Financial sustainability

Assessing the finances of pension systems over the long term

Pension systems involve long-term financial commitments. The promise to pay a benefit during retirement to today’s workers covers a period that can span many decades. The capacity to meet these promises is one of the most important issues in the design of retirement-income systems.

Issues of financial sustainability are mainly relevant to earnings-related schemes. These are of three different types. First, defined-benefit schemes have a formula directly relating retirement incomes to individual earnings. Secondly, in points schemes, individuals earn pension points for each contribution which are then converted into a pension on retirement. Thirdly, in notional defined-contribution schemes, benefits depend on the amount of contributions made and notional interest credited to individual accounts.

With pure defined-contribution schemes – where benefits depend solely on the value of contributions and on the investment returns earned – financial sustainability is not an issue. At any point in time, the value of future pension liabilities is exactly the same as the value of the assets in the funds.

This is not the case with the other types of scheme: defined-benefit, points and notional defined-contribution. It is important to note that financial sustainability matters irrespective of whether these types of scheme are financed on a funded basis – where current contributions pay for current benefits. Measures of financial sustainability are therefore applicable to a wide range of types of pension scheme.

Calculation

Carrying out long-term financial projections for pension systems is not an easy task. It requires a wide range of administrative data from national authorities. Detailed current data on expenditures provide a baseline for the projections. Information on coverage patterns, the income level of members and a variety of other characteristics is also required.

Looking forward, the calculations rely on assumptions about the future path of the population, economy and individual behavior. These include changes in the numbers of people of working age and pension age, coverage of the pension system, retirement decisions etc.

Despite these challenging assumptions and the uncertainties involved, it is strongly recommended that projections are made for the next 50-75 years. Pension-policy decisions today affect future liabilities over this long horizon. There are often long periods before an imbalance in the design of a pension system will show up. A pension system is only mature when it has been in existence since every retiree started their careers. Spotting problems of financial sustainability early is vital to enable corrective actions that avoid more painful adjustments later on. At the limit, the pension
system might be forced to default on its past promises to a population that is no longer in a position to adjust its savings and labor-market behavior to compensate.

Projections of pension-system finances need an analytical or modeling tool. The sample results here are derived from projections using the World Bank’s Prost model (Pension Reform Options Simulation toolkit).

**Stocks and flows**
This briefing note examines a range of different measures of long-term financial sustainability of pension schemes.

The first indicators presented show financial flows into and out of the pension system. These flows of revenues and expenditures are calculated annually for the next 50-75 years.

The second group of indicators are stock values. These show the present value of these future flows.

All of the measures presented below have been normalized to the value of gross domestic product (GDP). This makes it easier to compare countries and to compare results in a single country over time. Presenting nominal values is difficult to interpret, because the numbers rapidly increase over time due to price inflation and increases in living standards. It is also intuitive to measure pension values relative to the size of the economy as a whole.

**Expenditures**
The expenditures of the pension system are principally the outlays on benefits. For ease of comparability between countries, spending on old-age, survivors’ and disability benefits are included.

There are, however, additional expenses, particularly administrative costs. But, for reasons of comparability, these outlays must have not been included here. (See the briefing note on ‘Administrative efficiency: Assessing the cost of running public pension systems’, no. 8 in this series, which discusses in detail the technical problems with producing comparable figures on administrative expenses.)

Figure 1 shows information on benefit expenditures for three example countries. Brazil currently spends around 8% of GDP on pensions. This is a much higher figure that either Fiji (just over 2% of GDP) or Syria (less than 1%).

In all three cases, pension expenditure is forecast to increase more rapidly than GDP over the 50-year time horizon. Starting from the lowest base, Syria shows the strongest growth in spending over the period: 4.7 percentage points faster than the growth in GDP. In Brazil, the increase in pension spending is 1.9% per year faster than GDP growth and in Fiji the differential is just 0.8 percentage points.

**Revenues**
The revenue side of the pension system is made up mainly of contributions from employees and employers in most countries.
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The general government budget also often acts as a source of income for the pension system. Here it is important to distinguish between ‘unconditional’ transfers and those that are ‘conditional’ in the sense that they depend on the system’s financial position. However, in some cases, differentiating the two types of transfer can be tricky.

A third source of revenue for the pension system is investment income on pension reserves. In some cases, there are large public pension reserves (see the discussion in ‘Security: Risk and uncertainty in retirement-income systems’, briefing note no. 9 in this series). However, most countries have at least a modest liquidity reserve to meet short-term benefit payments.

Contribution-revenue forecasts

Contribution revenues in Brazil are expected to decline slightly over the period relative to GDP. A modest increase is expected in Fiji and more rapid growth – 1.7 percentage points per year faster than GDP – in Syria.

In part, these results are driven by assumptions about coverage by the pension system. Coverage is assumed to be stable, at a little over 25% of the working-age population in Brazil. In the other two examples, coverage is assumed to expand at fairly similar rates: from 16 to 18% in Syria and from 33 to 38% in Fiji.

