborated by the authors based on the data analyzed for 1,878 funds.*

The most fatalistic action found on the part of the RPPS fund manager is the "delay in the payment of retirement benefits" (fatalist), that is, not paying benefits on the date they are due. In Figure 4, each dot is a fund, according to its age and in how many periods (zero to 36 months) there was some interruption or delay in the payment of retirement benefits. The delay was captured in levels of variation of the monthly values (10, 25, and 50%) (see Methodology).

In Figure 4, it is observed that, in a 36-month period, in between one and five periods there was a fall of more than 50% in the value paid. The 10% variations could be due to deaths and a change in the nature of the benefit (to a pension), but it was considered that 50% is a dysfunction. Analyzing the limitations of the metric proposed for small funds (fewer beneficiaries), in cases in which one of the only two retirees dies, the variation will be 50%; in another fund, with 10 retirees, if one dies in that month, the reduction will be 10%. These cases are an exception and the variations observed derive from events of another nature and not the substitution of retirement for pension benefits. Both young and mature funds had between one and five months in which the benefit was paid late, that is, it was not paid in the month it was due.

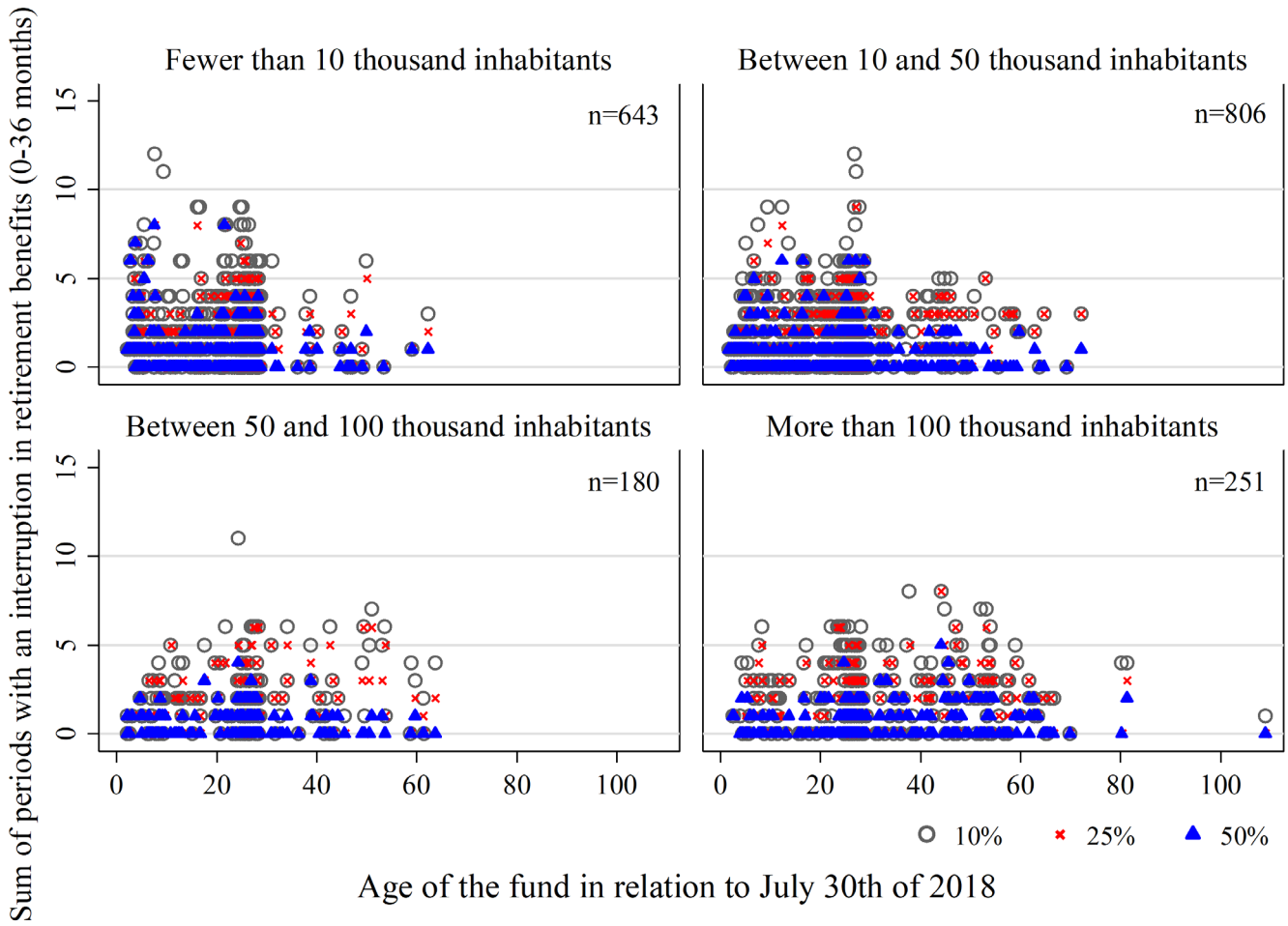

Figure 4 *Number of retirement benefits paid late in the pension funds for variations of 10, 25, and 50%*
Source: *Elaborated by the authors based on the data analyzed for 1,880 funds.*

