

The Shift to Defined Contribution Scheme. An Italian Case

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Abstract

Many countries are facing the financial sustainability problem of their pension systems by the transition from the Defined Benefit to the Defined Contribution scheme. However, the Defined Contribution formula alone does not guarantee the sustainability. Many are the economic, financial and demographic factors to take into consideration, first of all the rate of return to be paid to contributions and benefits.

This article deals with the shift to the Defined Contribution scheme in contexts of economic and demographic instability, in which does not occur substantially the steady state, with reference to one of the largest Italian statutory pension systems for professional workers.

We propose a new way to structure and manage a pension system on the basis of a general principle, we also provide a proper rule for the rate of return on pension liability and we propose a pension indexation rule differentiated for Defined Contribution pensions and Defined Benefit pensions in order to improve the intergenerational equity.

Keywords: Defined Contribution, financial sustainability, intergenerational equity, pensions indexation rule.

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1. Introduction

The Italian pension system has a multi-pillar structure, as in most European countries, with a mandatory public unfunded first pillar offering basic coverage, a voluntary private funded second pillar that provides supplementary coverage and a voluntary private third pillar offering additional coverage on an individual basis. This article deals with the first pillar; the supplementary pension system was introduced in Italy in 1993 but second and third pillars still have a low membership equal to 24.3% of the workforce in 2013 (COVIP 2013).

The Italian mandatory public pension system is inspired by the principle of the social protection on an occupational basis (*Bismarckian model*) and provides coverage to all categories of workers, employees, self-employed, professionals. The Italian system, however, is also based on the plurality of social security covers and on the plurality of insurance institutions. This makes the mandatory system very complex and varied in all respects. There are different systems for employees and for professionals. Each of them, while operating within the same pillar, is characterized by different financing scheme, different architecture of the contribution rates, different formula for the pension calculation, different retirement rules, different financial sustainability criteria. In turn, these differences are found within the system aimed at professionals depending on the profession type.

As structured by law 335/1995 the Italian pension system is configured according to the Notional Defined Contribution scheme, totally unfunded. Indeed, only the system directed to both public and private employees, whose management is entrusted to a single institution INPS, is actually NDC. This system is the result of many reforms introduced over time, some of which have operated in the direction of a progressive expansion of pension

spending by allowing early retirement and very generous pension benefits, unbalanced compared to contributions paid. The system is currently in deficit and requires significant public transfers to cover the difference between contributions and benefits.

The shift from the Defined Benefit to the Defined Contribution scheme realized in 1995 would have to ensure financial sustainability. This did not take place nor could it in contexts of PAYG scheme with economic and demographic instability. In such a context, the assumptions and the thesis of the Aaron's theorem do not occur, see Aaron (1966). The DC scheme alone does not guarantee the financial sustainability and it is necessary to structure appropriately the financing scheme in two components - PAYG and funded - in which the determining variable for sustainability is the rate of return credited to contributions and benefits. There is another aspect to take into consideration. In Italy the rate of return recognized to the contributions paid is equal to the five-year average change in nominal GDP, whereas the benefits are calculated on the basis of a transformation coefficient that recognizes in advance a fixed interest rate equal to 1.5% in real terms and are subsequently indexed to the Consumer Price Index. In such a context, in addition to the instability of the economic cycle and to the demographic instability affecting Italy and most of the European countries, characterized by the baby boom of 60-70 years and the subsequent sharp decline in the birth rate and longer life expectancy, you need to consider the economic structural composition of the population. Generally, in all developed countries, we can find: an economically weak structural component of the population, characterized by low incomes and low productivity; a young component with discontinuous careers and a migrant component with a low economic profile and job instability. That affects negatively the rate of return to be recognized to the contributions paid; since it is a function of the GDP, this will be the lower the higher the weight of these components.

