NDC – the Generic Old-Age Pension System

*Basics and why NDC is the generic universal public pension scheme*

by Marek Góra* and Edward Palmer**

Abstract
This paper argues that the NDC pension scheme is the generic universal public pension scheme (UPPS). The building blocks are individual accounts and a one-to-one relation between individual contributions and pensions, with life annuities based on life expectancy at retirement. The concept is a transparent, economically efficient, intra- and inter-generationally fair mechanism for insuring a country’s entire population against the risk of outliving their resources. At the same time its construction – through indexation and the creation of life annuities based on individual accounts and life expectancy at retirement, yields financial stability over time. And, the microeconomic properties support the macro property of financial stability. Participation in UPPS means buying a part of future GDP. NDC provides the most efficient institutional structure for this transaction. The paper discusses that issue and also discusses other advantages of the NDC framework over both tax-financed as well as other contribution financed (prepaid) pension arrangements.

*Polish Pension Group, Warsaw School of Economics
**University of Uppsala Center for Labor Studies
Introduction

In all societies those who are of working and child-bearing age transfer consumption resources, in the form of goods and services, to their children, to their parents and to themselves in old age. In other words, the value of the product of the working generation is divided between remuneration of factors of production – labor and capital – and the coming working generation of children and the past working and now retired generation. What differs between countries, depending on the stage of development of institutions and the development of the market-economy is the extent to which these transfers are financed through private or public institutional arrangements – whether individuals make their own arrangements for old age (the private system) or whether society organizes a public pension scheme. In the latter case, if the scheme accommodates all of society’s population, we call it a universal public pension scheme irrespective to whether it is publicly or privately managed.

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<th>The distinction between Public and Private pension schemes</th>
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<td><strong>Public</strong> pension schemes – characterized by standardised decisions (no freedom of choice) for all and with the risk spread over the entire population.</td>
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<td><strong>Private</strong> pension schemes – freedom of choice and risk on individuals or group of individuals.</td>
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<td><strong>Management</strong> of the schemes and the methods applied for administering them should not be confused with the system itself.</td>
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The focus of this paper is on NDC – non-financial defined contribution – UPPS, the first of which emerged as recently as in the 1990s in Sweden, Latvia and Poland. In Europe, these countries were joined by Norway in 2011.¹ A nascent NDC scheme was also introduced in Italy in the 1990s, but it took until 2012 to fix the contours of the Italian NDC scheme. Nowadays NDC based thinking influences policymakers’ consideration of reform options in countries. Since the 1990s, other countries have introduced features of NDC into their public pension schemes, and in this respect the NDC has become a benchmark in the world of public pension schemes. However, NDC is not just an additional pension arrangement among many. As we will argue in this paper, NDC is the generic old-age pension scheme.

¹ For public pension arrangements (NDB, FDB, FDC and NDC) we apply terminology as developed in Góra and Palmer (2004).
This paper is divided into two parts. The first one focuses on key theoretical issues with no reference to any practical case. The paper presents the argument for why NDC is the generic pension scheme, its advantages over other ways of organizing Universal Public Pension Schemes (UPPSs). The second part and identifies and discusses issues in setting up an NDC pension scheme in practice.

Why Universal Social Insurance?

Why save through insurance?

Let’s begin with the raison d’être for insurance. The reason for individuals to contract into a pension insurance scheme is to insure themselves against the risk of outliving their resources in old age – i.e., what is called the longevity risk. We all want to enjoy a sufficient level of consumption throughout our entire lives, including during the phase when we are old. In the absence of insurance, rational individuals would save from their earnings on a regular basis when young to provide resources for consumption when old. This is not as simple as it might sound, however. Among other things, the question that comes up naturally is, how many years of consumption in old age must I save for?

The best guess for the answer to this question would be to seek out and use the information on average life expectancy, which would be provided by the official agency responsible for computing and providing this information. The individual would save in order to provide for consumption in old age for the average person. This is obviously a risky choice, however, because the individual may live considerably longer – in fact some people in the individual’s birth cohort will live to be 100 or more – despite a statistical average life expectancy of, say, 85!

So, now, to the insurance answer to the question. The insurance answer is to join an insurance pool consisting of a large number of individuals all faced with the dilemma of not having reliable information about their own life expectancy. The insurance provider can then set up a system where everyone is expected to live to the average age. Some of the individuals in the pool will live shorter lives and other longer lives. How much they get in the form of a life annuity will depend on their own transfer of savings and the life expectancy of their birth cohort, and all the individuals in the pool share the costs of administration. This is in fact

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2 In UPPS’s saving too much is also inefficient. Insurance prevents both under-saving and over-saving.
what a public NDC scheme does for the entire population of the country, where the
government takes in the role of the insurance provider, and in NDC determines what percent
of monthly earnings needs to be set aside to provide a reasonable pension amount in order to
cover consumption needs in old age. We will describe how this can be done below. And, the
pool of individuals in the NDC insurance scheme are in principle all individuals within the
country. But, now the question arises, why a universal public scheme?

**Why a Universal Public Pension Scheme for individuals’ pension insurance?**

To begin with, universal means everyone adheres to a set of standardised rules; there is no
freedom of choice. Why then are we interested in a *universal* insurance scheme to insure
against the longevity risk? Here, we explain the rationale of this.

The central argument for insurance is that by forming a large pool of persons, we reduce the
variation in outcomes around the mean, and by doing this we reduce the uncertainty about the
distribution of outcomes around the average. By reducing the uncertainty of outcomes, we
reduce the costs to the insures that the insurance administrator may have to charge in order to
make ends meet. The larger the better in this respect. The largest possible insurance pool for a
country is the entire population of that country.