6.1 Looking for the Resilience Patterns

To identify patterns in the RPPS funds, it is understood that it is essential to segregate the fund managers' responses from those that emerge from the city hall. These (#6, #7, and #11) will alter the fund's level of vulnerability, since they condition the demand for responses from the manager over the period, who, with the councilors, must give solutions according to their possibilities (e.g. responses #1 and #2).

Table 5 refers to the combination of the vulnerability generated by the city hall's responses with the responses given by the RPPS fund manager in the period from 2014 to 2016. The fund managers have to cope with the pressure originating in the city hall, which by seeking solutions for budgetary pressure or from its cash flow, may end up transferring part of this pressure to the fund, increasing its short or long-term vulnerability.

Table 5
Distribution of the cases according to the vulnerability created and the response of the managers of the civil servants' pension funds (RPPS)

Responses used by the RPPS fund manager	Vulnerability originating from the city hall's response				
	In the short term	In the long term	Reduced in the long term	None	Total
Delay in the payment of retirement benefits (#1)	Fatalistic + powerless 175 (1.65;1.13)	Fatalistic + powerless 47 (1.47;1.08)	Fatalistic + active coping 72 (1.42;1.05)	Fatalistic + no action 155 (1.54; 0.93)	449 (1.56;1.04)
Use of the portfolio to pay benefits (#2)	Powerless + powerless 46 (0.00;5.84)	Powerless + powerless 25 (0.00;5.28)	Powerless + active coping 56 (0.00;4.90)	Powerless + no action 103 (0.00;5.30)	430 (0.00;5.56)

Table 5
Cont.

Responses used by the RPPS fund manager	Vulnerability originating from the city hall's response				
	In the short term	In the long term	Reduced in the long term	None	Total
Both responses #1 and #2 are used	Fatalistic + powerless 145 (1.38;6.14)	Fatalistic + powerless 14 (1.43;5.57)	Fatalistic + active coping 34 (1.35;4.70)	Fatalistic + no action 54 (1.44;4.94)	247 (1.39;5.66)
Responses #1 and #2 are minimal or were not taken	No action + powerless 253 (0.00;1.09)	No action + powerless 91 (0.00;0.97)	No action + active coping 125 (0.00;1.12)	No action + no action 293 (0.00;1.03)	762 (0.00;1.06)
Total	819 (0.60;3.41)	177 (0.50;1.97)	287 (0.52;2.21)	605 (0.52;2.07)	1.888 (0.55;2.67)

Note: *Short-term vulnerability: cases in which the city hall interrupted transfers and contributions [interruption of transfers and contributions (#6) = 1], with or without a rate adjustment, since increasing it does not eliminate the short-term pressure and reducing it increases the short-term pressure; long-term vulnerability: cases in which the city hall reduced the employer's rate [reduction in the contribution rates (#7) = 1]; reduction of long-term vulnerability: cases in which the city hall increased the employer's rate [increase in the contribution rates (#11) = 1]; vulnerability not affected (city hall did not adopt any response): cases in which no responses by the city hall were observed. The cells present the combination of the type of response, from the manager + from the city hall, followed by the number of cases of this combination, and in parentheses is the mean of periods in which there was a delay in retirement benefits (#1) followed by the mean of periods in which the portfolio was used (#2). It is noted that, despite the predominant use of one response, such as #1, there are cases in which the use of #2 occurs at a minimal level, such as the use of the portfolio in an average of 1.13 periods, since the classification was carried out using the binary measures generated by the quartiles.*
Source: *Elaborated by the authors.*

Of all the funds, 287 are in a context in which the city hall took measures to reduce the fund's long-term vulnerability and 605 did not have their vulnerability affected by a city hall decision. The other 996 (first two columns of Table 5) came under exogenous pressure from the city hall, increasing their vulnerability. The way these managers respond to this pressure composes, together with the city hall's position, the resilience pattern.

The combinations presented may suggest some resilience patterns described previously in Table 1, for the 2014-2016 period. Only 125 have a superior resilience pattern. In Barbera et al. (2017), they are the constrained adapters, since the city hall took preventative measures to reduce the long-term vulnerability, and the managers did not need to respond with weak patterns in the period. Some of these 125 funds may be a typical self-regulators one with greater collaboration between the city hall, fund manager, and councilors. But, as transformative measures were not captured with the financial data, they could not be identified.