On the contrary, the Italian mandatory pension system for professionals, by virtue of the plurality of insurance institutions, is entrusted to 18 social security institutions different for professional category. The administrative and managerial autonomy enjoyed by these institutions has led over time the existence of various social security systems depending on the profession type, with different configurations compared to the pension system for employees. Some institutions are structured according to a Fully Funded scheme with a Defined Contribution formula. Others institutions are structured according to a PAYG scheme with a funded component and the Defined Benefit formula. Others are structured according to a PAYG scheme with a funded component and formula both Defined Benefit and Defined Contribution on the basis of a pro-rata rule. Finally, some institutions are structured according to a PAYG scheme with a funded component and the Defined Benefit formula but have made the transition to the Defined Contribution scheme because they have not passed the sustainability test according to the law 214/2011. This law established the transition for all those systems which failed to demonstrate a balance between contributions and benefits for a period of 50 years. The case study belongs to the latter category. Overall the pension system for professionals deals with the social security protection for about 1.5 million professionals and unlike the system for employees is not in deficit and holds an invested asset amounting to € 64 billion, see ADEPP (2014).

Our paper aims to represent an innovative way to structure and manage a pension system according to a general principle referred to as the Separation Principle, see Angrisani and Di Palo (2014; forthcoming), based on a financing scheme PAYG with a structural funded component and based on a Defined Contribution formula that recognizes the same rate of return on contributions and benefits also taking into account the financial rate of return on invested assets. The PAYG component plays the role to managing the stable part of the system. The funded component plays the role to managing in a structural way the

demographic instability and the economically weak portion; for the exceeding part than the coverage of such pension liabilities it can also represent a guarantee reserve for the PAYG component.

Systems like the case study also have the problem of managing the intergenerational equity, due to the previously in force and generous DB component. In this regard, our article aims to pursue that purpose even at the stage of retirement by proposing different indexation rules for DB pensions and DC pensions.

Our proposal affects also virtuous systems such as the Swedish pension system. Although such a system already recognizes the same rate of return on contributions and benefits and although it is already structured according to a PAYG scheme supported by a funded component - Buffer Fund - it does not take into account the financial rate of return on invested assets in determining the rate of return to be paid to contributions and benefits and it has not structured the funded component with the purpose of managing the unstable part of the system in the way that we will show in section 3. According to our idea, that funded component should handle, for example, the system portion characterized by irregular and potentially short careers - as often happens to migrant workers - in addition to the demographic and economic instability. Moreover, this issue affects Sweden in particular following the liberalization implemented by the labor immigration law of 2008.

The paper is structured as follows. In section 2 a brief description of the case study is provided. Section 3 analyses some criticisms of the recent reform implemented by INARCASSA in 2012 and presents our proposal. Section 4 presents some other adjustment proposals. In section 5 a conclusion is provided.

2. Brief description of the case study

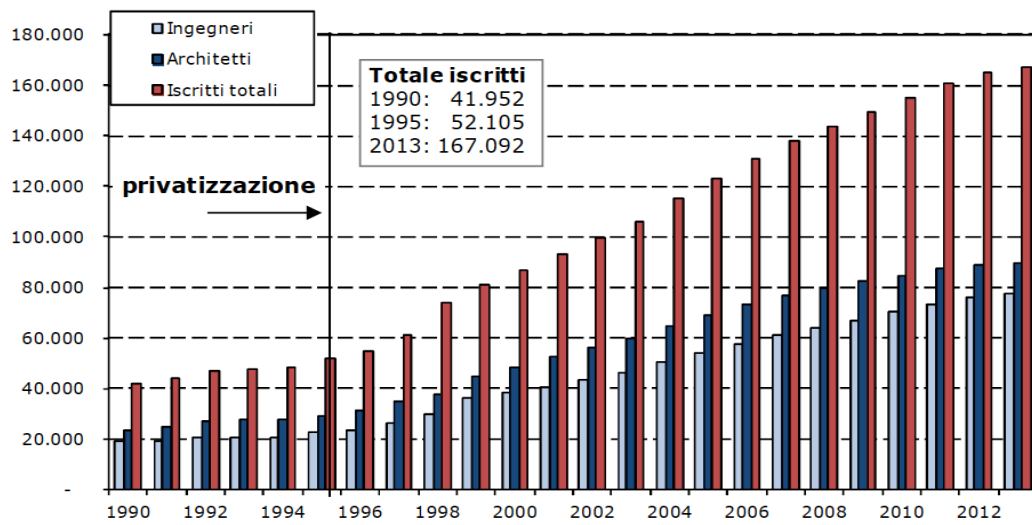
INARCASSA is the social security institution for engineers and architects and is one of the largest Italian professional social security institutions. In the following part, we are going to present the main economic, demographic and financial features of this pension system which, after several partial reforms within the Defined Benefit scheme, was structurally reformed in 2012 when, following the law 214/2011, the transition to the Defined Contribution scheme was made.