There are more advantages to a large insurance pool. First, there is a technical advantage.
Since there is only one big insurance pool, the insurer does not have to perform separate
calculations for a number of groups. In fact, if we imagine a country with hundreds or
thousands of insurers, the insurance pools will not only be small, but the costs will also rise
due to the fact that all the insurers will have to determine how their particular pools agree
coincide with or diverge from the national population. Cost go up for all, because insurers
need study their insurance pools. Insurance providers cannot count on their insurance pool’s
being a reflection of the national population. Second, all sub-populations are risker than one
central population because their composition can change over time, as people change jobs,
occupations, etc. This increases further the cost to study the information needed to determine
probable outcomes for a specific insurance pool. In addition, different providers will charge
different fees to customers to research their company’s population. Thirdly, group insurances
mean that workers who are mobile between jobs and occupations may find themselves at a
cost-disadvantage every time they make a change, and historically, and historically there has
been a discussion about insurers fees in conjunction with switching to another company, if
this is at all possible. On the other hand, from the societal point of view job mobility greases the wheels of the labor market. With many providers, there is no real gain to be made from competing on exactly the same product, and, in the worst case, this simply leads to exorbitant sales and marketing costs for services that provide no value added to the product. All that is needed for a whole country is a *single* best practice life expectancy projection, and the larger the population, the lower the uncertainty and cost of the insurance.

**The Rawlsian veil of ignorance**

There is yet another, argument in favour of one scheme covering the entire population. This is the Rawlsian inspired argument that in the position having to make a decision before we have information on our fate in life, under the vail of ignorance, where individual fates in life are distributed randomly, rational people would choose the largest possible insurance pool, because it is the most efficient (least expensive) administration. This is especially the case since the product is a longevity insurance, which is based on one input, an estimate of average life expectancy, which is by definition the same for all persons born into the same birth cohort.

Of course, there are many socio-economic and demographic differences that arise as our fates become known, and if it for some reason proves to be important to differentiate between these different “cultural environmental factors” then the single provider can easily create identifiable groups within the overall collective. Above all, the universal NDC scheme does not by any means need to be the only longevity insurance in the overall pension system. There should be a ceiling on the earnings covered by the national scheme, which leaves room at the top to supplement the national scheme through individual imitative, through private insurance.

**The simplicity of the NDC scheme**

There is another compelling argument for a single universal scheme covering the longevity risk. This is its simple construction. How is this? *All* individuals are mandated to pay into an insurance scheme that provides at least a minimum standard of living for all when old. Their payments – i.e., individual contributions to their own individual accounts – constitute their savings, with are a claim on future pension payments for them and a liability to provide these for the provider, i.e., the state administrator.
How do we determine how much to save? Assume an individual expects to work for 45 years and, as the average person, be a pensioner for 15 years. To show how simple the idea is, let’s assume one currency unit is earned per year over 45 years, and that the individual contributes 22% of yearly earnings to his/her savings in the pension scheme. This gives a retirement income of 10 units of consumption, and leaves 35 units of consumption during working years. This gives a replacement rate in retirement of 67% of the income during working years, and consumption after paying insurance contributions of 78 percent of total earnings. Since most people have children during their working years, which entails transferring resources to them while they are growing up, they may already be very used to living on less than 100% of their earnings.

The NDC scheme is the basic earnings-related scheme in a country’s national pension landscape, but not necessarily the only pension scheme. People may want to save more through insurance, but they may also want to save for other ends, too, where there are other more liquid forms of saving. NDC contributions become liquid only upon retirement, and then only in the form of a life annuity. This is the whole idea, the purpose of which is defeated if people are able to withdraw funds from their pension savings for other uses.

Free riders and short-sighted (myopic) decision makers

The economic rationale behind a universal public insurance scheme, as we have argued, is that informed, rational individuals would freely choose to insure themselves against the risk of outliving their savings, as a result of living longer than the average person, i.e., longer than average longevity for their birth cohort, with no possibility of remedying this later in life when old. If the pension scheme is the scheme just described, then rational people would join this scheme.

Now, the question is, would everyone join this scheme and begin to contribute when young and continue throughout their working life, which is necessary to earn the benefit we have just calculated here? The answer is almost certainly no. People are generally speaking short-sighted, they live for today and forget their obligation to themselves to save for their future consumption tomorrow. The risk is that they start up this project too late in their working lives to create sufficient saving for consumption in old age. Every humane society will have minimum income guarantee for the elderly, and myopic individuals risk joining this group – and complaining to their politicians that their possible level of consumption is far too low. Of
course, they have brought on this situation themselves by saving too little when young to provide for themselves in old age, and now what’s left is to hope that those who have provided for themselves, will also transfer money to them. Part of the logic of the UPPS is to minimize if not eliminate this sort of behaviour – to save people from the unfortunate consequences of their own poor judgment.

**Communicating the logic of the NDC pension scheme**

What is important, we believe, is not to neglect the importance of the minimum benefit. Instead, it is for policymakers to successfully argue the case for the universal scheme and the importance of participating in the lifelong “saving” scheme that potentially provides a sufficient level of consumption for all in old age, regardless of how long they live.

What does NDC bring to the table here? The argument favoring NDC is that it is fair, efficient and transparent: The individual’s transfer of consumption possibilities from the working stage of life to time in retirement is on a 1:1 basis to contributions. People get what they pay for with interest (to be discussed below). This is a possible definition of fair. It is also a definition of efficient, because by efficiency we mean that there are no hidden transfers of money within the system. Economists say that there is no tax wedge.