Current balance

The current balance of the pension system is simply the difference between benefit expenditures and contribution revenues. This shows the degree to which the pension system needs external sources of financing, be they conditional or unconditional transfers from the general budget or from investment returns on public pension reserves. When the current balance is positive, the scheme has a surplus that might be invested in pension reserves or transferred to the general government budget.

Current balance/GDP

Figure 2 shows projected revenues from contributions: it does not include transfers from the general government budget or investment income for reasons of comparability and technical difficulties in measurement. Again, the data are presented over a 50-year time horizon.
The results for the current balance are shown in Figure 3. At the start of the period shown, Fiji and Syria’s pension systems are in surplus, by 1% and 0.3% of GDP respectively. However, all three countries are projected to show a rapid deterioration in their finances. For example, Fiji is expected to move into deficit from 2015 and Syria from 2025.

The figures show that contribution revenues will only cover half of benefit expenditures in Brazil from 2042 onwards and in Syria, from 2044 onwards. At the end of the period, the deficits are worth 6.3% of GDP in Brazil, 4.3% in Syria and 2.2% in Fiji.

Figure 4 shows an alternative presentation of the current balance: as a percentage of the wage bill rather than as a percentage of GDP. Both alternatives provide useful information for policymakers because they show two different ways of financing future cash-flow deficits: either by transfers from the central budget or by increases in contributions.

As a result of different rates of coverage of the working-age population by the formal pension system, the wage bill varies substantially as proportion of GDP in the three countries. In 2010, for example, aggregate earnings covered by the pension schemes amount to 9% of GDP in Syria, 20% in Brazil and 32% in Fiji.

According to Figure 4, Fiji could pay for its public pensions right across the forecast horizon with an increase in contribution rates of five percentage points. However, the increases in contributions required to achieve cash-flow balance are over 35 percentage points in Syria and over 40 points in Brazil. Such increases are unlikely to be feasible. With the additional information that pension contributions are already 31% of earnings in Brazil, this would bring the total pension-contribution rate to over 70% of earnings, with other social security contributions and personal income taxes on top of that.

The measures of the current balance in Figures 3 and 4 are useful because they define both the scope and the timing of changes in cash flows that require a policy response. For example, the time series shows the point of ‘cash-flow reversal’: that is, when benefit expenditures exceed contribution revenues and so the scheme moves into current deficit. If the scheme is building up a reserve, this is the turning point from accumulating additional reserves to drawing them down. If it does not, then this is the point at which the general budget no longer receives surpluses from the pension scheme but must now finance its deficits.

Brazil already runs a deficit, and one is expected to emerge in Fiji in the near future (2014). Deficits appear rather later in Syria: around 2025. This timing reflects the maturity of the pension system as well as demographic pressures and policy variables.

These differences are suggestive of certain policy responses. In Syria, small surpluses over the next 15 years mean that additional reserves will build up. A focus on protecting and optimizing the returns on these reserves is therefore appropriate. Cuts in benefits levels can be made just for younger workers who will retire as the system, on current rules, moves into deficit. Brazil’s problems
are much more urgent and older workers should probably be also included in benefit reductions to balance the scheme’s finances.

**Financing gap**
The time-series presentation of expenditures, revenues and the current balance is an essential input to policymaking in a single country. But it is less easy to compare between more than a handful of different countries at once. More useful is a single financial-sustainability ‘score’.

The ‘financing gap’ provides such a measure. This is calculated by aggregating the (negative of the) current balance of the pension scheme over a particular period. This is the ‘stock’ value of the ‘flow’ of future deficits or surpluses. As with the expenditure, revenue and current balances above, the financing gap is normalized to current GDP for ease of interpretation.

The financing gap is also a useful measure in evaluating schemes – such as Fiji’s and Syria’s analyzed here – that are currently in surplus but will move into deficit in the future. To what extent do these early surpluses neutralize or mitigate future deficits?

The current balances over time are discounted to the present and summed to give the financing gap. The value of the financing gap depends critically on the time horizon chosen and the discount rate used.

There are many options for choosing a discount rate to apply to projections of current balances well into the future. One is to use a market interest rate, which could either be the risk-free interest rate or the returns that a pension fund or pension reserves would be able to return on their investments. But this requires projection of such market rates over a long time period, which brings with it a large degree of uncertainty.

For practical reasons, the approach adopted here is to discount projected current balances by the series used to normalize the current balances and the financing gap, namely GDP. With the rate of growth of GDP as the discount rate, the implication is that the future is given equal weight as the present, relative to GDP. The financial and fiscal problems of future generations of workers have the same importance as those faced by the current cohort, allowing for the fact that future generations will be richer as a result of economic growth.

This equal weighting relative to GDP means that the choice of time horizon is important. (A higher discount rate than GDP growth would mean that further into the future, the balances would have a smaller weight making the choice of time period less significant.) As discussed previously, pensions policies made today have an influence on the finances of the system over many years. When new pension schemes are introduced, it takes decades for them to reach maturity. It is therefore strongly preferable to calculate the financing gap over a long time horizon.