Regarding the demographic features, over the past 20 years members have quadrupled reaching 167.092 in 2013, see Figure 2.1. As can be deduced from the figures 2.1 and 2.2, there was a substantially constant growth until 2011 due to a net annual flow of enrollments on average equal to 6.000 members; from 2012 there was a marked reduction in the net annual flow which equal to 2.250 in 2013 is forecast at 1.708 and 1.000 respectively in 2014 and 2015, see INARCASSA (2015).

From a demographic point of view, an explosion of the enrollments that occurs for several years (1994-2011, in INARCASSA case) and it is not followed by the same trend in the following years (in INARCASSA case 2012-2015 and beyond, as it is likely observing the current trends), implies very large cohorts followed by smaller cohorts and denotes a demographic instability that we define “demographic wave”, see Angrisani et al (2001). Such a phenomenon assumes great importance in the context of PAYG pension systems, in which the annual contribution revenue directly finances the annual pension disbursements.

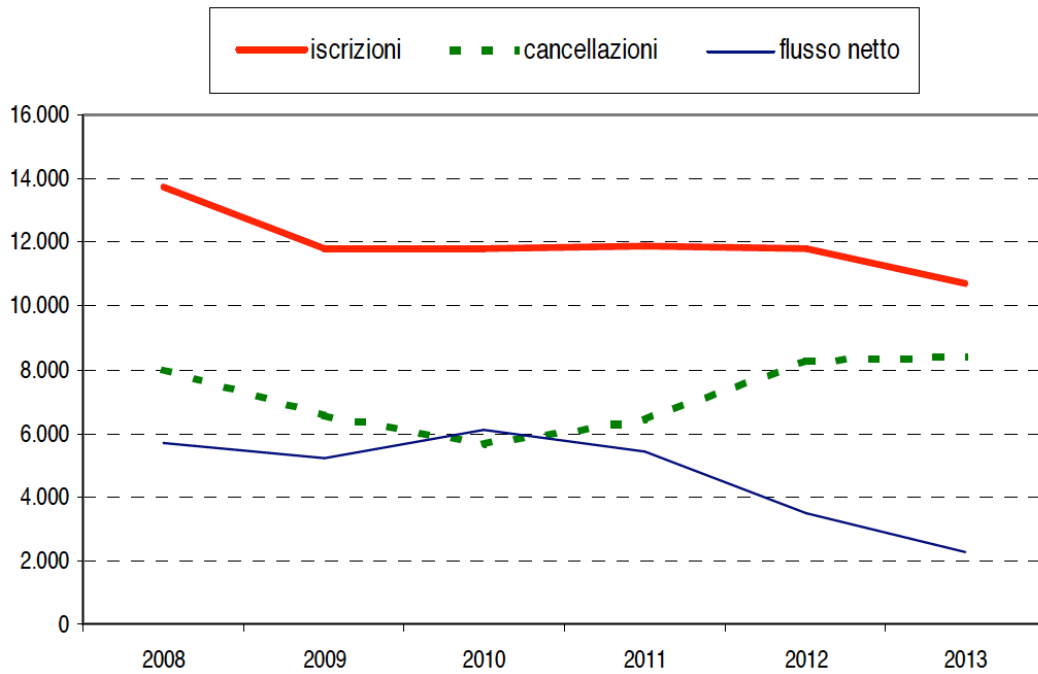
Figure 2.3 shows the consequences of the enrollments explosion compared to the older generations: more than 50% of members holds an insurance seniority not exceeding 10 years.

