A New (and Better?) Pay-As-You-Go Pension Scheme

Introduction

Pay-as-you-go (PAYGO) pension systems may have negative side effects: for instance, they may discourage labour market participation among mature workers, depress saving, and lower fertility. They also raise concerns with regard to redistribution, inter- and intra-generational equity, and gender equity. Most importantly, when the system matures and populations age, PAYGO systems frequently prove unviable: costs increase rapidly, outlays tend to exceed revenues, and the relevant demographic and economic variables rarely evolve as policy makers hope or experts foresee.

Despite their nature of "intergenerational compacts", which would call for rules that change only rarely, if ever, pension systems tend to undergo frequent revisions, under the pressure of economic crises and population ageing, leading typically to higher contribution rates, lower benefits, later retirement, or a combination of the three.

According to several scholars, notional (or non-financial) defined contribution pension systems, or NDC are *the* solution. Applied in a few countries (Sweden, Italy, Latvia, Norway, and Poland), although in different versions, NDC pension systems mimic funding, guarantee actuarial equity, and therefore (so the argument goes) cannot incur deficits.

In this paper, after discussing a few of the limitations of NDC arrangements (*not in this abstract*), I will present the "improved" PAYGO pension system, IPAYGO, which has all the merits of NDC, but outperforms them in several respects. Among these, it does guarantee viability in all possible demo-economic scenarios, does not need forecasts, and forces explicit (simple and transparent) policy choices, for instance in the alternative between redistribution and actuarial equity, or in the quest for the best compromise between age at retirement, "generosity" of the system and contribution level.

In this context, I will insist in particular on the demographic aspects of the proposal, underlying the advantages of including child benefits, thus transforming the scheme into a true intergenerational transfer system.

The rationale of the improved PAYGO (IPAYGO) pension system

IPAYGO hinges on the notion that everything is relative, and this is what makes it viable, which means that it can last forever, with unchanged rules. It is a combination of several automatic adjusting mechanisms, or AAMs, nowadays frequently advocated, and sometimes implemented. The difference is that IPAYGO takes care simultaneously of *all* the areas where adjustments may be needed, be it demographic (survival and population age structure) or economic (employment and labour productivity). With IPAYGO, the choice of the key parameters that shape the system is made keeping under control all the possible consequences that derive from these choices and a set of clearly defined exogenous variables (Table 1). This avoids the two main shortcomings of AAMs, namely unforeseen consequences on the one hand, and, on the other, the ambiguous role of forecasts, which are absent here, because IPAYGO relies only on observed variables.

IPAYGO belongs to the general family of "risk sharing" pension systems, inspired by the Musgrave (1981) rule of proportionality between pensions and net labour incomes, although IPAYGO differs from the original in a couple of relevant respects, discussed in the text (*not in this abstract*).

Finally, with IPAYGO the balance between actuarial equity ("Bismarckian" corner solution) and redistribution ("Beveridgean" corner solution) is explicit, and is fine-tuned by a simple weighting parameter Q ($0 \leq Q \leq 1$).

Table 1: List and classification of the relevant variables in an IPAYGO pension system

Step	Policy choices (parameters)	Exogenous variables	Endogenous variables
1	Y^*, S^*		A^*
2		$\boldsymbol{L}_{x,t}$ ($\Sigma_x L_{x,t} = T_{0,t}$)	α_t, β_t
3		$\boldsymbol{I}_{x,t}$ ($\Sigma_x I_{x,t} = I_t$)	Y_t, A_t, S_t, $\lvert A_t \rvert$
4	y, s		c_t, c^*
5		E_t, $W_{e,t}$	e_t, $W_{a,t}$, $N_{a,t}$, P_t, B_t
6	Q	$\boldsymbol{K}_{s,t}$, K_t	$\boldsymbol{P}_{s,t}$

Note: x=age; t=time. Bold denote vectors. (The derivation of dependent variables from policy choices and exogenous variables is shown in the full paper)

Y^*, S^*, A^* = % of years of life lived ($L_{x,t}$) to be spent in the three basic life states (young, adult, senior)

y, s = relative value of pension and child benefits

Q = relative weight of actuarial equity, as opposed to redistribution (1-Q)

Y_t, S_t, A_t = shares young, adult, senior in the population **(I)**

α, β = threshold ages (separating the young from the adults and these from seniors, respectively)

c_t, c^* = current and "reference" (average) contribution rate

E = employed and e = employment rate

W, N = gross and net wage (of the employed and of the adults)

P, B =pensions and child benefits

$K_{s,t}$ = individual virtual capital (representative of past contributions), whose average is K_t.