### Sustainability indicators

<table>
<thead>
<tr>
<th>% of GDP</th>
<th>Brazil</th>
<th>Fiji</th>
<th>Syria</th>
</tr>
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<tbody>
<tr>
<td>Present value pension spending (2007-2056)</td>
<td>489.7</td>
<td>233.3</td>
<td>152.2</td>
</tr>
<tr>
<td>Present value contributions (2007-2056)</td>
<td>271.9</td>
<td>189.0</td>
<td>97.7</td>
</tr>
<tr>
<td>Financing gap (2007-2056)</td>
<td>217.7</td>
<td>44.3</td>
<td>54.5</td>
</tr>
<tr>
<td>Implicit pension debt (2007)</td>
<td>148.6</td>
<td>73.9</td>
<td>72.5</td>
</tr>
<tr>
<td>Pension-reserve assets (2007)</td>
<td>0.0</td>
<td>63.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Solvency gap (2007)</td>
<td>148.6</td>
<td>10.1</td>
<td>71.5</td>
</tr>
<tr>
<td>Implicit pension debt (2055)</td>
<td>241.0</td>
<td>124.9</td>
<td>240.4</td>
</tr>
<tr>
<td>Pension-reserve assets (2055)</td>
<td>0.0</td>
<td>50.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Solvency gap (2055)</td>
<td>241.0</td>
<td>74.4</td>
<td>240.4</td>
</tr>
</tbody>
</table>

*Note: calculated for all countries for the period 2007-60*

*Source: Prost models*
The calculations for the financing gap over the period 2007-56 are shown for the three example countries in the first three rows of Table 5. The presentation begins with the present value of pension spending and contributions: the financing gap is the difference between the two.

As would be expected from the current-balance analysis above, Brazil’s pension system faces much the greatest financial and fiscal challenge on this measure. The deficit over this 50-year period is worth more than two years’ of GDP. Syria’s financing gap over this period is rather larger than Fiji’s: the run of surpluses over the next 15 years or so is more than offset by the large deficits that emerge after 2040.

It is also interesting to compare the scale of the financing gap with the present value of pension expenditures. Dividing the former by the latter reveals that 45% of Brazil’s pension spending up to 2056 is not financed by contribution revenues, compared with 36% in Syria and only 18% in Fiji.

**Implicit pension debt**

The implicit pension debt (IPD) shows the present value of the stream of pension payments to current workers, beneficiaries and their survivors that have been accumulated up to the current date. It is often called the ‘termination liability’ or the ‘accumulated benefit obligation’ because its calculation effectively assumes that the current scheme is closed to any further accruals and that only existing rights are paid out. Both IPD and the present value of pension spending are ‘stock’ or ‘balance-sheet’ concepts: the different is that the present value of spending assumes that the system continues in operation in the future.

The concept is called ‘implicit’ debt to draw attention to the fact that like government bonds (or ‘explicit’ debt) it involves government promises to pay money to people in the future that have already been made.

The value of the IPD depends on assumptions about mortality rates, future wage growth, disability and retirement patterns. It also requires a discount rate to be chosen. However, unlike the previous measures discussed above, it does not depend on the choice of a time horizon, since this is defined by the mortality rates. It is effectively backward-looking, since at any point it shows past liabilities of the system.

Figure 6 shows how the IPD is projected to develop over time in the three example countries. In 2007, IPD in Brazil is shown to 150% of GDP, around double the figure in Fiji and Syria. The value of termination liabilities is expected to increase in all three cases faster than growth of GDP. The most rapid growth is seen in Syria’s pension scheme. This was only established in the 1970s and so is currently immature relative to the other two countries. Indeed, Syria starts with half the IPD of Brazil in the mid 2000s and ends with around the same IPD as Brazil in the mid 2050s: around 230% of GDP.

**Solvency gap**

IPD measures only the liability side of the balance sheet of the pension system. However, many pension schemes hold reserves designed to meet at least some of these future benefit liabilities. The
The solvency gap simply deducts these assets from the IPD.

The calculation of this measure is shown in Figure 7. Summary numbers at two points in time – currently (2007) and the end of the forecast horizon (2055) – are also shown in Table 5.

The three example countries provide interesting contrasts. First, there is no pension-reserve fund in Brazil, and so the IPD is equal to the solvency gap.

The solvency gap gives a very different view of financial sustainability for these three example countries than IPD. In particular, Fiji’s large and growing reserve fund provides a substantial cushion against future expenditures.

The solvency gap and the financing gap presented above are both ‘stock’ or ‘balance-sheet’ concepts. The key difference is that the financing gap calculation assumes that the system continues in operation, and so includes projections for the future flow of contribution revenues. The solvency gap, in contrast, assumes that the system closes down without further accrual of benefits or collection of contribution revenues.

**Further reading**


Secondly, Fiji has a large pension reserve, worth 62% of GDP in 2007. The assets are projected to increase until 2028, reaching a peak of 78% of GDP. After a period of stability, the reserves will be drawn down from 2034 onwards, falling to 49% of GDP at the end of the forecast period.

Thirdly, Syria’s has a reserve, but much smaller than Fiji’s. It is expected to grow from 1% of GDP in 2007 to a peak of 8% in 2024. However, pension spending is projected to exhaust the reserve by 2038.