Figure 2.1 - Members (contributors) of the INARCASSA pension system



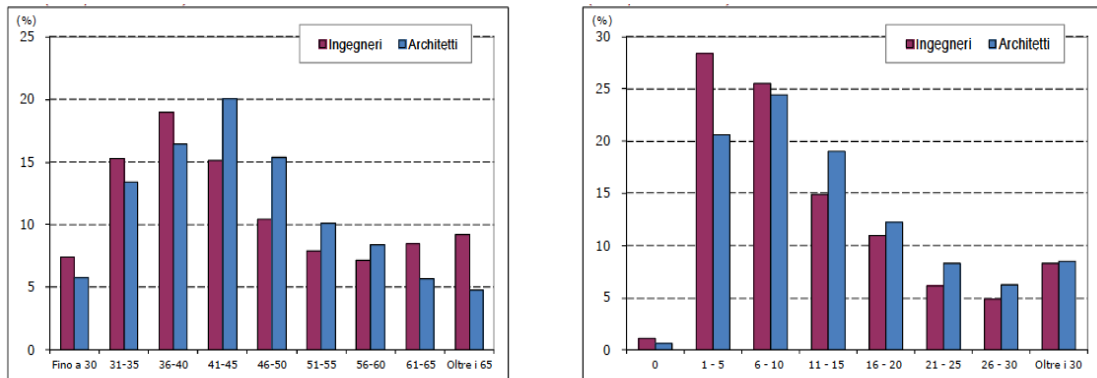
Source: INARCASSA (2015)

Figure 2.2 - Enrollments and unsubscriptions to the INARCASSA pension system



Source: INARCASSA (2015)

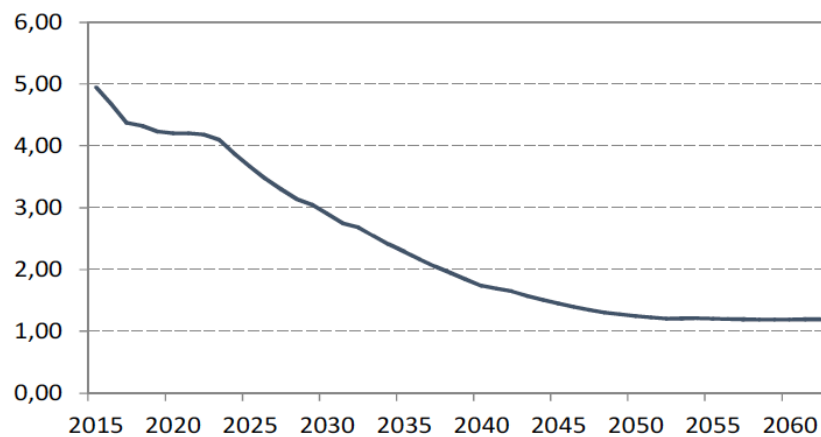
Figure 2.3 - Distribution of the INARCASSA members by age and seniority (2013)



Source: INARCASSA (2014)

In terms of contributions and benefits this currently means a large number of contributors and a low number of retirees, therefore an excess contributions on benefits. However, the members/retirees ratio currently equal to 5 will drop below 2 in the next 20 years to reach 1 later, see Figure 2.4. Actually, this ratio will probably drop below 1; in fact the forecast shown by the Figure 2.4 is based on assumptions, consistent with the legislative provisions, which imply that when members of the demographic wave come into retirement the number of new contributors is calculated substantially at replacement of the number of new retirees. In other words, these assumptions imply that when the large cohorts of about 6.000 members will retire they will be replaced by an equal number of new enrollments, but this is far-fetched than the current trends and implies a demographic stability that as shown above is not found, see INARCASSA (2011).