In everyday vernacular “you get what you pay for”. The caveat is, if you are for some reason incapable of providing for yourself then you will have “earned” the right to a minimum benefit.

**When competition occurs solely through marketing**

Importantly for our argument is also the fact that all insurers have the same general information about the population’s life expectancy, which consists of known life expectancy tables. And, as we have stressed from the outset, this is the only information necessary to provide the insurance product. The catch that makes market possible in this case is that the general population is not sophisticated enough to understand the simplicity of the product.

So, from the point of view of economic efficiency, a single provider insurance can be claimed to be preferable to a myriad of market-based insurance, where competition occurs through marketing that offers no or very little value added to the basic knowledge needed to “produce” the product. This argument emerges in the literature from the Coase’s (1937) prescient answer to the question “Why Does the Firm Exist”? His answer was that the firm
exists because the activities of the firm can be more efficiently organized by a single administration, rather than through a myriad of sales and purchase transactions within the marketplace. In other words, the firm exists to manage transactions and reduce transaction costs. This is the reasoning behind the logic of public pension schemes, put into other words.

And finally, the old age pension scheme is just that – an insurance scheme for the risk covering the risk of outliving one’s saving for old age: It cannot play the role of a cure-all for the country’s socio-economic problems

One can of course argue, rightly, that not everyone is born into the same set of cultural and economic circumstances. Where socially desirable, these should be corrected through social policy, which nevertheless might be a separate component of an overall pension policy. The old-age pension scheme is, however, not a remedy for all of a country’s social and economic problems. The system has its own goal, to provide insurance for the longevity risk that is a universal problem for us all. Attempts to design and use it to play other roles leads to a loss of efficiency. Social policy is definitely important and should not be ignored, but treated as a set of separate issues. We will discuss this issue in depth later on in this paper.

Shifting perspectives in pensions

In this section, we introduce the nomenclature for what has become the modern classification of universal public pension schemes, which we refer to as UPPS, originally published as an IZA Discussion Paper *Shifting Perspectives in Pensions* (Góra and Palmer 2004), and briefly present some important economic differences between contribution and tax financing of pensions. We begin with the dichotomy of Public Pension Schemes:

**Double dichotomy of prepaid UPPS**

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<th>Involving financial markets</th>
<th>Requiring interventions</th>
<th>Automatic</th>
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<td>FDB</td>
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The above double dichotomy has an additional, hidden, hybrid element. It is an arrangement using government bonds as if it was NDC, however, the bonds are marketable as if the NDC was an FDC scheme.³

We may also consider issuing NDC bonds. Such bonds exist in typical NDC schemes. They are, however, hidden. They yield the rate of return called “indexation”, that could be an economic coefficient converging to long term nominal GDP growth rate. That hidden NDC bonds could be issued as legally binding non-market instruments. If that is the case NDC schemes will become more understandable and reliable for participants not trained in macroeconomics. That would also contribute to more transparent public finance.⁴

Contributions versus taxes as a means of financing universal public pension schemes

In tax-financed Universal Public Pension Schemes (UPPSs) there is no particular incentive to participate and there is also no liability created for participants. People just pay various taxes and then they expect a kind of social help in their old age. Nothing is promised, and there is no formal liability corresponding to the account values of the participants in an NDC scheme. Instead, paying benefits is a part of general social policy. And, the additional taxes needed contribute to larger tax distortions. On the other hand, politicians have more room for fiscal manoeuvre since they are not constraint by any pension liabilities/promises. The pension system is mostly focused on old age poverty alleviation. In consequence pension expectations created remain moderate.

In contribution-financed (pre-funded) UPPSs an incentive for participation exists. They pay contributions and a kind of liability is created. Then, when the participants become old paying benefits is understood as a kind of meeting the liabilities. Benefits are deferred remuneration. In principle paying contributions should be less distortional than paying additional taxes. In practice that depends on a design of the UPPS and also on its scale.

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The demographic transition caused the need to reform pension spending as a share of GDP or at least to stop further increase of that expenditure. In other words, pension benefits will be relatively less generous than they were previously. Reforming pension systems (in fact reducing expenditure) is the more difficult the stronger pension expectations are. Throughout decades of applying NDB without proper adjustment to population developments the last phase of the demographic transition led not only to the loss of sustainability but also created strong expectations pension benefits will remain as generous as in the past. Historically, practically all pension reforms had the goal of bringing pension expectations with what is affordable, in a real-world politics where it’s all too easy to promise the sky as the limit.

NDC’s Place in the History of National Universal Pension Schemes

The early roots of UPPS – Universal public pensions schemes

Institutional old-age social security originated in politics. In order to win elections and counter the rising forces of Marxism, Germany’s Chancellor, Otto von Bismarck promoted a universal social security and in 1881 the German parliament mandated a universal invalidity and old-age pension system, in principle, requiring employers to cover all employees, but leaving out all the self-employed (farmers, “shopkeepers, and many professionals of various kinds). Using our terminology, Chancellor von Bismarck’s scheme was a Financial Defined Benefit (FDB) scheme. Largely driven by the prevalence of poverty in old age and the political demands of the times for change, other countries – among them Denmark (1891), the United Kingdom (1905) and Sweden (1913) – followed suit. The pension schemes introduced in all these countries were defined benefit pensions, from the beginning providing a basic benefit at a legislated pension age.