An example of how IPAYGO would have worked in Italy in the past 120 years

In the basic variant of IPAYGO, the threshold ages α_t and β_t "follow" survival in such a way that the average shares of life spent in the three states (young, adult and old/senior; Y^*, A^* and S^*, respectively) remain those preferred by society. For instance, in the case of Italy, assuming that the initial policy choices were $Y^*=S^*=20\%$ (and therefore $A^*=60\%$), and assuming no change in this respect, in the past 120 years, threshold ages should have evolved as shown in Table 2: α from 11.5 to 16.5 years, and β from 54 to 67 years. Admittedly, these are large variations, but they are consistent with the even larger increase in life expectancy in the period, from 41.9 years to 82.0 years.

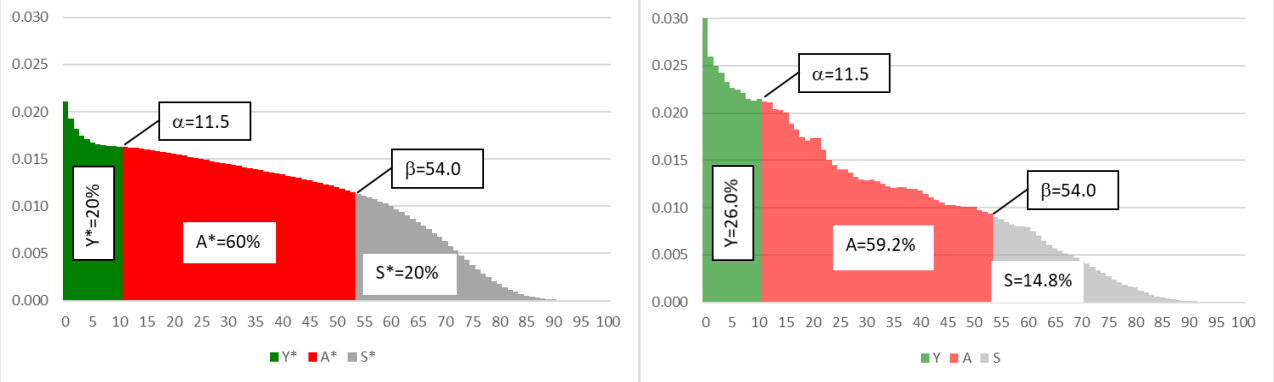
Table 2: Life expectancy, threshold ages and shares of young, adult and senior population if $Y^*=S^*=20\%$ and $A^*=60\%$. (Example referred to Italy, 1900-2020)

	1900	1950	2000	2020
$\boldsymbol{e_0}$	**41.9**	**65.7**	**79.6**	**82.0**
α	11.5	14.3	16.0	16.5
β	54.0	60.0	65.5	67.0
Y	27.1%	25.4%	15.3%	14.4%
A	58.0%	62.5%	67.1%	65.8%
S	14.9%	12.0%	17.6%	19.8%

Source: HMD, Istat (for 2020) and author's calculations.

Figure 1 gives an example of how threshold ages can be determined every year, based on observed survival conditions, and then applied to the observed population of that year.

Figure 1: An example of how, given policy choices and survival conditions, threshold ages α and β are determined (left panel) and then applied to the observed population (right panel). Italy, 1900 (e_0=41.9)



Note. Policy choices are that *Y** and S* (average shares of life spent as a young as a senior, respectiely) equal 20%.
Source: HMD and authors's calculations

Note that nothing is projected, or forecasted, in IPAYGO: all dependent variables (here: α_t, β_t, Y_t, A_t, and S_t) derive from the interplay of policy choices (Y^* and S^*) and observed independent variables (cross sectional life tables and population by age), and all adjustments are automatic.
Note also that $Y_t \neq Y^*$, $A_t \neq A^*$ and $S_t \neq S^*$. This happens because the reference values, with an asterisk, are constant (and very close to the long-term average of their corresponding current values), while the corresponding current variables change every year. The distance between the two may increase in turbulent historical periods (demographic transition, very low fertility nowadays, etc.), but it remains relatively small, and declines once these turbulences are over.

