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**An Overview of Notional Defined Pensions Plans**  
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## I. Introduction

A (NDC) is a scheme that has characteristics of FDC and PAYGO schemes. It shares with the first one the fact that the pension will depend on the accumulation of contributions--and its capitalization--of each affiliate, for whom an individual account is created, and the fact that at retirement the sum accumulated in the account is converted into an annuity. It shares with the PAYGO schemes the characteristic that NDC are also unfunded, current contributions go to pay current benefits of pensioners. Thus, individual accounts are “notional”: contributions are credited and capitalized in these accounts but with out money. Since no capital is accumulated and the claims on the balance are not traded, there is no market-mechanism to determine the rate of return, instead, the capitalization rate is defined by the managers of the plan.

A lot of nations with relatively mature pay-as-you-go (PAYGO)/defined benefit (DB) schemes are facing current or projected problems with respect to the way of financing these programs. Several factors explain this situation: population aging, program maturation, promises of generous benefits and early retirement conditions, changes in employment patterns, and in some cases the fiscal problems that arise in the transition to a market economy. The change from a PAYGO/DB scheme to a fully defined contribution (FDC) scheme or to a multi-pillar scheme including a FDC component has recently been viewed by a number of public pension experts as a possible solution in the long-term (Fox and Palmer 2000; Holzmann and Stiglitz 2001).<sup>1</sup> Nevertheless, in the mid-1990s another social security model emerged, under the banner of “notional defined contribution schemes” (NDC) which consist of a combination of PAYGO and FDC schemes. These kinds of schemes have been implemented in Italy (1995), Kyrgyzstan (1997), Poland (1999), Sweden (1999), Mongolia (2000) and Latvia (2001).

This paper will present the characteristics of the notional account pension model and a comparison, on a selected number of parameters, to the approaches of PAYGO/DB and FDC. In doing so, it will highlight the advantages and disadvantages of this model over the other two schemes and will present requirements for its implementation, based on the experiences of the countries that have opted for this model. Finally, it is worth commenting that it will not include in detail the actuarial or economic models underlying the NDC pension plans, on the contrary, we will make an effort to translate technical terms into common ones.

After the wave of reforms towards FDC solutions in the nineties, the pace of change has slowed in Latin America (LAC) and in some countries reforms have been

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<sup>1</sup> If the system of FDC has a scheme of solidarity, like a minimum pension, we will refer to it as DC.

partial. In the United States, the government has proposed a reform towards a partial FDC approach. Partial reforms share similarities with an NDC approach, and some of the alternative proposals in the US also have NDC-features. Basically, when savings (all or part) are directed towards an individual account but funds controlled (received and invested internally) by a public agency, the mechanics are those of an NDC plan. Thus, the research on the meaning and implications of NDC is quite relevant for the analysis of public pension systems in the Americas.

The organization of the paper is as follows: Section II establishes a general framework to analyze different pension plans, Section III shows a comparative analysis among the DB PAYGO, DC and NDC over eight characteristics, Section IV mentions the requirements needed for the implementation of a NDC scheme, and Section V presents a summary of the comparative analysis and the conclusions.

## II. Description of Different Pension Plans

The objective of this section is to present a general framework of PAYGO/DB and FDC schemes and to select the key parameters that will guide the discussion between these two traditional social security systems and the NDC scheme.

### II.1 Classification

Public mandatory pension plans are approached based on three relevant features for discussion: i) benefits and contributions, ii) financing and iii) administration. This section presents a brief explanation of each of them.

Regarding benefits and contributions, in defined benefit schemes the benefits the worker will receive at the moment of retirement are determined up front; a person's pension is based on his wage at the end of his working life, or based on his career salary actualized with prices, and the length of service (over a minimum period of contributions). In defined contribution schemes (DC), the amount of the contributions is fixed and the benefits depend on the accumulation of the contributions and its capitalization. Usually, in these systems a minimum guaranteed pension is established, following the principle of solidarity.

In terms of funding, schemes are basically divided into funded and unfunded plans. Unfunded or pay-as-you-go plans (PAYGO) are those in which the contributions are channeled to a common fund used to pay the benefits of current pensioners of the plan; as a consequence, reserve funds that can be invested and capitalized do not exist. On the other hand, in funded plans the contributions are channeled to a fund which is invested

and whose capital and returns are used to pay the pensioners. It should be noticed that the capitalization scheme can work, either, with a defined benefit plan and with a defined contribution plan. In the first case it is possible that part of the contributions are channeled to create a reserve fund that is invested, in which case, it is said that the capitalization is partial; in a defined contribution plan there is always full capitalization.

Finally, another type of classification is based on who manages the plan: the account management and the investment.<sup>2</sup> The plan can be managed by the government, by private entities or both. For example, it is possible that the account management can be performed by the government while the investments can be managed by private financial entities.

PAYGO/DB and DC schemes are widely known so it is not the objective of this paper to extend the analysis. Instead, Box 1 describes the case of provident funds in Asia, which are in general NDC plans.

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<sup>2</sup> Another distinction that usually is made in the literature is the public or private nature of the plan. This distinction is obeyed since only public mandatory pension plans will be considered.

**Box I**  
**Provident Funds in Asia**

Provident Fund schemes have been typically developed in former colonies, particularly British, both in Africa and South East Asia. Provident Funds are defined-contribution arrangements in which an account is set up for each participant whose wage contribution may be mandatory. Contributions are usually provided by employers as well. Although their main goal is to establish and provide retirement savings, one of the key features about Provident Funds is that they are often used for other explicit purposes, such as home purchase and educational expenses. In general, the funds are invested in low-risk, low-yield assets, which usually correspond to governmental debt instruments.

In most of the East-Asian countries, provident funds schemes are publicly managed. Even so, Hong Kong was the first country of the region to introduce a mandatory and privately operated provident fund scheme. In fact, according to recent literature, the provident fund of Hong Kong seems to have a leading performance among other East-Asian countries, probably due to a private kind management.