Figure 2.4 - Dynamics of the members/retirees ratio

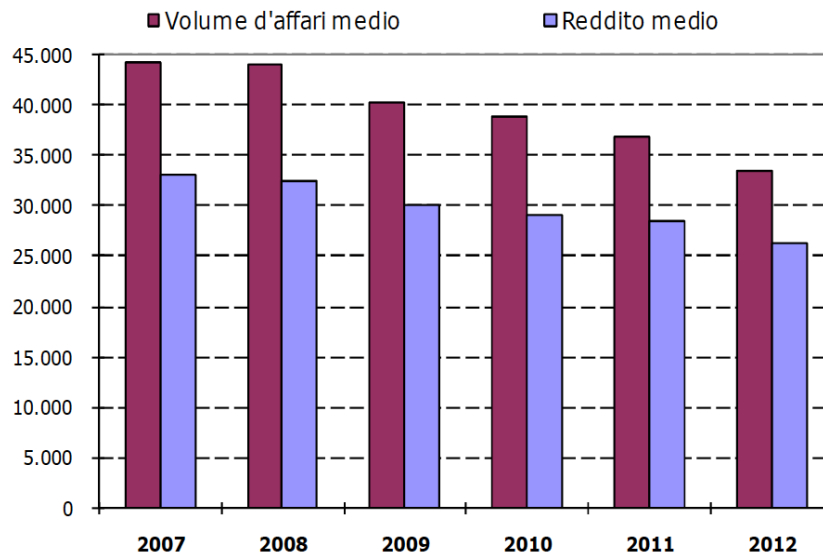


Source: INARCASSA (2012)

The contributions are calculated by applying the two provided contribution rates respectively to the taxable income and to the turnover. The contribution rate on income equal to 14.5% is intended to finance the individual's personal account; the contribution rate applied to the turnover equal to 4% is intended in part to finance the individual's personal account and partly to cover the institution's operating expenses. However, in the last 10 years there has been a marked reduction in average income and average turnover, see Figure 2.5. This clearly denotes an economic instability. Furthermore, a significant portion of members systematically experiences hard economic conditions; in this regard the INARCASSA balance sheet 2013 points out that “... circa il 27% dei nostri associati versa in condizioni economiche prossime alla soglia di povertà”¹, in other words there is a significant economically weak structural component of members, about 27%, close to the poverty threshold with low incomes and low productivity, principally young professionals and/or professionals with discontinuous careers. Such a portion of the system represents what we define “economic wave”.

¹ Translation: “... about 27% of our members experiences economic conditions next to the poverty threshold”. Source INARCASSA (2013), p.6.

Figure 2.5 - Average turnover and average income of the INARCASSA members

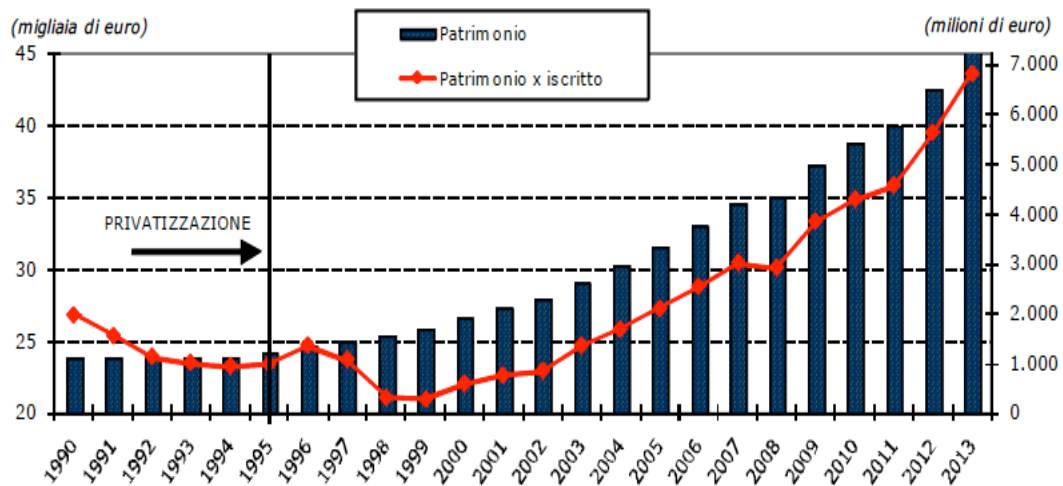


Source: INARCASSA (2014)

Regarding the financial features, INARCASSA holds significant invested assets equal to € 7.3 billion in 2013, estimated at € 8.6 billion in 2015 (INARCASSA 2015), see Figure 2.6, resulting from the accumulated contributions and from the returns obtained by the financial market. However, the rate of return credited to the contributions paid does not take into account also the financial rate of return.

Therefore INARCASSA is a PAYG scheme with a funded component which, although its significant amount, it is not structured to manage the demographic and economic unstable part of the system and to “fund” the corresponding pension liabilities.