How child benefits limit the variability of the contribution rate c_t

One of the reasons why budget balance is always guaranteed in IPAYGO is that the contribution rate adjusts automatically to the demographic situation, preserving the socially preferred cross-sectional equity (constant y and s). As the contribution rate c_t varies over time (increasing in periods of demographic ageing), it is theoretically possible to determine its long-term average, which turns out to be very close to c^*. (*Not shown in this abstract.*)
An illustrative example of the variability of the contribution rate is presented in Table 3, where, for the sake of the argument, the case of Table 2 has been broken down into two possible scenarios with regard to cross-sectional equity. In scenario A, child benefits are excluded (y=0) and transfers towards the elderly are generous (s=0.8). In scenario B, child benefits are envisaged (y=0.2), but transfers towards the elderly are reduced (s=0.6), so that the reference contribution rate remains the same (c*=21.05%). Over time, the actual (equilibrium) contribution rate c_t varies. In periods of demographic bonus (favourable age structure, with high share of adult population), c_t is below its reference value c^*, even largely below it (e.g., c_{1950}=13.34% without child benefits; c_{1950}=17.02% with child benefits). Notice that this favourable period has lasted for more than a century, but is practically over nowadays and, according to all demographic forecasts, it will be followed by an (almost) equally long period of demographic "malus", with $c_t > c^*$.
This tells us two things. The first is that the comparison between c_t and c^* indicates how good (or bad) the demographic phase is, or, in other words, that IPAYGO offers an original metric for

measuring the existence and the strength of the "demographic window of opportunity". The second is that c_t varies over time, but much less so when child benefits are included: in Table 3, for instance, the standard deviation of c_t is about half as large in scenario B than in scenario A (1.1 against 2.2). This happens because, while the relative share of the adult population tends to remain approximately constant, Y_t and S_t (shares of young and seniors, respectively) may vary considerably, but they typically do so in opposite directions. If non-trivial child benefits are included in the intergenerational transfer system, the variability of the equilibrium contribution rate diminishes substantially.

Table 3: Reference and actual contribution rate in two scenarios, with different policy choices regarding cross-sectional equity (y and c) (example referred to Italy, 1900-2020)

	1900	1950	2000	2020	Std.dev. of c_t
Scenario A) y=0; s=0.8					
c^*	21.05%	21.05%	21.05%	21.05%	
c_t	17.04%	13.34%	17.36%	19.39%	*2.18%*
Scenario B) y=0.2; s=0.6					
c^*	21.05%	21.05%	21.05%	21.05%	
c_t	19.83%	17.02%	18.51%	19.74%	*1.14%*

Note: This is a prosecution of the example of Table 2.

6. Conclusions

How to strike the best balance between simplicity and proper functioning of a pension system is still an open question, and various theoretical and practical solutions have been proposed over time. The most recent, and possibly the best thus far, is NDC, the notional defined contribution pension system. However, a further step may be possible, because the IPAYGO (improved pay-as-you-go) pension system presented here is not worse than NDC in any respect, and better than it in several ways. It guarantees budget balance, incorporates the socially preferred degree of redistribution, does not create "vintage pensions", brings to the fore and keeps under control the most relevant policy variables, adjusts automatically to all possible economic and demographic changes, and does not require forecasts (or ad-hoc adjustments, expert committees, etc.) of any kind. On top of that, it is simple (as simple as possible, at least), it circumvents a series of obstacles (interest rates, for instance, are much less an issue here than in NDC) and, perhaps most importantly, redistributes fairly among population subgroups (young, adult and old) all the possible future economic or demographic uncertainties, while at the same time minimizing political risks. With an appropriate parametric set (policy choices), it can encourage "virtuous" behaviours, such as higher fertility and participation in the labour market. Finally, similarly to NDC, IPAYGO can be adopted in a wide variety of forms, depending on parametric choices: it could even become a standard for EU countries ("United in diversity"), each free to select their preferred national form.

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