These nascent national pension schemes hardly had a chance to develop before workers’ human capital was largely destroyed by a sequence of three devastating events: World War I, and, then, following a brief period of exuberance in the 1920s, the Great Depression of the 1930s, ending with outbreak of World War II.
The universal public pension schemes in the early post World War II years were defined benefit schemes

The debates leading to the introduction and reform from the mid-1950s of those national schemes that remained after WWII were driven by an “alliance” of employers, unions and politicians, all with different motives, but with the same end, a lower pension age. The role of politicians was to champion an issue that could easily receive the sympathy and votes of all. Although there existed occupational schemes and basic tax-financed flat rate or means-tested social benefits, the grounds for universal public pension schemes for old age did not go much farther than tax-financed universal benefits of various kinds. With economies being without some form of organized universal pre-funding for pensions, the logical construction of the pension system was tax-financed, based on employer/employee contributions or general tax revenues – or both, organized as defined benefit schemes.

This made it possible to pay benefits, without previous savings or accumulation of formal rights in the NDC sense, within a decade or so after the war. Workers in need of these pensions had no other hope of acquiring sufficient, own rights in a pension scheme of any kind in the short period of 1945 – 1960. Ergo the rise of NDB old age benefits, financed by “employer” contributions, were, to a significant, extent in the end financed de facto by employees accepting lower wage increases in turn for the financing of these benefits. This is, thus, a highly non-transparent model of financing, where there is no systematic, juridical connection between what people pay and what they have the right to receive. Up until around 2010, the typical NDB scheme could contain many non-transparent redistributions of money within the scheme, in the worst case as a result of the success lobbyists to capture the ear of politicians – and many still do.

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5 A notable exception was the US Old Age Social Security Act of 1935.

6 In 1975, Sweden unintentionally performed a “natural experiment” by converting employee to employer contributions, which econometric modelling of the outcomes for wages, prices and profits showed that the initial impact was on profits and prices, but that within about 5 years after the “reform” most of the impact was shifted to wage growth that was lower than it otherwise would had been, Palmer and Palme (1989).

7 This has, in fact, always been the theoretical position of economists on this issue, despite the “rhetoric” from all sides putting forth the opinion that it is employers who pay. All employers in the market place factor these costs into prices as labor costs, and if their market demand is price elastic, then they are compelled by competitive – these days international markets – to pay mandatory contributions at the expense of granting lower in-pocket wages in setting wages.
We note also here that the Soviet pension philosophy inherited by Russia, the independent states of the pre-1990 Soviet Union, and generally speaking Eastern and Central Europe, were all built up around general taxes, with “special” rights for a large number of categories of workers, where pensions were regards as “rewards”, on the one hand for the apparatus of the political elite (the military, the police, representatives of the judiciary system, and generally speaking party members) and on the other hand workers who sacrificed their health, and potential longevity, by working in hazardous conditions (instead of investing in clean, and safe work environments).

Here we can also note that pensions to public sector employees are by definition financed through tax revenues, as are their salaries. What NDC does in this case is to create order in a country’s overall system by creating an account system covering the entire working population (including the self-employed), that converts individual savings into pensions. This also means that the municipal, regional and central governments are also required to pay contributions into the NDC scheme to finance the pensions of this group of workers.

From the 1950s, when universal public NDB schemes were on the rise, or those that existed were being revitalized, the attitude towards retirement at the time, especially in Europe, was framed by the post-war economic boom, a general feeling of wealth and optimism, and a poor understanding of the demographic future. A political-cultural view developed in the midst of this economic euphoria. This was spearheaded by unions and employers shared interests in lowering the pension age. Albeit with exceptions, depending on especially on the physical demands of employment, employers were eager to rid themselves of older workers and unions eager to gain more paid retirement leisure time.

Politicians seized upon the opportunity to cater to the “joint” demand of labor and employers by introducing (or reforming/reinforcing existing) Universal Public Pension Schemes with NDB rules. In this way, defined benefit like criteria emerged in many countries, with financing arranged through contributions and/or general taxes. But, the pension rules legislated had only weak connections between what individuals perceived that they paid and the benefits they received. This constituted an easy environment for politically inspired policymakers to win votes by proposing and implementing simple rules that did not embody

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8 Defined benefit as well as defined contribution are pension regimes applied in private pension schemes. UPPSs partially mimic the private schemes. However, UPPS are macro by definitions while private pension systems are micro, also by definition. So, the two should not be confused.
economic incentives, and not so seldom with built-in perverse redistribution, and in many
countries succumbing to demands to use the old-age pension system to retire workers, either
directly or through the disability component, already well before age 60.9

The conclusion of this short account of history is that universal public defined benefit (NDB)
pension schemes introduced in the post - World War II period were destined to implode. Even
the FDB schemes of Europe have been plagued by demographics (e.g. the Netherlands), and
have begun a process of conversion from NDB to NDC or NDC like arrangements.

Already in the 1980s the discussion among pension economists was focused on the
unaffordability of NDB pension schemes, the low de factor age of exit from the labor force,
and what to do about it. This discussion continued in the two decades in the interlude 1990 -
2010 (see Gruber and Wise, 1999; Palmer 1999, 2002, 2005)10, with increased force, resulting
in piecemeal ad hoc changes in the benefit rules for public pension schemes. In the beginning
of this epoch a new category of pensioners emerged, the “not-yet-old” pensioners (Góra
2013),11 and by the mid-1990s, de facto pension ages had declined in Europe from 65 – 67 in
1970 to around 57 – 58 (according to OECD country data). Summing up, by the 1990s, NDB
public pension schemes had become the norm– and in the mind of the public, and especially
unions, the sky seemed to be the limit for low pension ages and high benefits.