The others are constrained adapters or reactive and fatalistic-arrogant or powerless cases. However, to classify them more precisely, more information about the context in which the decisions are being taken would be needed, for example to differentiate whether the managers of funds that had their rates increased by the city hall are offering fatalistic responses as a short-term coping strategy until the corrective measures take effect; or, also, whether the 293 funds in which there were no manager responses are those that are already adjusted in the short-term or whether a rate adjustment would be needed and the city hall did not anticipate the vulnerability.

Independently of this limitation, it stands out that more than 1,300 funds are involved with some type of fatalistic or powerless response from managers and city hall, with a potential or real increase in vulnerability for subsequent years, that is, a weak pattern of financial resilience. The intertemporal tensions between short and long-term perspectives in municipalities, presented in Aquino and Cardoso (2019), besides pressuring the pension accounting structure as shown by the authors, may be strong inducers of this weak resilience pattern.

6.2 Effect of the Vulnerability Created by the City hall in the Fund Managers' Response

Fund managers have restricted possibilities to deal with exogenous pressures, such as an interruption of transfers by the city hall. In some cases, fund managers may be involved in the mayor's and finance secretary's decisions, which will impact the fund's cash flow, but this is not always observed (Aquino & Lima, 2018). No causal relationships are suggested between the responses of the fundholding city hall and of the managers of their

RPPS funds, but rather the relationship between the five responses are merely analyzed.

Table 6 presents the association between the responses given by the managers, depending on the context of vulnerability created by the city hall. The first part of the table represents how the responses were being given by the fund manager in the same period in which the short-term vulnerability was caused by the interruption of transfers by the city hall. The mean test is carried out for the three vulnerability scenarios caused by the rates adjustment. The second part of the table refers to how the responses vary with the change in rates adjustment scenarios, in the cases in which there was short-term vulnerability combined with an interruption of transfers and in the cases in which there was not.

Use of the investments portfolio to pay benefits is a recurrent practice and emerges when the city hall increases short-term vulnerability in the fund. In comparison with the cases in which the short-term vulnerability does not arise, the difference is significant for all the rate adjustment scenarios, perhaps as it is the response that has the lowest political and reputational cost for the fund manager. However, this response increases the fund's vulnerability when it is institutionalized and comes to be seen as a routine form of solution.

In contrast, delays in the payment of benefits are not associated with the interruption of transfers from the city hall; their occurrence is low (most of the occurrences are limited to one or two delays in 36 months). The repercussion of this fatalistic response is highly politically damaging to the mayor, remaining the last alternative to be chosen.

The RPPS fund manager's response of delaying the payment of retirement benefits does not vary with rate increases in comparison with other rate changes, whether when combined with the greater short-term vulnerability or not (second part of Table 6). As for rate increases, the manager tends to use the portfolio more to pay benefits when there is an interruption of transfers. In these cases, the portfolio was used to complement the payment of benefits until the rate was corrected. Thus, the effect of the rate increase was immediate, given the financial disequilibrium.

Finally, mean tests were carried out to verify the effect of the size of the municipalities and of the age of the funds (not presented). The tests confirm what was already observed in the graphical analysis presented. The resilience pattern and propensity to use the responses analyzed have no relationship with the size of the fundholding municipalities and the age of the funds.

Table 6

Association between the responses of the civil servants' pension funds (RPPS) depending on the city hall responses

How does the RPPS fund managers' response vary when an interruption of transfers occurs?	**Short-term vulnerability caused by the interruption of transfers and contributions (#6) (mean/standard deviation)**		
Long-term vulnerability due to the reduction in contribution rates (#7)	Yes (n = 114)	No (n = 177)	*t* test Yes > No
Delay in the payment of retirement benefits (#1)	0.6578/0.1167	0.5028/0.0600	NS
Use of the portfolio to pay benefits (#2)	3.0789/0.2526	1.9717/0.1737	***
With no alteration in vulnerability, no contribution rate adjustments were made (#11)	Yes (n = 387)	No (n = 605)	*t* test Yes > No
Delay in the payment of retirement benefits (#1)	0.5736/0.0442	0.5239/0.0370	NS
Use of the portfolio to pay benefits (#2)	3.2642/0.1587	2.0794/0.0968	***
Vulnerability reduced in the long term due to the increase in contribution rates (#11)	Yes (n = 318)	No (n = 287)	*t* test Yes > No
Delay in the payment of retirement benefits (#1)	0.5028/0.0589	0.5156/0.0493	NS
Use of the portfolio to pay benefits (#2)	3.7183/0.1878	2.2135/0.1350	***
How does the RPPS fund managers' response vary in the different rate scenarios?	**Short-term vulnerability caused by the interruption of transfers and contributions (#6) (significance of the *t* test)**		
Delay in the payment of retirement benefits (#1)	Yes	No	
With a reduction > no rate adjustment With or without short-term vulnerability	NS	NS	
With a reduction > with a rate increase Short-term vulnerability vs. long-term reduction	NS	NS	
No adjustment > with a rate increase With or without a reduction in long-term vulnerability	NS	NS	

Table 6
Cont.

