Non-financial (Notional) Defined Contribution Schemes

Pension Core Course 2010 – Session 06

Robert Holzmann
World Bank
Road Map

I. Motivation for NDC approach
II. The Basic Design of NDC
III. NDC-Type Developments and Country Experiences with NDC reforms (Latvia, Poland, Sweden, and Italy)
IV. Key Design and Implementation Issues
V. Concluding Remarks
VI. Selected References
I. Motivation for NDC Approach

- Limited reform options for unfunded first pillar due to:
  - Inherited implicit pension debt and hence the costs of transition
  - Absent or underdeveloped financial markets
  - Low credibility and limited success of parametric reforms

- Promises of NDC to handle key reform pressures:
  - Basic design is simple, transparent and credible
  - Capacity to handle fiscal pressure from demographic, economic and political shocks
  - Ability to address social-economic changes (aging, divorces, female labor force participation, etc)
  - Attractive features to deal with challenges and opportunities of globalization

- Promising experiences with NDC reforms in Sweden, Latvia, Poland and Italy
II. Basic Design of NDC

- The Beauty of Simplicity
- Generic NDC – Individual Equilibrium
- Generic NDC – Macroeconomic Equilibrium
- Simple but a Few Rules Need to be Respected
The Beauty of Simplicity

NDC is like an illiquid life-time cash balance plan (or individual account on Pay-As-You-Go basis)

- Participants (and/or their employers) pay contributions on earnings during their whole career
- Contributions are noted on an individual account
- Account grows with contributions and is credited with rate of return (but remains unfunded/PAYG)
- At retirement, the “notional” capital is converted into an annuity which takes account of remaining life-expectancy
Generic NDC – Individual Equilibrium

- Individual notional capital

\[ K_{i,T} = \sum_{t=1}^{T} c w_{i,t} I_t \]

\[ I_t = \prod_{t+1}^{T-1} (1 + \alpha_t) \]

\[ I_T = 1. \]

- Converting capital into annuity

\[ P_{j,\tau} = \frac{K_{j,\tau-1}}{G[LE_\kappa, \alpha(LE_\kappa)]} \]
Generic NDC – Macroeconomic Equilibrium

- **Static equilibrium condition**

\[ K_t + P_t = L_t \leq A_t = F_{At} + P_{At} \]

- \( K_t \): notional capital of all active workers
- \( P_t \): present value of all benefits in disbursement
- \( L_t \): total liabilities,
- \( A_t \): total assets
- \( F_{At} \): financial assets,
- \( P_{At} \): Pay-As-You-Go Asset

- **Dynamic equilibrium condition**

\[ L_t \left(1 + \alpha^*\right) = F_{At} \left(1 + r\right) + P_{At} \left(1 + w\right) \]

- **Permissible notional interest rate**

\[ \alpha^* = \frac{F_{At}}{L_t} r + \frac{P_{At}}{L_t} w + \frac{F_{At} + P_{At} - L_t}{L_t} \]
A sustainable rate of return on contributions exists (case of Jordan)

Real return on contributions = 5%
Real return on contributions = 3%
Real return on contributions = 1%
Real return on contributions = growth average covered wage

Current situation
Basic Principle of Solvency in the NA system...

Liabilities = Assets
Liabilities

Pensions in payment

Individual accounts

=

Assets

Financial assets

?
Liabilities

- Pensions in payment
- Individual accounts

= 

Assets

- Financial assets
  - PAY-AS-YOU-GO ASSET

IMPLICIT TAX
What happens in the insolvent pay-as-you-go system?

Liabilities =

Financial assets
PAYG Asset
Unfunded Liabilities
Or Tax Overhang

Could be <0
Pay-as-you-go assets can be largely negative.
How to compute the notional interest rate?

The sustainable notional interest rate is actually the allowable growth rate of liabilities: the rate used to index pensions and revalorize individual accounts.
Liabilities = Assets

New assets

Assets
Liabilities = Assets

New Liabilities

From changes in life expectancy

New assets
Liabilities = Assets

New Liabilities + Allowable change = New assets

From changes in life expectancy
NDC is simple but a few rules need to be respected, inter alia

- Choice of appropriate interest rate, life expectancy
- A buffer fund to handle short-term (financial and economic) shocks
- A balancing mechanism to address long-term shocks
- A financing mechanism to handle inherited commitments (legacy costs) when moving from existing system
III. NDC-Type Developments and Country Experiences

- NDC movement across the world
- NDC Experiences 10+ years after (Italy, Latvia, Poland, and Sweden)
NDC movement across the world

- **Countries with NDC-reformed schemes (late 1990s)**
  - Sweden, Latvia, Poland, Italy

- **Recently legislated NDC schemes**
  - Norway (2009), Egypt (June 2010)

- **Countries with NDC-inspired reformed systems**
  - Brazil, Kyrgyz Republic, Russia

- **Countries with NDC-type systems (point systems)**
  - Germany and France; Croatia, Romania, Slovakia, Ukraine...