Table I.1  
Provident Funds in Asia: Main Characteristics

Country	Body of Operation	Management Sector	Year of Introduction	Individual Participation	Coverage	Other Provisions
Hong Kong	Mandatory Provident Fund Schemes Authority (MPFSA)	Private	1995	Compulsory	<ul style="list-style-type: none"> <li>▪ Labor force (including self-employed)</li> </ul>	
Indonesia	JAMSOSTEK	Public	1992	Compulsory	<ul style="list-style-type: none"> <li>▪ Private sector employees</li> </ul>	<ul style="list-style-type: none"> <li>▪ Employment Accident</li> <li>▪ Death</li> <li>▪ Health Insurance</li> </ul>
Malaysia	Employees Provident Fund (Tripartite governing board)	Public	1951	Compulsory	<ul style="list-style-type: none"> <li>▪ Private sector employees</li> <li>▪ Non pensionable public sector employees</li> </ul>	<ul style="list-style-type: none"> <li>▪ Disability</li> <li>▪ Death</li> <li>▪ Housing</li> <li>▪ Health Financing</li> </ul>
Singapore	Central Provident Fund (Tripartite governing board)	Public	1955	Compulsory	<ul style="list-style-type: none"> <li>▪ Employees</li> <li>▪ Self-employed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Housing</li> <li>▪ Pre-Retirement Investment</li> <li>▪ Insurance</li> <li>▪ Medical Coverage</li> <li>▪ Tertiary Education</li> </ul>
Thailand	State Agencies	Public	1996	Compulsory	<ul style="list-style-type: none"> <li>▪ State agencies</li> <li>▪ Certain private companies</li> </ul>	

*Source:* Holzmann *et al* (2000) and, SSA (2004).

**Box I (continued)**  
**Provident Funds in Asia**

Some of the main characteristics about provident funds in East-Asia include both the compulsory individual participation and the similitude of the contribution rates distribution between the employer and the employee. Actually, Thailand is the only country where government also contributes to the provident fund. But provident funds' schemes in East-Asian countries also share one common problem, which deals with their own administrative capacity and autonomy: in deed, the East-Asian provident funds are characterized by the limits of coverage and investment options, as well as the lack of portability, transparency and accountability, compared with DC systems.

Table I.2  
Provident Funds in Asia: Retirement Conditions

Country	Age of Eligibility	Contribution Rates (%)				Labor Force (%)	Years of Contribution
		Employees	Employers	Government	Total		
Hong Kong	65	5.00	5.00	0.00	10.00	100.00	N. A.
Indonesia	55	2.00	3.70	0.00	5.70	20.00	35
Malaysia	55	11.00	12.00	0.00	23.00	50.00	N. A.
Singapore	55	20.00	20.00	0.00	40.00	65.3	N. A.
Thailand	55	1.00	1.00	1.00	3.00	3.00	15

*Source:* Holzmann et al (2000) and, SSA (2004).

## II.2 Notional Defined Contribution Pensions

A NDC is a scheme that has characteristics of FDC and PAYGO schemes. It shares with the first one the fact that the pension will depend on the accumulation of contributions--and its capitalization--of each affiliate, for whom an individual account is created, and the fact that at retirement the sum accumulated in the account is converted into an annuity. It shares with the PAYGO schemes the characteristic that NDC are also unfunded, current contributions go to pay current benefits of pensioners. Thus, individual accounts are "notional": contributions are credited and capitalized in these accounts but with out money. Since no capital is accumulated and the claims on the balance are not traded, there is no market-mechanism to determine the rate of return, instead, the capitalization rate is defined by the managers of the plan.

The systems that have established NDC pensions include a redistributive element, that can take two forms: i) a *lump sum* payment, or, ii) a guarantee paid only if the NDC pension falls below a predetermined level or means-tested, similar what it is done in the

majority of the DC systems. This redistributive element is typically financed by general taxation. Moreover, the NDC pension is typically established as a first pillar (in which case it is known to include the redistribute element) in multi pillar systems. A second mandatory pillar based on DC accounts, and sometimes, a third voluntary pillar is usually established, as will be explained below.

Some countries have already established *explicit* NDC pensions, usually as a first pillar, as can be seen in Table 1. The contributions made by these countries to finance their NDC pension system as a percent of payroll are shown in Table 2.

Table 1  
Countries that Have Established NDC Pensions

Countries	Year of Reform	Pillars		
		1 Public PAYGO	2 Mandatory funded schemes	3 Voluntary funded schemes
Italy	1995	NDC	✓	N.A.
Kyrgyzstan	1997	NDC	X	N.A.
Poland	1999	NDC	✓ <sup>2/</sup>	✓ <sup>2/</sup>
Sweden	1999	NDC	✓ <sup>2/</sup>	✓
Mongolia	2000	NDC	X	✓
Latvia	2001	NDC	✓ <sup>3/</sup>	✓ <sup>1/</sup>

Notes: 1/ 1998, 2/ 1999, 3/ 2001.

Source: Dupont (2004) and Williamson(2004).

Table 2  
Contributions as a Percent of Payroll for NDC and Funded Accounts

Countries	Total payroll tax rate	Portion to	
		Notional account	Funded account
Italy	32.8	32.8	0.0
Kyrgyzstan	29.0	29.0	0.0
Poland	19.52	12.22	7.3
Sweden	18.5	16.0	2.5
Mongolia	19.0	19.0	0.0
Latvia <sup>1/</sup>	33.0	20.0	2.0

Note: 1/ For Latvia the total payroll tax is 33%, but only 22% of payroll is currently credited to the NDC and the funded accounts. The balance is used to pay current pension obligations. The 2% figure for the funded accounts will increase to 10% by 2010 and the NDC figure will decrease to 10%.

Source: Williamson (2004).