9 In Sweden, the right to an early pension was embodied in the 58.5-year rule, which allowed persons who had
been registered as unemployed (with unemployment insurance) a year and a half to apply for disability status,
converted at age 65 to a full old-age pension if they had 30 or more years of contributions to the ATP-scheme
(replaced by the NDC scheme in 1999).


11 Marek Góra (2013). “Political economy of pension reforms: selected general issues and the Polish pension
reform case”, IZA Journal of Labour & Development 2013, 2:2
NDB seen through the glasses of generic NDC

NDB pension schemes benefit rules are often claimed to be unique, but in practice they are not. When it comes to universal public pension schemes there are as many different ways to mix the ingredients as there are cooks. What they perhaps mostly have in common however is that they have been gradually moving towards incorporating some of the principles of generic NDC. Most purport to redistribute income within the overall system, but in a very non-transparent way, and by definition creating tax wedges. It is well-recognized that for many individuals and groups, the rules, de facto, sometimes unintentionally favor some categories of participants at the expense of others, without being able to justify redistributions on the basis of fairness. An example being benefits determined by final years earnings, which are usually higher for white collar than for blue collar workers.

At the same time the incentives for participation in DB schemes, neither NDB nor FDB, are not explicitly individualised, i.e., there’s often not a strong connection between what the pays and the pension received at retirement. Furthermore, the conditions of the defined benefit pension scheme are frequently revised, often to clear up what the NDC scheme does automatically through the combination of indexation and the life expectancy factor in the computation of the benefit. In NDC the definition of liabilities is exact and transparent, as we have already discussed. In DB schemes the definition liabilities to account holders is fuzzy.

Above all, in DB schemes, and at the individual level, we not infrequently observe that the present value of the individual’s benefit is greater than the present value of the accompanying contribution. In aggregate, this means the system is underfinanced, which becomes evident as benefits have to be paid. This means creating financial equilibrium often entails non-transparent transfers from the rest of the participants. In fact, this even occurs in so-called pre-funded DB schemes, where money is redistributed from workers to pensioners, without informing the workers. Since there is an exact equivalence between contributions and benefits, in NDC his does not occur. This leads to a situation where the present value of benefits of the non-pension generation becomes less than their contributions.

The DB financing dilemma almost always leads to pressure on politicians, which creates increasing costs, putting demands on tax revenues, and leading eventually to unpopular ad hoc adjustments. In the NDC format, the adjustments are always ongoing through the very
transparent mechanisms of indexation, the effect of increasing life expectancy on benefits and the for countries that have it a solvency ratio, i.e., ratio of aggregate assets to liabilities, with a balancing rule to scale down, systematically, liabilities to bring them in line with assets. And, obviously, one cannot talk about pension rights in the DB context, which on the other hand is generic to NDC.

Finally, since DB schemes do not have individual accounts as their common denominator, it can be difficult if not impossible to transfer rights between DB schemes, whereas DC – both NDC and FDC – makes this easy and transparent. This is particularly a drawback where people are constantly changing places of employment and even occupations, where mobility can be a condition for individual economic advancement, and a necessity when jobs fall victim to closure or geographic changes in the individual’s place of employment. This is where a universal public pension scheme, constructed as a generic NDC scheme, has its major advantage. It contributes to economic efficiency both at the individual micro-level and at the societal macro-level.

An NDC public pension scheme has many other advantages over NDB. In the NDB context micro incentives, i.e., incentives at the individual level, contradict the macro (social) goal of the universal public pension scheme. For example, the lack of the incentive to postpone retirement in NDB schemes easily results in a shifting of costs to younger generations in order to finance the increasing costs of older associated with the older generation’s failure to postpone retirement with increasing life expectancy. This means the younger generations end up paying for themselves plus some portion of the cost of the preceding generation, which easily develops into a cost increasing spiral. Above all, NDC is, by definition, both intra- and inter-generationally fair, where NDB schemes usually are not.\(^{12}\)

And, there is no escaping the fact that NDB schemes have to be regulated by political decisions at the macro level. And, as reality has witnessed, it is attractive to politicians to take advantage of the rule-less framework of NDB schemes to promise financially unsupportable promises of gold, where the likelihood is that it a later regime that will be confronted with the unpleasant job of raising revenues with increased taxes or cutting benefits. In fact, this has been the bottom line in the 21\(^{st}\) century. And, NDB public pension schemes are usually not regulated at all. Instead, the administrative institutions focus on meeting cash balance, i.e., the

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\(^{12}\) This is discussed in depth in Góra (2013).
macro (social) goals without the help of micro incentives. With NDC, the advantage is that the incentive structures – i.e., economic efficiency – is built into the system.

The beginning of the demise of both FDB and NDB, was the combination of continuously falling fertility rates, falling exit ages from the labor force, and the increasing life expectancy for persons 60 and older. As a result, the demographics were gradually driving the NDB schemes into unaffordable territory, and it was only inevitable that technically uncontrolled pension promises could not be kept. The outcome was that they absorbed increasingly portions of countries’ GDP. What’s worse, also FDB pension schemes also turned out not to be sufficiently funded at all – due to the negative demographics and the repercussions of unrealistic discounting factors.