How does the RPPS fund managers' response vary when an interruption of transfers occurs?	Short-term vulnerability caused by the interruption of transfers and contributions (#6) (mean/standard deviation)	
Use of the portfolio to pay benefits (#2)	Yes	No
With a reduction > no rate adjustment With or without short-term vulnerability	NS	NS
With a reduction > with a rate increase Short-term vulnerability vs. long-term reduction	NS	(-)*
No adjustment > with a rate increase With or without a reduction in long-term vulnerability	NS	(-)*

Note: *Both variables, a delay in the payment of retirement benefits (#1) and use of the portfolio to pay benefits (#2), have a normal distribution in the Shapiro-Wilk test for all subsamples compared. Thus, parametric mean tests were adopted, controlling the effect of the unequal variance and using the Welch formula (1947).*

****, **, *: level of significance at 1, 5, and 10%, respectively.*

NS = non-significant.

Source: *Elaborated by the authors.*

6.3 Possible Relationship with the Governance of the Funds

The typical pattern (fatalistic + powerless), identified as recurrent, is the combination of the response of using the investments portfolio and a delay in the payment of benefits in response to the interruption of transfers by the city hall.

The predominance of these responses, and resulting inefficiency of financial and actuarial management, may be associated with faults in the governance of the funds. In a study of RPPS fund managers, Aquino and Lima (2018) showed the weak governance of some RPPS funds, in which managers with low autonomy in relation to the mayor and with no support from councilors were unable to avoid the city hall considering the cash flow as an extension of its own (Aquino & Lima, 2018).

The fund manager, councilors, and consultants would not have the means to interfere in the mayor's decision to interrupt the monthly transfer. However, the way they react to this action may vary from condescending support to formal questioning and a possible notice to the City Council and to the public servants' association. Similarly, the reduction in rates approved in the City Council may involve more or less activism from the board of the fund, which may be more or less inclined to support the short-term actions proposed by the mayor, depending on how autonomous the manager presiding over the board is from the mayor.

Finally, faults in governance may open opportunities for other responses that create vulnerability. For example, instead of spreading transformative actions, consultants and experts may encourage solutions to obtain simple compliance with the legislation, without the effective delivery of financial and actuarial results, such as smoothing out the pre-requisites of the actuarial calculation to reduce the fund's actuarially balanced rates.

7. CONCLUSIONS AND IMPLICATIONS

The fiscal sustainability of the government holding the pension fund and the financial sustainability of the pension fund (financial solvency and actuarial result) are interconnected. It was proposed that city halls have reduced spaces to act repairing short-term fiscal equilibrium or long-term actuarial equilibrium. The sustainability of the funds derives from three conditions. The first significant part is given by the general parameters of the federal legislation for pensions policy, the second comes from local micro reforms in the contribution rates, and another part derives from the (in)efficiency of fund management. Transforming the pension accounts lies within the national regulatory scope, leaving to mayors and councillors what was called here micro reforms, which are basically rate adjustments.

By analyzing the resilience patterns of the RPPS funds, through the combination of the vulnerability scenario caused by the city hall's decision and managers' responses, the predominance was observed of the interaction of low resilience pattern responses, both by the city hall and by the fund managers. These, in turn, have few possibilities to deal with the vulnerability caused by some city hall

responses, such as interrupting transfers, and, in these cases, they generally use the investments portfolio to meet the payment of benefits. This city hall-fund managers interaction around low resilience patterns tends to increase the fund's vulnerability and transfers ever more critical conditions to future administrations.

No differences were found in the resilience patterns and responses of managers and city halls in relation to the size of the municipalities and age of the funds. This similarity may be due to the low diversity and quality of the observed responses caused by the lock-in effect in Pike et al. (2010). A reduction in the possible responses would give all the municipalities the same chances to resolve the issue. The lock-in effect in the pension responses of different sized municipalities, identified here, warrants careful and in-depth study. However, even if in the whole country the reduced space for response is equal for all mayors and there is the predominance of a weak resilience pattern, some funds are not having their vulnerability increased by city hall decisions, and their managers do not make use of typical responses with the low financial resilience standard, which shows a certain differential in terms of anticipating threats and in the governance of these funds.

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