There is a proposal in the Czech Republic to transform their current system into a NDC scheme and there is one country that has established an *implicit* NDC scheme, Mexico. The *implicit* NDC system in Mexico is integrated by a complementary contribution to the defined contribution individual pension accounts, a payroll tax equal to 5 per cent (which is paid by the employer), which objective is to found a housing program administered by a public institution called INFONAVIT. The contributions are piped directly to the INFONAVIT, while the individual account managers of the DC pensions

register the balance of the housing item in each individual account.<sup>3</sup> The return on the housing balance is determined by the authorities of the INFONAVIT and it is not related to any market instrument, although in recent years it has been loosely linked to the annual adjustment in minimum wages (which is usually below the inflation rate). The contributions that the INFONAVIT administers are used to finance mortgages, in a PAYGO fashion. There are two options to receive the individual housing balance: i) if a person wants to get a house, the balance on the housing account is used as up-front payment and the contributions are used to pay the mortgage, or ii) if the worker does not use the fund to buy a house, the end-balance in the housing account will be added to the pension account balance at the end of his working life, and this amount will be used to buy an annuity (or to get programmed withdrawals). It is in this last case in which the housing program is an *implicit* NDC pension.

As mentioned before, the balance on the notional individual accounts earns an interest which is determined by the managers of the plans. The magnitude of this return is a central parameter of the NDC system. Viewed from a macroeconomic perspective, the “natural” rate of return for a NDC system is the implicit return of a pure-PAYGO system, i.e. the growth rate of the contribution bill. However, some NDC systems – such as the Swedish system – have chosen rates of return which are higher under current circumstances, such as the rate of wage growth (Table 3).

As mentioned before, at the individual’s chosen retirement age, typically subject to a minimum retirement age, a pension in the form of an annuity is given. The pension level is calculated by reference to accumulated, revalued, contributions and the basis projected life expectancy at the date of retirement. There are several ways to index the pension, as it is shown in Table 4. Also is worth commenting that in these schemes, usually the government finances the pension if the pensioner outlives his assets.

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<sup>3</sup> In Mexico, the system we are referring to is a DC scheme, where the management of the accounts has been privatized.

Table 3  
Rates of Return Used to Capitalize Notional Balances

Countries	Reference rate	Annual return	Rate of growth of contribution base
Italy <sup>2/</sup>		3.6%	3.3%
Kyrgyzstan	N.A.		
Poland <sup>3/</sup>	Growth of the contribution base	2 %	4%
Sweden <sup>4/</sup>	Growth of the contribution base	1.6 %	1.5% <sup>1/</sup>
Mongolia <sup>5/</sup>	Growth of the contribution base	Rate of Growth in average wages	
Latvia	Growth of the contribution base		

Note: 1/ Projection between 2010 -2015.

Sources:

Mora (1999) and Lasagabster, E. *et al* (2002)

2/ Mora (1999)

3/ Chlon *et al* (1999)

4/ Sundén (2004) proposes a rate of return equal to national per capita real wage growth. Börsch-Supan (2004), suggests a rate or return equal to rate of wage growth.

5/ Holzmann *et al* (2000).

Some NDC pension systems incorporate an additional benefit known as an “imaginary” contribution that takes place when the worker is out of the labor market for a number of reasons such as unemployment, care of children, and disability periods among others. In these cases, the worker’s individual notional account is credited as if the actual contributions were made so the retirement benefit is not affected by the aforementioned circumstances (see Table 5).

Table 4  
Formula to Index the Annuity

Countries	Index parameter	Other features
Italy	Prices	
Kyrgyzstan	Nominal wage	There is a base pension--a flat amount added to the earning-related pension for each year of service—between 5 and 20 years
Poland	Real wage and prices	Procedures can vary if nominal wage growth falls below price inflation
Sweden	Nominal wage per capita and prices	Takes into account any deviation of real wage growth from a growth 'standard' (to be set at 1.6 per cent)
Mongolia	Nominal wage	Observed three-year rolling average rate of growth in average wage
Latvia	Prices and wages	If the longevity is above the life expectancy at retirement, pensions has to be covered from other government revenues

Source: Disney (1999) and, Fox and Palmer (2000)

Table 5  
'Imaginary' Contributions to the Systems for Non-Contributory Periods

Countries	Unemployment	Care of children	Disability	Others
Italy	x	x	x	x
Kyrgyzstan	N.A.	✓	N.A.	N.A.
Poland	✓	✓	✓	x
Sweden	✓	✓	✓	Military conscription and post-school education
Mongolia	✓	N.A.	N.A.	N.A.
Latvia	✓	✓	✓	Military, spouses of diplomatic staff

Source: Disney (1999)

### III. Why NDC Pensions?

#### III.1 Transition Costs

Transition costs refer to the financial cost when there is a shift from a defined benefit scheme to a defined contribution plan. Transition cost arises because contributions to private savings accounts are redirected from the payment of pensions of current retirees. Transition costs are usually financed by general taxes, even though some

countries have found other sources to finance the transition cost, like Poland, where the transition costs were partially met by privatization of state companies. International experience show that moving to a funded system often requires substantial transition expenditures that may be politically unattractive in the short term (see Table 6), even if the long-term budget constraint of the government is not really affected. NDC systems avoid these transition costs by retaining pay-as-you-go financing. The low transition cost is one of the strengths of the model. In Box 2, a detailed description of the impact of the transition on cash flows and debt is done.

Table 6  
Transition Cost as Percentage of GDP

Country	Cost
Chile	80-100
Peru	27
Argentina	N.A.
Colombia	87
Mexico	80

Source: Mitchell (1998).

#### Box 2 Considerations of the Effect of the Transition Mechanisms on Cost and Debt

When talking about cost we have to distinguish what is the effect of the reform on the cash flows and what is the effect of the reform on the debt, implicit or explicit. A reform to a NDC will have no effect on the implicit or explicit debt--except in the cases the balances in the accounts are recognized as debt in public accounts (and the implicit debt from the DB schemes are not registered)--nor on the cash flows, since the contributions are used to pay the pensioners in both cases.

A transition from a DB/PAYGO to a DC scheme can have an impact on the cash flow and on the explicit and implicit debt, depending on the mechanism used to accrue rights and on the strategy used to finance the cash flow deficit that arises from the redirection of the contribution to private saving accounts from the payment of pensions of current retirees.

The general government cash flow deficit can be financed by redirecting the public expenditure, by increasing taxes or by issuing debt. This strategy has “*grosso modo* no macroeconomic impact. The drop in general government savings exactly compensates for the rise in household savings” (Dupont 2004 pp.71). In the latter case, if the pension funds are invested in the newly issued public bonds, the reform merely transforms the implicit debt of the DB PAYGO system into an explicit public debt.