The entrance of FDC into the genre of Universal Public Pension Schemes – as a pre-cursor to generic NDC

What was obviously missing was a focus on the individual, i.e., the microeconomics of pension systems. In the pre-1990s, this perspective was associated solely with Defined Contribution (DC) pre-funded, private and privately managed pension schemes. FDC was invented to introduce micro incentives to participation in UPPSs: Let people behave in the UPPS as if it were a private pension scheme, where for participants the present value of contributions equals the present value of benefits. So, the aggregate macro condition of aggregate balance is automatically met. However, in order to reach the goal, financial markets are needed, since this is the natural environment for private pension schemes. In fact, the name “private pensions” was frequently applied to FDC schemes, which is misleading since covering entire population they are UPPS by definition. FDC mimics private DC, by satisfying the necessary macro necessary condition that liabilities equal assets. FDC is, thus, the arrangement that provides universal public pensions with automatic micro adjustment.

Using the micro instruments for macro public policy goals has a lot of advantages, all discussed in literature. Unfortunately, FDC requires strong regulations and supervision since the microeconomic features of financial pension schemes also have disadvantages. Among these are exposure to financial market fluctuations, risk of financial fraud due to the non-transparent operations of private pensions schemes. And, the risk of political manipulation is even real in this arena, as evidenced by the political reversal of reforms involving FDC component.
Sweden’s pension reform group brought the idea of NDC into the international public domain in 1992

NDC entered the public arena in Sweden in 1992\textsuperscript{13,14} when the Swedish Government’s Working Group on Pensions’ published the basic elements of its forthcoming proposal for completely new concept for an old-age pension for Sweden. With this publication, the details and the first legislation needed to support them were introduced to Parliament and voted into effect in 1994. With this the micro concepts of efficiency, intra-generational fairness and adequacy for the average worker were linked with financial stability and sustainability (macro concepts) and intergenerational fairness. The basic building block were individual accounts, indexation that generates economic and demographic stability, and individual life annuities based individual account values and life expectancy at retirement.

Poland fully adopted the ideas developed in Sweden which led to introduction of new NDC+FDC systems in other countries on 1\textsuperscript{st} January 1999.\textsuperscript{15}

**Why Is NDC the *Generic* Public Old Age Pension Insurance Scheme?**

The question as we entered into the 1990s was, how can the public pension scheme with the lynchpin being with individual accounts, providing a rate of return consistent with preserving the one-to-one relation between what people pay into the scheme and what they can expect to get out of it as a pensioner, that by construction yields automatic financial stability at the macro level, which is consistent with the one-to-one principle, and with a framework that yields intra- and intergenerational fairness.

In order to achieve this end, from the very beginning it was important to be clear about what the risk to be insured was. The existing NDB schemes had a mixed pot of risks, and the principle leading to NDC is that risk to be insured by the old-age pension is exclusively the

\textsuperscript{13} En promoria av Pensionsarbetsgruppen (Working Group on Pensions). Socialdepartementet 89, Stockholm: Morstedts.

\textsuperscript{14} See Palmer 2000 and 2002a, 2002b; Könberg, Palmer and Sundén 2006 for descriptions of the process and Settergren 2001 for the first reference to the Swedish automatic balancing mechanism.

longevity risk. Economists have long-since promoted the idea that the risk to be insured is the risk of outliving one’s own resources in old age. And, the standard life cycle of consumption and saving of economics tells us that rational individuals will strive to distribute their economic resources over their lifetime in order to cover this risk, and that the economically efficient way to do this is by creating an insurance pool of those interested in doing this – in principle this includes all people in a nation. Ergo why not create a public old-age pension insurance?!

This leads to many other policy conclusions. The first is that the disability scheme is not a compatible bedpartner for the public old-age pension scheme. It is an insurance, but a separate insurance covering the risk of losing one’s work capacity due to illness or injury. Its purpose has nothing directly to do with the longevity risk – it covers the inability to generate income from one’s own work efforts. One can argue, neither are surviving children left behind below a certain age, say 18, following the death of a parent – who normally is not an old-age pensioner – a generic issue for the old-age pension scheme. Albeit this is an important issue for social policy in general. A similar argument can be presented for the surviving working-age adult after the death of a partner.

The single goal of the old-age public pension scheme is income allocation over an individual’s life cycle. On the other hand, the NDC construct brings to the table the possibility of partners sharing accounts during working years and contracting joint annuities upon retirement (which takes care of the survivor risk). Social needs and social redistribution should on the other hand be an issue redistribution from those who have good steady income, the “income song” to the support the “income weak”. Put differently, these transfers should be financed through other transfers from the general coffer and tax policy.

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NDB and FDB do not respond automatically to demographic transitions of any kind, which means they always require frequent and strong political interventions. In FDC, if designed so that positive features, i.e., good returns with low administrative fees due to the scale of the
business in a UPPS setting, with proper regulation and supervision hey may be a good component of an overall UPPS.\textsuperscript{16} NDC does not require any conditions. If properly designed and administered (that is required in all types of UPPS) it works automatically an is fully neutral for economic and social developments.

**Summing up – important strands of thought on the generic old-age longevity insurance**

Summing up, the generic universal public pension scheme has no need for large sales forces, multiple administrations and discriminating products. Fundamentally there is a universal need for a homogeneous product – an insurance that covers the risk of outliving one’s resources in old age, when there is no longer a reasonable possibility to continue to work and provide for oneself. The insurance is based on individual NDC savings accounts, which at retirement are converted into life annuities (and not a choice between a host of other products). The general idea is the social responsibility of nations to construct systems that as much as possible bring all the population into the basic old-age insurance system, where everyone has the same interest of contracting this insurance, and society’s interest is to assure the entire population of a sufficient standard of living in old age.