Figure 2.6 - Dynamics of the INARCASSA invested assets



Source: INARCASSA (2015)

All the social security systems for professionals which adopt the DC scheme are required to recognize the rate of return, the five-year average change in nominal GDP, established for the pension system for employees because operating in the first mandatory pillar. However, as we have just seen, each professional category is characterized by a different economic development that does not always reflect the national trends.

INARCASSA established a different rate of return equal to the five-year average change in GDP produced by the members with a guaranteed minimum equal to 1.5%. That rate of return can be increased in a discretionary way depending on the return on invested assets. However, this choice must be contextualized within the economic and demographic instability of the profession.

This case study is just an example of those pension systems that decide to face the financial sustainability problem by the transition to the DC formula in contexts of PAYG scheme with demographic instability and structural economic weakness for a portion of members, as well as in the current economic and financial context.

In order to achieve the financial sustainability, in observance of the intergenerational equity, namely keeping a fixed contribution rate, the transition to the DC scheme is not sufficient.

3. Structural errors of the case study and adjustment proposals

Two are the main structural errors introduced by the 2012 reform of the INARCASSA pension system.

The first error regards the financing scheme, in the meaning of the management of the financial resources to cope with the pension expenditure, which does not properly works with respect to the economic and demographic unstable part of the system, namely the economic and demographic waves. As far as we know, it is not clearly understood to what extent the demographic extra component could coincide with the component with lower productive capacity. However, such an economic and demographic instability is far away from the steady state and needs to be managed in accordance with logic rules different than the stable part of the system, which is manageable according to a PAYG scheme.

The second error regards the rate of return recognized on the contributions paid which, equal to the five-year average change in GDP produced by the members with a guaranteed minimum equal to 1.5%, it does ignore the consequences on the GDP of the economic wave and it does not take into account the financial rate of return on the invested assets. As a matter of fact, each participant contributes to determine the specific professional Gross Domestic Product (INARCASSA GDP), but if more than one quarter of the participants experiences low and instable income profiles such a GDP can be affected by this economic weakness.

Therefore, the Reform implemented would have to properly consider the economic and/or demographic wave that disrupts and weakens the demographic, economic, and

financial stability of the whole system and would have to manage such an unstable part of the system according to the logical-mathematical approach that we are going to explain in the following section, see Angrisani and Di Palo (2014; forthcoming).

3.1 The Separation Principle approach

The approach suggested in Angrisani and Di Palo (2014; forthcoming) allows the pension system to control the instability stemming from the demographic/economic wave by means of a general principle referred to as the Separation Principle with the goal of the financial sustainability jointly with the respect of the intergenerational equity. The idea underlying this principle breaks up with the existing literature. In fact, the Separation Principle basically states that it is necessary “to fund” the system component that cannot be managed according to the PAYG scheme, in this way overtaking the classical juxtaposition between the two alternative financing schemes of a pension system, PAYG or Fully Funded. In particular, with specific regard to the problem of the demographic/economic wave, this principle implies that the group of individuals who constitute the demographic/economic wave “has to be fully funded”.

The approach proposed does not require actuarial projections or stochastic simulations as it relies exclusively on the actual dynamics of the variables involved. However, although our results in Angrisani and Di Palo (2014; forthcoming) are proved in assumptions of a constant financial rate of return and a constant wage growth rate, further extensions of our study in the case of interest rates modelled by stochastic processes are forthcoming and they confirm the substantial validity of our methodology, see Angrisani et al (2015).

In the case of the demographic/economic wave, the Separation Principle leads to a related theorem, which outlines the operating method and, amongst other technicalities, implements a proper rule on the rate of return on pension liability. Without detailing the

theorem's technicalities, for which we refer to Angrisani and Di Palo (2014; forthcoming), let us consider that the pension system is in a state of general equilibrium in a demographic, economic and financial profile, and that a demographic/economic wave disrupts this equilibrium. In this situation, following the Separation Principle the system has to technically manage its participants in two subsystems in the operating way that let us describe.

The first subsystem continues to receive the same number of new entrants with stable wage dynamics. Hence, it remains in a state of economic and demographic stability and is the natural continuation of the pre-existing stable pension system. We refer to this as the *Pivot Pension System*.