On the other hand, the way the accrued rights of active workers are recognized in the new system can have also an effect on the debt. If a recognition bond is issued and deposited in the individual account, as in Chile, the recognition of the accrued rights has a direct effect on the public explicit and implicit debt: the first one increases in the same amount as the second one decreases. If the transition mechanism is based on providing the active workers at the moment of the reform with the right to decide under what schemes retire, there is no impact on the explicit debt, since no bonds are issued, but the implicit debt associated to the accrued rights of the active workers remains.

### III.2 Fiscal Sustainability

One of the main objectives of the reforms of the pension system around the world is to make them financial sustainable in the long run. In a PAYGO/DB system, parametric reforms can make the systems financial sustainable. In contrast, a FDC scheme avoids the problem of financial sustainability by assuring that the assets accumulated will be equal to the benefits for each affiliate.<sup>4</sup> DC schemes with a minimum pension imply that the government will bear some cost depending on the number of person who will receive the minimum pension and the difference between the individual's accumulated assets and the present value of the minimum pension. A recent study of the World Bank about the experiences in the Latin American reformed pensions systems shows that a "dramatic improvement in fiscal sustainability" was brought about by the reforms to DC schemes (World Bank 2004). In this context one question arises: why should countries opt for NDC pensions? After all, the pension debt, before the reforms, was very high for each country as we can see in Table 7.

Table 7  
Implicit Pension Debt  
(% GDP)

	Public debt 1999/2000	Pension Spending	IPD by discount rate		
			2%	4%	5%
Poland	43	12	379	261	220
Kyrgyzstan	135	7	282	185	154

Source: Holzmann et al (2004).

A NDC pension that i) calculates the annuity at retirement based on the updated life expectancy and on the funds revaluated according to the growth of the contribution base, and ii) continuously updates the annuity post-retirement for changes in the contribution base and the life expectancy is, in theory, consistent with financial sustainability. For example, an increase in the life expectancy will reduce the prospective annuity, therein maintaining the actuarial balance of the pension system. On other hand, an adverse employment or productivity shock leads to revisions to the prospective annuity and benefits in retirement. The automatic adjustment to the life expectancy is known as the first stabilizer mechanism. The adjustment of the annuity calculated at retirement to changes in employment and productivity is known as the second stabilizer mechanism.

<sup>4</sup> Parametric reforms usually have taken the form of changes in contributions rates and the establishment of minimum retirement age and little has been done, for political reasons, to change the benefits (see the recent experience of Brazil). Its is worth commenting that there are some schemes that given the benefits offered and the replacement rates that the contribution rate should be established at 80% to make the plan sustainable. See World Bank (2004) for the case of public sectors pensions plans in Mexico.

Nevertheless, these mechanisms do not fully guarantee financial sustainability because, as was seen in Table 4, in most plans there is a commitment to a post-retirement annuity. Two examples illustrate this point. The first one refers to an increase in longevity. If a post retirement increase in longevity occurs, the annuity originally calculated, will be insufficient and i) either, the government has to pay the pensioners who outlive their assets, or ii) the annuity formula must be adjusted, which implies *de facto* a change in the promised benefits equivalent to a parametric reform in a DB system. The second example refers to changes in the contribution base. If the contribution base decreases, the plan will run deficits, and, the contribution rate or the pensions should be adjusted or the government has to pay part of the pensions. The first two options are, again equivalent to parametric reforms in a defined benefit scheme.

Thus, from the previous discussion, it can be concluded that the NDC can be *ex ante* financial sustainable, but it is not always *ex post* sustainable, where *ex ante* and *ex post* are defined in relation to the moment of the retirement and the calculation of the annuity. *Ex ante*, the system will be financial sustainable, if the parameters of the contributions and the benefits are designed to be actuarially balanced, including that the rate of return of the funds growth at the rate of the contribution base; which is equivalent to the defined benefit pensions' requirements for fiscal sustainability. *Ex post*, the system can be financial sustainable in case there are not deviations from the assumptions of longevity and the parameter to index the pension, and there are not reductions in the contribution base or the pension is continuously adjusted. Thus, as Valdes-Prieto (2000) has stated "it is only under extremely restrictive conditions--basically, constant demographics and productivity growth--that fiscal stability can be continuously maintained by a 'pure' notional accounts system".

As mentioned by Disney (1999), none of the countries that have established NDC pensions meet the requirement for being *ex ante* financial sustainable. In Italy for example, the contributions are indexed to real earnings growth, which will not be sufficient if, for example, there is a fall in the labor force, and the contribution rate established is already below the rate needed to sustain fiscal balance.

Notional accounts systems thus, do not guarantee financial sustainability, as an FDC scheme does, but might have better short run properties than traditional DB that lack explicit stabilizing mechanisms. There are some critics to the scheme though. Valdés-Prieto (2000) argues that the NDC is less transparent than the PAYGO/DB scheme. His reasoning goes as follows. In the PAYGO/DB scheme commitments must equal revenues in each point in time, so, it is soon apparent that sustained deficits must be eliminated by benefit cuts or rises in contribution rates. In the NDC, the built-in stabilizers are designed to maintain fiscal sustainability. Thus, in case they do not 'work', as can happen in

situations like the ones explained in the previous paragraphs, “the scheme does not have direct recourse to the standard ways of restoring pay-as-you-go equilibrium. Any effective solution would question the credibility of the whole notional accounts scheme.” There are other authors that argue that it is the automatic balance mechanism that may carry a considerable political risk, as further reduction of pensions may turn out to be politically unviable (Sundén 2000). The NDC pensions could then be less appealing than the DC schemes to reach fiscal sustainability, and the answer to why countries have opted for this scheme must be found elsewhere.