The individual’s role, the organisation and administration of the accounts of this insurance scheme is as simple as that associated with the individual’s role in putting money into the traditional individual savings account at a bank on a regular basis and the bank’s role in administering this money, and converting the money on account into a life annuity based on life expectancy at any age from a minimum age set by the government. In this way, the NDC scheme provides a simple, transparent vehicle for transforming saving when young into consumption when old. And, new entrants into the labor force from each generation receive an individual account as soon as they begin and are paid for gainful employment, or self-employment economic activities.

The NDC scheme moves on from one generation to the next, with the same rules and the same contribution rate. The NDC scheme is designed to “chug” continuously over decades of new generations. Design mechanisms – indexation, generational funds, short-term balancing reserves continuously steer the system towards financial stability and long-term sustainability,

\textsuperscript{16} The mix of NDC and FDC became one of key features of new OA systems introduced in Sweden and in Poland. In the latter case that was even expressed in the mane of the reform “Security through Diversity”.
based on the simple construction of individual transparent, accounts. NDC automatically balances the interests of the retired and working generations.

NDC is neutral in terms of its effects on the economy, does not require or invite discretionary political interventions for financial sustainability, as it balances itself automatically, and, in its generic form, it is not exposed to financial market risks and the volatility associated with these. The fact that benefits depend on contributions encourages and rewards formal participation in the economy. While at the same time there is no tax wedge. And, the fact that the life annuity is based on life expectancy encourages postponement of retirement as life expectancy increases. Both of these features contribute to promoting higher labor force participation.

We will return below to some of the important practical details of NDC. Before present these, it is useful to begin with a short history behind the emergence of NDC, to understand the setting into which it came into being.

**The Nuts and Bolts of NDC: Indexation, funding and social policy account add-ins (Marek this is unfinished)**

Indexation of accounts of contributors and life annuities of pensioners in NDC

We begin with the general equation of an NDC scheme specified in discrete time, which describes the costs of a pension system in terms of the ratio of expenditures to the contribution wage base, and the resultant contribution rate (C):

\[
C_t = \frac{\bar{P}_{t-1}(1 + g)_t(1 + \lambda)_t(1 + p)_t \cdot R(LE)_t}{\bar{W}_{t-1}(1 + g)_t(1 + \lambda)_t(1 + p)_t \cdot L(lf)_t}
\]

Equation (1) can be seen as consisting of two terms on the right-hand side. The first is the average pension of pensioners, denoted \(\bar{P}\), related to the average wage of contributors, denoted \(\bar{W}\) which is the ratio \(\frac{\bar{P}}{\bar{W}}\). The second term is the number of retirees (R) related to the number of persons in the labour force, \(R/L(lf)_t\). As it is expressed here, the labor force (L) is
the working-age population, taking into consideration the age-related participation rate of persons in the formal economy, \( l_f \).

Equation (1) tells us how the indexation of NDC accounts and benefits is one of the two main gyros that steer the NDC scheme towards financial stability. The generic index, illustrated in the equation is composed of the rates of growth of average per capita contribution wages, and the number of persons paying these: In real terms this means that indexation of accounts (unconverted benefits) and benefits being paid out with the growth rate of the real wage bill, as represented by \( g \) and \( \lambda \) adjusts benefits to the growth of the real contribution wage base. In nominal terms \( p \) is also a part of the equation. If the system begins in balance, then balance is maintained. If the system moves away from balance, for example due to a shock that decreases the working age population, the negative change in \( \lambda \) adjusts benefits downwards, and vice versa. Albeit the process of adjustment can take some time depending on how the discrete variables are employed in the index formula. Finally, the process is easier to see if we begin with a continuous time formulation as in Palmer (2013).

Owing to the use of life expectancy in computing benefits, increasing life expectancy is, in principle, always being factored into the amount of benefits granted.

One can, and should, if the scheme’s financial balance is to be more-or-less spontaneous compute a solvency, or balancing, ratio of the scheme present value of assets to scheme present value liabilities at a given point in time. Computation of the present value of liabilities is straightforward: It is the value of accounts (future pension liabilities) plus pensions paid in any discrete time period. The present value of assets can have various measures.

However, the Swedish method is the only balancing mechanism that is designed this way and, in addition, is actually in use in practice. This is a “simple” measure of the duration of time a unit of money contributed remains in the system, from the year in which it is paid until the year in which it is paid out. This is called the turnover time. The measure of assets is then the value of the fund (if there is one) at time \( t \) and what is the value of what is called the contribution asset, defined as contributions in \( t \) (or in practice \( t-1 \)) multiplied by the turnover time. If the solvency ratio is less than unity even after indexation has been employed, then a
separate index component – based on the value of the solvency ratio – is added to the overall indexation.17

**Large and small waves of birth cohorts**

One may say, well, if the retired generation becomes more numerous in relation to the working generation the former should receive an increasing part of GDP. This can be argued if the “relatively numerous” generation saves more money as a collective when working to finance the collective’s relatively higher costs when old. In the NDC context, this entails generational funding. For example, taking the large post World War II baby-boomers as an example, one could have established an explicit fund for the extra payments. Generally speaking, countries didn’t do this. Instead, the normal model is to rely on the state budget as the demographic buffer fund, which always has the problem of competing uses. Not even pension finances come as a gift from heaven. So, without a general reserve fund, then the additional consumption of the elderly has to be produced by the working generation, diminishing the potion of GDP left for after-tax remuneration for them, hence, lowering the motivation of current workers to support the system. The technical issues involved in creating reserve funds are discussed in considerable depth in Holzmann et al. (2013).