The second subsystem receives the individuals of the demographic/economic wave, namely the individuals who have features of instability in the demographic/economic profile. We refer to this as the *Auxiliary Pension System*. According to the Separation Principle this subsystem has to follow the fully funded scheme also in order to realize a greater protection for that portion of members.

Members of the *Auxiliary Pension System* can be shifted to the *Pivot Pension System* and vice versa depending on the stability degree of the individual economic/demographic dynamics.

It is worth noting that the two subsystems are separated only technically and integrated in relation to the financial management; both together constitute a unique pension system with respect to the pension rules and benefits. Namely the members pay contributions according to the same fixed contribution rate, share the same pension calculation rules and the same rate of return on pension liability. It is therefore irrelevant for an individual whether he/she joins the first or the second subsystem in order to pension benefits.

Specifically, as asserted in the Separation Theorem, the rate of return to be recognized on the pension liability has to follow this rule:

$$r_L(t) = rD_c(t) + \bar{\sigma}_1(1 - D_c(t)) \quad (3.1)$$

where:

t is the time;

$r_L(t)$ is the rate of return on the pension liability to be recognised to both the *Pivot* and the *Auxiliary Pension Systems*;

r is the financial rate of return on the fund;

$D_c(t)$ is the degree of funding of the pension liability of the Total Pension System, defined

as the ratio between the fund, $F(t)$, and the pension liability, $L(t)$, i.e. $D_c(t) = \frac{F(t)}{L(t)}$;

$\bar{\sigma}_1$ is the wage growth rate of the *Pivot Pension System*, whose productivity, by assumptions, is not modified by the individuals constituting the wave.

Rule (3.1) sets the rate of return on the pension liability equal to the linear combination of the financial rate plus the wage growth rate of the *Pivot Pension System* – namely the stable part of the system – with weights equal to the degree of funding of the pension liability of the whole system and to the complementary to one of the same degree of funding, respectively.

The Separation Theorem substantially asserts that the whole pension system remains sustainable and drains effectively the demographic/economic wave, in the meaning that when the demographic/economic wave exhausts, the system goes back to the stability condition in which it was before the wave entrance. In addition, this fact allows us to state the optimality of the choice on the rate of return used in the Separation Theorem.

The Separation Theorem proves that the rule (3.1) allows the system to keep constant the level of the unfunded pension liability with respect to wages (see the definition in Angrisani (2006; 2008)) of the *Pivot Pension System*. This indicator denoted by $\beta(t)$, is one of the most useful state indicators of a pension system. It is defined as $\beta(t) = \frac{L(t) - F(t)}{W(t)}$, where $W(t)$ is the instantaneous wages flow of the pension system. Therefore, stabilising the value of $\beta(t)$ means keeping equal the rate of change of the unfunded pension liability - at the numerator of $\beta(t)$ - and the rate of change of wages flow - at the denominator of $\beta(t)$. In other words, the changes, positive or negative, in the unfunded pension liability keep up with the changes in the wages flow, which is the contributory source by which is paid the current expenditure not covered by the fund.

3.2 Adjustment proposals

In the light of the Separation Theorem, in the case of INARCASSA as well as in the case of any other pension system experiencing or that will experience a demographic and/or economic wave, the financial management of the system has to be based according to the approach presented in the previous section. As a consequence, the portion of the system with stable income and productivity profile has to be managed into the *Pivot Pension System*, whereas the portion with unstable income and productivity profile has to be managed into the *Auxiliary Pension System*. The rate of return to be recognized to the pension liability of all participants is defined in (3.1), which, as already noted, takes into account the productivity of the members belonging to the *Pivot Pension System* and the return on the whole fund that also includes the fund to coverage of the *Auxiliary Pension System* liability. Furthermore, if the pension system is provided with a fund higher than that

necessary to coverage the pension liability of the demographic/economic wave's individuals, the exceeding part of the fund can be considered as a guarantee reserve for the *Pivot pension system*.

In other words, the financial returns on the funded component must be redistributed to the participants. This redistribution, however, must be credited maintaining constant the level of the unfunded pension liability with respect to wages in order not to threaten the sustainability of the system.