### III.3 Insurance Properties

There are several risks involved in pension plans. Broadly speaking we can distinguish the following aggregated risks: i) macroeconomic shocks, in which we include inflation, employment rate, and productivity; ii) investment risk (which can have a macroeconomic component); iii) management risk; and, iv) political risk; and the following individual risks: i) longevity risk, and ii) shocks to the individual employment and salary paths. The different pension schemes are to some extent exposed to each of the risk and make a different arrangement regarding who bears each of them. Tables 8a and 8b show how these different risks differ in each scheme and who is the affected player. When the exposure to a risk varies across the different schemes, we order them accordingly to the grade of exposure: higher exposed, exposed, or lower exposed.

Table 8a  
Exposure to Risk under Different Types of Pension Schemes

Risk	DB-PAYGO	DC	NDC
<b>Aggregate</b>			
Inflation	Exposed	Exposed	Exposed
Employment rate	Exposed	Not exposed	Exposed
Productivity	Exposed	Not exposed	Exposed
Investment risk	Not exposed	Exposed	Not exposed
Management risk	Exposed	Exposed	Exposed
Political risk	High Exposed	Lower exposed	Exposed
<b>Individual</b>			
Longevity risk	Exposed	High exposed	Lower exposed
Unemployment spells / changes in productivity	Exposed	High exposed	Lower exposed

Table 8b  
 Player's Exposure to Risk under Different Types of Pension Schemes

Risk	DB-PAYGO	DC	NDC
<b>Aggregate</b>			
Inflation	Government in case pensions are linked to prices/ Pensioners in case pensions are not indexed to prices	Pensioner in case annuities or programmed withdrawals are not indexed to prices	Government in case pensions are linked to prices/ Pensioners in case pensions are not indexed to prices
Employment rate	Government	Not exposed	Government
Productivity	Government/Pensioners	Not exposed	Government/Pensioners
Investment risk	Not exposed	Pensioner	Not exposed
Management risk	Government	Pensioner	Pensioner
Political risk	Government	Pensioner	Pensioner
<b>Individual</b>			
Longevity risk	Government	Insurance company in annuities/pensioner with programmed withdrawals	Government
Unemployment spells/ changes in salary	Pensioner	Pensioner	Government assuming "imaginary" contributions/Pensioner

DB and the NDC schemes are exposed to the risks of employment rate and productivity, whereas the funded schemes perform better in the face of these risks, but are vulnerable to financial market downturns. The NDC model is not vulnerable to volatility in financial markets because its rate of return is tied to broad economic indicators like wage growth rather than the performance of stocks and bonds. As a consequence, the rate of return on notional accounts will tend to fluctuate less than returns based on financial assets.<sup>5</sup> In fact, it can happen that, even though a funded account plan may provide a better return over the long run for the average worker, a rapid drop in such assets during the weeks or months just prior to planned retirement could require workers to adjust their retirement plans even when the lifetime average return is quite favorable.<sup>6</sup>

NDC pensions also improve matters in that they avoid management risk and political risks, for example management risk can arise through incompetence or fraud, which imperfectly informed consumers generally, cannot monitor effectively, but in a NDC scheme workers are informed about their accounts. In some, but by no means all countries, the transformation into a funded DC plan may allow a reduction of some political risks due to greater transparency.

<sup>5</sup> Since NDC systems are unfunded, their ability to pay benefits is vulnerable to economic and demographic changes. In response, the systems tend to rely on a variety of mechanisms to ensure that they remain in financial balance.

<sup>6</sup> Williamson (2004). While individuals could significantly reduce their financial risk by shifting to less volatile assets as they age, evidence from 401(k) plans in the United States suggests that many do not follow this strategy (Munnell and Sundén 2004).

NDC may also reduce longevity risk, if only because, with a single, nationwide annuities pool, the law of large numbers will reduce the variance facing the insurer (i.e. the state). This is an unambiguous advantage. However, the advantage is inherent in state-run PAYGO schemes generally, rather than NDC schemes specifically.

As is well known, under DB schemes, the government is the main actor who bears the risk. On the other extreme, individual account DC schemes force the individual to bear most of the risk, with the exception of the minimum pension that transfers to the government some of the investment shocks and of the individual shocks to employment and salary. NDC schemes translate some of the risk from the government to the pensioner, even though the minimum pension and credits to the system for unemployment spells ameliorate the risk faced by the worker.

### **III.4 Link Between Contributions and Benefits (Actuarial Fairness)**

A major goal of many pension reformers is to establish a tighter link between workers' contributions and their benefits (Williamson 2004), to make systems closer to "actuarial fairness" and to reduce marginal income taxes. The link between workers contributions and their benefits is important for two reasons: first, because, at the margin, it can influence the workers' incentives to retire, and second, because it can determine the income distribution.

In an actuarially fair system the present discounted value of benefits equals the present value of the contributions using a market discount rate. One implication of actuarial fairness is that it ensures that the pension benefits of two individuals of the same cohort entering the system at different stages of life are proportional to the amount of time in and how much they have contributed to the scheme (Palmer 1999).

Fully DC schemes (with no minimum pension guaranteed and in the absence of administrative charges) are by definition "actuarially fair". In theory, PAYGO/DB schemes can get outcomes that are "actuarially fair" if the pension is set as a function of the "history of the working life" salary and the accrual rate, the rate that links pension to the number of years participating in the program and the earning profile of the participants, is constant over the lifetime and across earnings (Disney 1999).<sup>7</sup>

Nevertheless, international experience shows that these restrictive assumptions do not hold in practice. Two thirds of developing countries and 40 per cent of OECD pension systems base their pension on "final" pay, ranging from the last month's to the last ten years (that may formed by continuous or interrupted spells of work) while another fifth of

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<sup>7</sup> Given the target level of pension, the contribution rate can be "solved" to generate pay-as-you-go equilibrium, where contribution revenues and benefit payments are equalized at each point in time.

countries base pensions on a limited number of “best years”. Other countries use average for the working life. Examples of the first group are Turkey (5-7), Greece (5), Mexico (5) Argentina (10), Iraq (3), Paraguay (3), Egypt (2), Nigeria (final month). Examples of the second group are: Norway, Austria, Panama, Ecuador, and Algeria, among others. Examples of the third group of countries are Belgium, Germany and the United Kingdom, and some non-OECD countries like Albania, Jamaica, Liberia and Trinidad and Tobago. The United States and Canada also take the average, but eliminate the worst years.