**Assets and liabilities, balancing and the uniqueness of NDC in the domain of UPPS’s**

Long term old-age pension scheme stability is guaranteed if the present value of liabilities equal the present value of future contributions. This can be achieved in various types of pension arrangements. However, this requires discrentional interventions by politicians in NDB schemes and by either politicians or administrators or both in FDB schemes. In addition, in FDB schemes the discount rate (usually determined by a financial market based estimate) has to be estimated over the period of around 40 years – from the average time a payment is made into the system until the average time at which the money is paid out. The bottom line is that adjustment of the contribution rate, the pension age, the benefit rules and/or other parameters is a frequent item on the to do agenda. In fact, the benefit is really *never* defined. In FDC strict supervision of financial investments and annuity creation is needed. The supervision of typically applied to private institutions responsible for privately run public FDC schemes is usually insufficient. Moreover, FDC is involved only in financial markets

17 A more technical explanation is provided in Palmer (2013), where the point of departure is a model in continuous time. The balancing mechanism employed in Sweden is explained in detail in the Swedish Pension Agency’s annual *Orange Report.*
(micro) while the GDP to be divided between the generations is the entire economy (macro). Micro assets if applied for the entire population should in principle converge to macro variables. If we were to imagine FDC pension funds buy the best assets in the economy steadily yielding the highest rates of return the pension system will redistribute from the working generation to the retired generation in a similar way to poorly performing (in actuarial terms) current traditional pension systems.

Finally, FDC schemes have their justification in that they can invest in the portfolio of assets that delivers the highest return – but at the expense of considerable short- and medium-term uncertainty (risk). Moreover, within the UPPS framework that would lead to redistribution from the next generation of retirees to the current one – similarly to unbalanced NDB. The broadest possible pool of national assets is all those investments, large and small, that lead the production of a country’s GDP.

One can thus imagine GDP-growth-rate-indexed bonds issued to the UPPS participants. The instruments would not be traded in the financial markets, but they should have a clear legal form, and constitute a purchase of a share in future GDP. If one were to go in this direction however, this would entail leaving the domain of equation (1) above, whose parameters would no longer apply. Instead, the entire index would have to be subject to adjustments via a solvency ratio.18

Conclusion – So Why is NDC the Generic Pension Scheme?

In this paper, we begin by making a distinction Universal Public Pension Schemes, which we call UPPS schemes, and private pension schemes. The two are fundamentally different. A universal pension scheme covers the entire population of a country with the same rules for. It is based on the premise that not everyone will provide sufficiently for themselves through some form of private saving, including contracting a private pension. The simple idea of the UPPS is that of NDC. It is a personal account scheme, and in fact, a personal savings scheme, that performs the simple function transferring resources for consumption from years when working to old age. The individual savings accounts receive a rate of return and are converted into a life annuity when claimed in old age. The annuity is based on the participant’s

18 The Italian NDC scheme indexes with GDP, but has no balancing mechanism. It is shown in Chłoń-Domińczak et al. (2013), with no balancing mechanism this is not superior to the Swedish model. This is because the system takes a long time to adjust itself to difficult shocks, if it does at all.
accumulated account values saving at retirement and life expectancy, thereby performing the function of insurance, to insure the entire pool of participants against the risk of outliving one’s resources.

This is in fact the definition of an NDC scheme. Some of these funds can also be invested in financial assets, which makes them an FDC scheme. The difference is the degree of risk the participant must bear, but as a marginal increment to NDC it can be reasonable to mix these two in the same individual portfolio. The major differences between NDC and FDC have to do with the need for regulation of FDC schemes, and the rates of return, which are expected to be higher in FDC schemes, but at higher degree of uncertainty about individual outcomes, i.e., risk. And, what FC has against it is the Achilles heel of inappropriate regulation, and potentially no regulation in the UPPS context.

NDB and FDB inevitably require repeated ad hoc interventions to keep them out of financial trouble, and NDC and FDC avoid this trouble by virtue of their construction. Likewise, NDC and FDC have built in incentives, you get what you pay, and the more you pay the more you get, and all of your contributions go into your own saving account. Distributional elements come from outside. NDB and FDB provide no incentives, and are economically inefficient in this respect.

NDC accounts are legal liabilities to the participants, as are FDC accounts. There’s no such thing in FDB and NDB. Instead, the participant’s contributions are malleable, and moved around in the scheme between cohorts in order to make ends meet when the only alternative is to increase contribution rates.

Transparency of individual accounts is what makes the NDC work in providing the right incentives to work and contribute at the micro level. At the macro level, NDC enhances participation (compliance), generating revenues for the entire pension scheme. And the lynchpin is the individual’s awareness of the importance of life expectancy for his own outcomes, whereas adjustment to life expectancy is keeps the NDC scheme stable at the macro level, as life expectancy continuously increases.

Summing up the arguments, NDC is the generic universal public pension scheme because it fulfils all the criteria defining an optimum pension scheme. The other contestants fall on one or more criteria. FDC deviates on the basis of its potential vulnerability to inadequate supervision (in the worst case, corruption and fraud) and volatile market returns to accounts –
questionable attributes for a Universal Pension Scheme. On the other hand, it is, of course, possible to design good supervision and invest in a safe manner, and not charge low fees, in exchange for the privilege of running a UPPS. NDB and FDB schemes fail on their dependency on ad hoc and non-transparent vulnerability on maintaining financial stability, their non-transparent redistribution, the immobility of individual money when changing jobs, employers and geographical location. In addition, NDB and FDB schemes are get a huge minus because of the absence of efficiency, i.e., they out of the arena when it comes to providing incentives to participate, and to postpone retirement, so there are no macro spinoffs.

References