In this perspective, the rule of the rate of return given by the Separation Theorem, could turn out to be the proper choice.

Differently, despite INARCASSA presents an incipient demographic wave and an economically weak structural component of members, the 2012 Reform made a structural mistake when set the rate of return on the individual pension credit equal to the five-year average change in GDP produced by the members with a guaranteed minimum equal to 1.5%. In the context of a system in which about 27% of members experiences economic conditions next to the poverty threshold, the GDP produced by all members is systematically overburdened; consequently that choice could result in a structural leveling of the rate of return to the minimum value equal to 1.5%. Furthermore, INARCASSA proposed to increase the rate of return to be paid on the contribution up to 4.5% for the years 2014 and 2015. This redistribution on a discretionary basis in the context of a decline in the professional wages does not allow to keep $\beta(t)$ constant and produces a dilation of the pension liability that will entail a possible inadequacy of the contribution rate in respect to the pension expenditure.

Regarding the intergenerational equity, which should be achieved mainly by a fixed contribution rate and should not change depending on the current pension expenditure, our article also deals with the attainment of that purpose in systems which have to manage the

previously in force and generous Defined Benefit component. In the Italian mandatory pension system, as well as in the INARCASSA pension system, the pension benefits are indexed to the Consumer Price Index independently from the calculation formula. Our proposal aims to pursue the intergenerational equity even at the stage of retirement by defining a different indexation rule. The Defined Contribution pensions, which are lower and they will be principally enjoyed by “young” professionals, have to be indexed by the rate of return of the pension system (according to the rule (3.1)), which includes the inflation rate, whilst the Defined Benefit pensions, which are higher and principally enjoyed by “old” professionals, have to be indexed only by the Consumer Price Index.

4. Further adjustment proposals

In addition to the above mentioned adjustment proposals there are some other adjustments that can be done in order to allow a better pension treatment principally for the young professionals. It is worth noting that these further proposals are the result of political choices and they are not adjustments of structural errors.

The mandatory pension system for professionals is based on a different architecture of contribution rates than the system for employees. Each member must pay the contribution on the basis of two rates: the first, so called “subjective contribution rate” is applied on the taxable income and is intended to finance the individual's personal account; the second, so called “supplementary contribution rate” is applied on the turnover and is intended to cover the institution's operating expenses but it can also be used in part to increase the individual's personal account (that rate is equal to 2-5%). In this regard, the INARCASSA pension system establishes a “supplementary contribution rate” equal to 4% and enables the allocation of a portion of it on the individual's personal account according to percentages - from 2 to 1% - that favor the members of the new Defined Contribution scheme but insufficiently to offset their pension treatment in respect to the more generous and

unbalanced treatment compared to contributions paid enjoyed by the members with Defined Benefit component. In order to improve the intergenerational equity this allocation rule should be changed in order to recognize a greater share to young professionals with discontinuous careers and a low income and productivity profile.

Furthermore, the INARCASSA pension system states that the amount of the individual pension benefit cannot be less than a fixed value equal to € 10.876 in 2015 and offers an integration to the pension in cases where it is lower than the value set. Actually, this benefit is not an effective and guaranteed minimum pension for different reasons: the assignment of the benefit is not guaranteed and is subject to requirements unrelated to the individual sphere of the beneficiary but related to the family income; the value set is not effective and becomes lower for professionals with low income profile. If the aim is to provide a minimum pension treatment in order to support the members with discontinuous careers and low income and productivity profile, would be more appropriate to provide an effective and guaranteed minimum pension financed on the basis of solidarity.

5. Conclusions

After providing a contextualization of the case study as part of the Italian mandatory pension system, we have examined the two main structural errors made by the 2012 reform of the INARCASSA pension system in the light of the approach of the logical sustainability, see Angrisani (2006; 2008). According to the Separation Principle mentioned in the previous sections, we have shown the technical changes to be taken in terms of the rate of return and the financial management in order to solve the above-mentioned mistakes.

We also addressed the intergenerational equity issue by proposing a pension indexation rule differentiated in order to improve at the stage of retirement the Defined Contribution pension benefits of the young generations with respect to the more generous and unbalanced Defined Benefit pension benefits.

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