- **Under discussion/consideration in**
  - Belarus, Czech Republic, France, Greece, Hungary, Spain, China, ?

- **All recent reforms in OECD countries mimicked elements of NDC reform (life-time earnings, decrements/increments, etc)**
Lessons from NDC reforms in Sweden, Poland, Latvia and Italy

- Overall, reforms went well. Reform delivers adequate replacement rate for average earners and are financially sustainable for next 50 years.
- Reform requires extensive preparatory work at technical and political level, good communication with the public, an efficient administrative framework, and good rules to cope with economic and demographic changes.
- All 4 countries applied different pathways to reform, i.e. there is no single way to do, or different paths lead to the same final destination.
- Reforms in all countries were undertaken against the backdrop of crises and the need to adjust.
### Year of implementation and coverage in NDC system

<table>
<thead>
<tr>
<th></th>
<th>Italy</th>
<th>Latvia</th>
<th>Poland</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year of implementation</strong></td>
<td>1995</td>
<td>1996</td>
<td>1999</td>
<td>1999</td>
</tr>
<tr>
<td><strong>Covered</strong></td>
<td>Private sector workers, Public employees, Self-employed workers, Several schemes run by two major public retirement institutions</td>
<td>Universal</td>
<td>Employees and self-employed</td>
<td>Universal</td>
</tr>
</tbody>
</table>
### Contribution rates for pensions as percentage of wages

<table>
<thead>
<tr>
<th></th>
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<th>Poland *)</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution rate for retirement savings, of which:</td>
<td>33% (employees) 20% (self-employed) 24% (atypical contracts)</td>
<td>20%</td>
<td>19.52%</td>
<td>18.5%</td>
</tr>
<tr>
<td><strong>NDC contribution</strong></td>
<td>33% (employees) 20% (self-employed) 24% (atypical contracts)</td>
<td>14% from 2012</td>
<td>12.22%</td>
<td>16.0%</td>
</tr>
<tr>
<td><strong>FDC contribution</strong></td>
<td>Voluntary scheme</td>
<td>6% from 2012</td>
<td>7.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Occupational and voluntary systems</td>
<td>Yes, initially low but gradually rising (20.1% of labour force in 2008)</td>
<td>Yes, but very low coverage</td>
<td>Yes, but very low coverage</td>
<td>Yes, high coverage</td>
</tr>
</tbody>
</table>
## Cohorts covered by NDC scheme

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Coverage policy</strong></td>
<td>Workers with less than 18 years of contributing (as of 1996) are in the new system. Those with more than 18 years of contributing can opt for the new system. For those working before 1995, pension calculated according to a mixed formula.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All contributors are in the new system</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mandatory for people younger than 50, with exception of those who can retire before 2009</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mixed old-new pension formula for transition cohorts. Past recalculated according to the existing data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oldest cohort with NCD</strong></td>
<td>Mandatory: 1960</td>
<td>1941</td>
<td>1949</td>
<td>1938</td>
</tr>
</tbody>
</table>
### Individual accounts build-up

<table>
<thead>
<tr>
<th></th>
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<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notional rate of return</strong></td>
<td>GDP growth</td>
<td>covered wage bill growth</td>
<td>covered wage bill growth</td>
<td>Per-capita wage growth</td>
</tr>
<tr>
<td><strong>Inheritance gain</strong></td>
<td>Increases general reserve</td>
<td>Increases general reserve</td>
<td>Increases general reserve</td>
<td>Equally divided between survivors and added to their notional accounts</td>
</tr>
</tbody>
</table>

Additional credits to notional account:

| **Insured periods of unemployment** | ✓ Based on past wage, up to total of 5 years | ✓ Based on unemployment benefit, only when eligible for benefit (around 12 months) | ✓                         |
| **Maternity and parental leave**  | No, but more generous transformation coefficient for mothers | ✓                         | ✓                         |
| **Taking care for disabled child** | ✓ (income tested) | ✓                         | ✓                         |
| **Conscripted military service**  | ✓                         | ✓                         | ✓                         |
| **Insured periods of income loss due to sickness** | ✓                         | ✓                         | ✓                         |
| **Disability**                 | ✓                         | ✓                         | ✓                         |
| **Occupational sickness/injury** | ✓                         | ✓                         | ✓                         |
| **Post-gymnasium education**    | ✓                         | ✓                         | ✓                         |
## Pensions formulae