Under NDC system the contribution-based feature assures that benefits are proportional to the contribution and are “fairer” on the margin relative to a PAYGO scheme (Hassler and Lindbeck 1996). The question is how it compares to the DC scheme. On one hand, the rates of growth of the funds are not market determined, and the rate of growth of the contributory base is typically lower than the market rate of return (Feldstein 1996) implies that the NDC pensions are less fair relative to the DC schemes. On the other hand, the administrative charges in a DC system are higher than in a NDC system, a point that will be discussed below, which makes the NDC schemes fairer relative to the DC schemes. Empirical evidence of the net effect of these opposite factors does not exist.

### **Labor Market Incentives**

Ideally, pension schemes should not provoke distortions on labor markets. The existence of a pension scheme should not change the individual decision to participate in paid work at any time. In the theoretical and empirical literature, it has been shown that labor market distortions positively depend on the degree of *marginal* actuarial fairness, i.e. on the relation between marginal contributions and marginal benefits even though “actuarial fairness” would not generally eliminate the effect of a compulsory social security fee on labor supply due to the fact that the individual inter-temporal discount rate may differ from the market rate of return (Hassler and Lindbeck 1996). Under this argument and taking into account the discussion from previous paragraphs, PAYGO/DB systems are associated in a higher degree with labor market distortions. Gruber and Wise (2002) have documented that incentives implicit in PAYGO/DB systems explain the reduction of male labor force participation rate of the last decades in Europe. Advocates of PAYGO/DB systems though, explain that the argument has been exaggerated since in many PAYGO/DB systems there is a link between contributions and future benefits at the individual level, and if not, this link could be strengthened by various modifications to the rules, say for example, appropriate actuarial adjustments to defer retirement (Disney 1999).

In DC schemes, the contributions to a fund with individual accounts, even if mandatory, are supposed to be perceived by employees as saving for their future and can in fact motivate the workers to continue working even beyond the retirement age, as their account balance continue to grow based on payroll contributions and the account's rate of return (even though a minimum retirement age is also established in these schemes). Unfortunately, there is not empirical evidence regarding these phenomena because the DC systems are "too young".

Since an NDC is "actuarially fairer" than the PAYGO/DB systems, it will reduce labor market distortions and it has better incentives to induce workers to extend its active working periods than the DC system. On the other hand, since we do not know how the NDC systems compare to DC systems in terms of actuarial fairness, there is not a conclusion regarding whether the DC systems distort less the labor market than the NDC systems.

### **Income Distribution**

Income redistribution is one of the objectives of pension schemes (Barr 2003). Governments reach its distributional objectives by setting the link of benefits and contributions. The more actuarially fair a system is the lower the possibility to redistribute income. Góra and Palmer (2003) write: "In the NDC and FDC framework there is no redistributive ambition, other than redistribution over the individual's own lifecycle from working years to years of retirement. Instead, the government's redistributive policy ...is financed through explicit taxes from general revenues" (p.22). "In this way, insurance and its source of financing and social policy and its means of financing are kept separate" (p. 23).<sup>8</sup> This feature has been signaled by some authors (for example Williamson 2004) as a potential weakness of the model. Evaluating the use of pension schemes for distributional objectives will led to endless discussion because the answer will depend on the ideology and the policy goals of the individuals.

It is worth mentioning though, that in the countries where this model has been established, some redistributive elements have been incorporated, usually of one or two types. The first one, as has occurred in many Latin American countries that shift to a DC systems, is the establishment of a minimum pension. The second one is that some NDC scheme provides some notional credit for time spend out of the paid labor force (Table 5).

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<sup>8</sup> However some countries with DB schemes, specially the less developed, have observed that there exists a regressive impact in the scheme, because many low-wage employees could not reach the eligibility criteria, and therefore they did not receive pension benefits although they contributed for many years. Depending on the situation of the country, a shift from a DB scheme to a DC or to a NDC scheme may decrease the impact, thus reducing the degree of regressive redistribution (Williamson 2004).

### III.5 Administrative Cost

In theory, administrative costs in NDC schemes are lower than administrative cost in DC schemes and in PAYGO/DB schemes. Costs in DC schemes are higher because managers of the plans have to record each affiliate's contribution, balance and investment decision, and the cost incurred due to the investment function should be added. Also, if the management of the accounts is done by private entities (pension fund managers) as is usually the case, costs have to include sales cost and profits. In NDC schemes, account administration costs are lower since only a bookkeeping record of the contributions has to be done. On the other hand, PAYGO/DB schemes can be more costly to administer than NDC schemes because the history of the worker's participation in the plan and salaries has to be maintained. Moreover, current DC schemes have higher surveillance cost since there are several players, pension fund managers, to monitor, compared to one manager as it is the case in PAYGO/DB or NDC schemes.

It is worth commenting though that, notwithstanding what we said in the previous paragraph, the administrative cost in PAYGO/DB or NDC schemes can be high due to the inefficiencies associated to the fact that the managers of these pension plans are public sector entities. On this issue, it is seen that public social security systems that manage PAYGO/DB schemes can be very efficient, while the reforms in Latin America suggest that high administrative costs of the old social security agencies was a factor to promote the move towards DC solutions. Nevertheless, lower administrative costs should be an advantage of PAYGO/DB and NDC approaches.

Related to administrative cost are administrative fees. It has been argued that the markets of private pension fund managers (PFM) present oligopolistic structures and that firms participating in them enjoy economic rents (Yermo 2002). Valdés-Prieto (2004) for the case of Chile, for example, has shown that commissions charged by PFM are higher than their economic cost. This factor is not innocuous. Aguilera (2004) estimated that in Chile and Mexico, the accumulated fees represent more than 25 per cent of the end balance of an individual account. Meléndez (2004) argues that the charges made by Mexican pension fund managers are higher than what it would have cost the IMSS, the public agency responsible for managing the pensions in the former defined benefit system, to handle the pension insurance. This fact favors even more the NDC plans.