<table>
<thead>
<tr>
<th></th>
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<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Denominator</strong></td>
<td>Life expectancy adjusted with an imputed rate of return, set at the level of 1.5%</td>
<td>Life expectancy (unisex) at retirement age</td>
<td>Life expectancy (unisex) at retirement age</td>
<td>Life expectancy adjusted with an imputed rate of return, set at the level of 1.6%</td>
</tr>
<tr>
<td><strong>Post-retirement indexation</strong></td>
<td>To prices</td>
<td>To prices since 2011</td>
<td>Mixed price-wage indexation with at least 20 per cent of wages</td>
<td>To prices plus discrepancy between real wage growth and 1.6% used to compute annuity &amp; balancing when liabilities exceed assets.</td>
</tr>
<tr>
<td><strong>Retirement age</strong></td>
<td>65/60 (optional for women), individuals with 36 years of contributions can retire at 61</td>
<td>62/62, but early retirement at 60 for individuals with 30 and more years of contributions into force until 31 December, 2011.</td>
<td>65/60</td>
<td>65/65 but the minimum retirement age is 61</td>
</tr>
<tr>
<td><strong>Minimum qualifying period</strong></td>
<td>5 years</td>
<td>10 years</td>
<td>None, but required for a minimum guarantee (25/20)</td>
<td>Minimum pension guarantee</td>
</tr>
<tr>
<td><strong>Minimum benefit level</strong></td>
<td>Social assistance pension (around 25% of average wage net of the income tax) paid from age 65</td>
<td>Depends of years of contributions. For individuals without a minimum qualifying period – state social maintenance benefit (45 LVL per month)</td>
<td>In 2009: 675 PLN per month (around 20% of average wage). The MB is indexed as other pensions.</td>
<td>2.13 base amounts for single pensioners, 1.90 base amounts per person for married couples. (base amount = 42 800 SEK in 2009 (around 15% of the average wage)</td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td>State budget</td>
<td>Social insurance contributions; State social maintenance benefit – from General budget</td>
<td>General budget revenue on the top of accrued benefit</td>
<td>State budget on the top of the benefit</td>
</tr>
</tbody>
</table>

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**Post-retirement indexation**

- To prices
- To prices since 2011
- Mixed price-wage indexation with at least 20 per cent of wages
- To prices plus discrepancy between real wage growth and 1.6% used to compute annuity & balancing when liabilities exceed assets.

**Retirement age**

- 65/60 (optional for women), individuals with 36 years of contributions can retire at 61
- 62/62, but early retirement at 60 for individuals with 30 and more years of contributions into force until 31 December, 2011.
- 65/60
- 65/65 but the minimum retirement age is 61

**Minimum qualifying period**

- 5 years
- 10 years
- None, but required for a minimum guarantee (25/20)
Country lessons

- Expected outcomes on labor force participation of elderly seems to have been achieved while replacement rates in line with OECD countries.

- NDC appears to have weathered the storm created by the deep recession of 2009, albeit it did not emerge completely unscathed.

- Expenditure projections suggest effectiveness of long-term fiscal balancing approach.
Estimated impact of pension reform on participation rates in 2020, in pp
Expected replacement rate

Figure 1. Relation between Lifetime Earnings and Pensions

- Italy
- Latvia
- Poland
- Sweden
## Projected pension expenditure

### Change in expenditure (in percent of GDP)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>0.1</td>
<td>0.7</td>
<td>0.8</td>
<td>−0.8</td>
<td>−1.1</td>
<td>−0.4</td>
</tr>
<tr>
<td>Latvia</td>
<td>−0.3</td>
<td>0.7</td>
<td>0.3</td>
<td>−0.3</td>
<td>−0.7</td>
<td>−0.4</td>
</tr>
<tr>
<td>Poland</td>
<td>−1.8</td>
<td>−0.3</td>
<td>−0.2</td>
<td>−0.1</td>
<td>−0.3</td>
<td>−2.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>−0.1</td>
<td>0.1</td>
<td>−0.1</td>
<td>−0.3</td>
<td>0.3</td>
<td>−0.1</td>
</tr>
<tr>
<td>EU27</td>
<td>0.4</td>
<td>0.9</td>
<td>0.7</td>
<td>0.2</td>
<td>0.2</td>
<td>2.4</td>
</tr>
</tbody>
</table>

### Decomposition of public pension expenditure (in percent of GDP)

<table>
<thead>
<tr>
<th>Country</th>
<th>2007 level</th>
<th>Dependency ratio contribution</th>
<th>Coverage ratio contribution</th>
<th>Employment effect contribution</th>
<th>Benefit ratio contribution</th>
<th>Interaction effect</th>
<th>2060 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>14.0</td>
<td>10.4</td>
<td>−3.2</td>
<td>−1.1</td>
<td>−5.5</td>
<td>−1.0</td>
<td>13.6</td>
</tr>
<tr>
<td>Latvia</td>
<td>5.4</td>
<td>5.7</td>
<td>−1.6</td>
<td>−0.2</td>
<td>−3.9</td>
<td>−0.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Poland</td>
<td>11.6</td>
<td>13.4</td>
<td>−6.3</td>
<td>−1.0</td>
<td>−7.1</td>
<td>−1.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>9.5</td>
<td>5.6</td>
<td>−0.4</td>
<td>−0.4</td>
<td>−4.3</td>
<td>−0.6</td>
<td>9.4</td>
</tr>
<tr>
<td>EU27</td>
<td>10.1</td>
<td>8.7</td>
<td>−2.6</td>
<td>−0.7</td>
<td>−2.5</td>
<td>−0.6</td>
<td>12.5</td>
</tr>
</tbody>
</table>
Poland: GDP and wage growth, NDC and FDC returns in comparison
IV. Key Design and Implementation Issues

- Choice of the notional interest rate proxy
- Design of explicit balancing mechanism
- Addressing the legacy costs of reform
- Role and size of reserve funding
- Estimation of remaining cohort life expectancy and mechanism of risk sharing
Choice of notional interest rate proxy

- **Purpose:** Critical for assuring solvency of system

- **Approach:** Direct estimation of notional interest rate via liability-asset projections or choosing proxies such as GDP, wage or contribution base growth

- **Issues:** The better the proxy, the less need for balancing mechanism intervention. Need to explore direct estimation approaches.

- **Approaches:** GDP growth (Italy), covered wage bill growth (Latvia and Poland), per-capita wage growth (Sweden)
How do alternative proxies perform?

Wages revalorized by growth rate of average wage; Pensions indexed by prices.

Source: Robalino-Bodor, 2008
Source: Robalino-Bodor, 2008
Sweden

Source: Robalino-Bodor, 2008
Based on Projection of Pay-as-you-go Asset Source: Robalino-Bodor, 2008
Design of explicit balancing mechanism

- **Purpose:** Assuring solvency of system
- **Approach:** Adjusting notional interest rate proxy and pension indexation rule in line with estimated asset-liability deviation.
- **Issues:** Little explored topic at conceptual and empirical level. Requires better understanding of direct interest rate estimates compared to proxies (i.e. asset and liability projections) and decision on triggers and phasing.
- **Approaches:** Only Sweden has explicit and direct approach. Others use discretionary adjustments of indexation.
Role and size of reserve funding

- **Purpose:** Assuring liquidity of system
- **Approach:** Creating reserves that are able to deal with short/medium-term macro-shocks and/or long-term temporary demographic bulges
- **Issues:** Size depending on objectives and risk preferences (6-24 months or 60 months expenditure), and build-up (easier in immature systems)
- **Approaches:** Sweden inherited fund. Others have no explicit fund yet (some have wealth fund)
Addressing the legacy costs of reform

- **Purpose:** Starting new scheme with clean balance sheet; establishing credibility; avoiding distortions during transition to new equilibrium

- **Approach:** Defining and estimating the costs and finding extra-system financing (budget, privatization assets, coverage expansion)

- **Issues:** Size of the costs, and capability to find less distortionary ways of taxation (as wage tax)

- **Approaches:** Reduced NIR (Latvia, Poland), or ignored (i.e. budget financed)
China: Phasing of Net Legacy Costs Under Different Degrees of Coverage Expansion (CE) and New Contribution Rates (15% - left - and 20% - right panel)

Holzmann and Jousten, 2010
Estimation of remaining cohort life expectancy and mechanism of risk sharing

**Purpose:** Assuring solvency and avoiding unplanned burden shifting (via adjustment mechanism)

**Approach:** Searching for best method to project cohort life expectancy given current information

**Issue:** No best practice yet emerged (given systemic underestimation in LE) and no consensus on how best to share risk for unexpected increase in life expectancy
V. Concluding Remarks

- NDC is a very promising approach to achieve sustainable, fair, and non-distortionary PAYG scheme (as part of multi-pillar approach)
- NDC is not fool proof. But done by the book offers less possibilities for political gaming
- Not all conceptual and operational issues have yet been solved. But they need to be addressed in any other system and reform
Selected References

- David Lindeman, David Robalino, and Michal Rutkowski. 2006. NDC Pension Schemes in Middle- and Low-Income Countries, in op.cit.
- www.worldbank.org/sp or pensions