A potential weakness of a NDC scheme, and also DC plans, is that it may cause administrative chaos in countries without the proper administrative infrastructure to handle individual accounts. The experiences in Poland, Latvia and Kyrgyzstan, countries where the administrative capabilities have shown its limits, as explained by Chlon-

Dominczak (2002), Fox and Palmer (1999) and Müller (2000) and World Bank (1994), underline that the success of the reform also depends on adequate preparation of administrative agencies for implementation.

### III.6 Political Feasibility

Reforms to PAYGO/DB pension schemes to improve financial viability, as have been the case in all reforms around the world, whether these are parametric reforms, a transition to a DC or to a NDC plan, always raise political debates. The question is ¿in case a reform needs to be done, which system would provide less political opposition?

Despite the common principles shared by DC and NDC pension models, these systems differ in significant ways that are relevant to the logic of structural reform. In particular, the time frame within which the political and financial costs and benefits are obtained differs markedly across the two reform models. The adoption of a DC reform typically exacts a high political and financial cost up-front. The reform to DC usually implies huge transition cost (see Table 6) that it is sidestepped by governments in a transition to NDC system as was explained in section III.1. On the other hand, the adoption of a funded DC pension reform is highly visible, and in most nations the label “privatization” makes it a lightning rod for opposition from well-organized beneficiaries of existing state pension systems. The argument against privatization has been stressed out as a result of the high fees charged by the PFM in some reformed countries. On the contrary, DC model promises dramatic long-term reductions of unfunded state pension liabilities (depending upon the degree of structural reform), along with long-term gains in growth and savings (World Bank 1994), and in labor market efficiency, that are not reached by NDC systems, as was seen in section III.2. Thus, the high visibility and politicized nature of DC pension reform obliges governments to confront opposition prior to the reform, which is not observed in a transition to a NDC scheme. We can conclude thus that a transition to a DC scheme is less politically feasible than a transition to a NDC plan.

Now we will analyze how a “parametric” reform compares to a transition to a NDC schemes in political terms. Since in a NDC system the adjustments of pension benefits are both contingent (upon future labor market and demographic trends), and potentially far in the future, it is difficult for most citizens to discern how the adoption of an NDC system will affect their own future retirement benefits and welfare, aspects that are readily known in a “parametric” reform to DB schemes. This feature makes the transition to a NDC system more politically feasible than a “parametric” reform to DC schemes, and even allows government actors to effect important significant structural changes to a pension

system through the adoption of NDC with relatively ‘clean hands’ (Brooks and Weaver 2003). Once the automatic benefit adjustments kick in, however, reforming governments run the risk of political backlash, as the costs of benefit reductions may fall heavily upon pensioners (Disney 1999 and Valdés-Prieto 2000).

As a result, the politics of NDC pension reform may be expected to revolve around the avoidance of blame *ex post* of adoption, rather than the task of overcoming of veto players *ex ante*, as in the case of FDC reform or a parametric reform. The distinctive profiles of these measures are underscored by surveys conducted after the implementation of a ‘mixed’ NDC and FDC pension reform in Sweden. Sundén (2004) finds that after several years of aggressive public information campaigns many citizens lacked basic knowledge about the nature and rules of the NDC portion of the system, while knowledge of the funded component was much higher.

### III.7 Portability

Portability is an important factor in countries that face important international migration flows and where the social security system is fragmented. A recent study of the Inter-American Conference on Social Security (CISS 2004) has shown that fragmentation is present in some countries like Brazil, Chile, Colombia, Mexico and Uruguay. International migration flows, on the other hand, are important between US and the Latin America and the Caribbean (LAC) countries and among countries of the regions in the LAC (CISS 2005).

International agreements have been recently signed between several pairs of countries in order to cope with the problem of migration, notwithstanding, the scheme of the pension system. For example, there exist an agreement between Chile and Peru, both countries under DC schemes. There exist also, examples of agreements between two pension systems within the same country, for example in Switzerland there is a guaranteed transfer of pension rights when individuals change jobs within the country. Mexico also has portability within the country, for example in 2004 the first agreement in this matter was made between the social security system for public sectors workers in the State of Nuevo Leon, ISSSTELEON and the IMSS, the social security institutions for workers of the private sector companies.

An agreement between two DC plans, whether they are in same country or in different countries, helps to solve the old problem of DC schemes, the lack of portability, as the accrued rights the worker has generated in two systems are recognized. It is not fully solved since some “arbitrary” formula has to be established due to the fact that the accrual rates typically changes over the working years, as has been mentioned before. It

can be said then, that portability can be reached in an easier way under FDC schemes since only two balances have to be added up, either at the moment of retirement or even at the moment the worker migrate to a new plan. The lack of funds in NDC schemes will make any agreement that involves a NDC scheme more similar to DB than to FDC schemes,. Finally, it is worth mentioning that the existence of a minimum pension, as usually occurs in DC and NDC schemes, complicates the agreement since some formulas to calculate the pension and the cost sharing of it should be established. Thus, portability can be a reality in NDC schemes, trough specific agreements, but, it will be more complicated than DC and DB schemes.

### **III.8 Transparency**

Analyst have not reached a conclusion whether NDC are less or more transparent than DB schemes. On one hand, the arguments go, NDC schemes are more transparent with respect to distributional policies and labor market participation decision. The fact that there are distributional elements of the NDC plans, those listed in Table 5, financed by general taxation, makes a clear separation between benefits based on contributions and redistribution programs, aspects that it is usually obscured in DB plans trough complex benefit formulas (Williamson 2004). Also, early exit from the labor force affects the worker's own benefit in a transparent way. This cost can not be shifted forward to another generation, nor to members of the same generation. The worker will be informed and can also determine his supply of labor and saving according to personal preferences, and the gradually increasing life expectancy of his/her generation which makes the NDC (and DC schemes) more transparent than DB systems.

On the other hand, NDC plans are less transparent than DB schemes because even though individuals can know their balance at any point on time, the individualized annuity and thus the implicit replacement rate is uncertain until the moment of the calculation of the annuity, factor that it is not present in DB schemes since a replacement rate is always promised. Moreover, the automatic adjustment mechanism of NDC system mentioned in previous section III.2 is highlighted by some authors as a politically less transparent way of reforming the pension system (Williamson 2004).

Finally it is worth mentioning that DC schemes are more transparent than NDC plans because in DC schemes individuals have clear property rights to accounts that are backed by funds.

#### IV. Prerequisites for Implementation

In the last section we perform a comparative analysis of PAYGO/DC, DC and NDC schemes. In this section we present some prerequisites for implementation.

*Positive long term expected growth of the contribution bill.* While the system stabilizer mechanism provides financial sustainability to changes in contribution bill, a system with a constant, or a decreasing, rate of growth of the contribution bill will require high contribution rates to make it financially stable. In this situation a DC scheme with positive expected long term rates of return could achieve its promised pensions with a lower contribution rate. An example in which case this requirement is relevant is the Mexican pension scheme for the public sector employees, currently under financial stress. As the size of the government is shrinking, the replacement rates are dropping drastically, which would imply a negative rate of return of the notional accounts if this is based on the rate of growth the contribution bill

*Sufficient public administrative capacity.* NDC pensions in particular, as any individual account based system, require government administrative capacity to manage individual accounts. Evidence suggests that one of the main problems of countries that have migrated to DC systems is the administration of individual accounts, as explained above.

*Sufficient political capacity.* The government must have sufficient political capacity “to make long-term pension promises credible” (Barr, 2003 pp. 12), because then individuals have confidence that what they are expecting to receive will be actually what they are going to receive when they retire and can plan with more certainty their future.

*Sufficient disparity in the level and distribution of income.* “In a poor country, the poverty line, which determines the minimum pension, is relatively close to average earnings, hence there is little gain from an earnings-related pension in general, and NDC in particular” (Barr, 2003 pp 12).

#### V. Summary and Conclusions

In the years to come several countries will face financial distress due to the financial unbalance of their pension schemes. In this scenario, authorities in each country will have to decide which road to take, either a parametric change or a reform to a new scheme. NDC pension scheme emerges as a solution that takes the individual-based approach of the DC schemes and the PAYGO and public management characteristic of the DB plans.

In this document we described the characteristics of the NDC pension schemes taken from the experience of several countries, especially in East Europe; provided a brief discussion of how this system compares to the DB/PAYGO and the DC schemes on seven main characteristics; and, mentioned some prerequisites for its implementation. The summary of the comparative analysis is presented in Table 9.

Each system performs better or worse on the characteristics analyzed. After all, none of the reforms is “*the solution*” and all of them involve pain in terms of transferring risk or adjusting benefits. Nevertheless, NDC schemes are an option in countries where the political context rules out the benefit cuts and payroll tax increases that would be necessary in a pure parametric reform. The NDC model also involves lower administrative costs and reduces the labor market distortion from the mandatory payroll tax. On the negative side, it minimizes the solidarity element and it is not as transparent as the DB/PAYGO and DC schemes. It is important to mention, that the experience has also shown that to implement an individual account scheme requires important administrative capabilities.

Finally, we believe that the final decision the authorities will take will be based on the particular situation of each country regarding the macroeconomic situation, the labor market characteristics, the political environment and even the aggregate preferences for individual-based vs. solidarity schemes; but it also should be based on a deep understanding of how each of the systems work and the experience in other countries. We expect this document can help to increase the knowledge of NDC pension plans.

Table 9  
Assessment of Different Pension Schemes

	DB/PAYGO	DC	NDC
III.1 Transition costs	N.A.	High transition cost	No transition costs
III.2 Fiscal sustainability	Unsustainable unless drastic parametric changes are done	Fiscal sustainable unless the cost of the minimum pension puts pressure on the system	Fiscal sustainable unless: i) the cost of the minimum pension, ii) the financing of <i>ex post</i> unbalance, and iii) the “credits” financed by the government puts pressure on the system
III.3 Insurance properties	High exposure by the government to aggregate risks	High exposure by the workers to aggregate and individual risk	High exposure by the individual to aggregate and individual risk
III.4 Link between contributions and benefits (actuarial fairness): Labor market incentives	Poor labor market incentives unless aggressive formulas are included to accrue benefits for labor market participation beyond the retirement age	High labor market incentives since contributions are seen by workers as savings	High labor market incentives since contributions are seen by workers as savings
III.4 Link between contributions and benefits (actuarial fairness): Income distribution	Possible to distribute income across workers through the formula to accrue benefits: between workers with different salaries and between workers with different years of participation in the plan	No distribution of income. The minimum pension is the only solidarity element but it is financed from general taxation	No distribution of income. The minimum pension and the “credits” to the system are the only solidarity elements but they are financed from general taxation
III.5 Administrative cost	In theory, higher than or equal to NDC and lower than DB, but inefficiencies related to the public administration can make the system more expensive than DC	In theory, higher than NDC and DB/PAYGO, but inefficiencies related to the public administration of last two plans can imply lower administrative cost of the DC plans.	In theory, lower or equal to DB/PAYGO and lower than DC plans, but inefficiencies related to the public administration can imply higher administrative cost of the NDC plans

Table 9 (Continued)

	DB/PAYGO	DC	NDC
III.6 Political feasibility	Very low political feasibility since changes in the contributions and benefits are transparent to the workers	Very low political feasibility since the solidarity element is almost eliminated and the “privatization” of the management generates high opposition	High political feasibility at the moment of the reform since there is no transparency on how the benefits are going to be affected and there is no “privatization”. It may be faced political backlash ex post if the benefits are reduced
III.7 Portability	Portability is reached with international agreements, nevertheless, some “arbitrary” formula has to be applied	Portability is reached with international agreements in an easy way since it is clear how the annuity corresponding to the DC scheme will be calculated based on the balance on the account. An arbitrary formula should be used in case the worker is entitled with the minimum pension	Portability is reached with international agreements, nevertheless, the fact that the government is the insurer in case the worker out lives its balance, makes the use of some “arbitrary formula” necessary
III.8 Transparency	High transparency on the contributions, benefits and the cash flow balance (unbalance) of the plan. Low transparency in the recognition of the debt in public accounts	Low transparency on the benefits for the worker but higher transparency than NDC because there are property rights of the funds	Low transparency on the benefits for the worker but transparency in the distribution tools included in the scheme

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