Economic efficiency

Minimizing the pension system's distortions of individual choices

Retirement-income systems have profound effects on individuals’ economic behavior. The most important of these impacts are on incentives to work and incentives to save voluntarily for old age.

This briefing note explores indicators related to the first of these: the incentive to work. The first part looks at the retirement decision. There is now a mountain of evidence showing that retirement behavior responds strongly to the incentives embedded in pension system (a small part of which is briefly summarized below). Equally, these incentives matter for equity reasons: people who work more and contribute more should have higher pensions. Yet many countries’ pension systems continue to subsidize people who retire early.

This effect comes through the parameters and rules of the benefits side of the pension system. The second part of this note, in contrast, looks at the contributions side. Pension contributions – along with other levies, such as income tax and social contributions for other programs – act as a tax on labor. They can discourage people from working or encourage them to work in the informal sector. This briefing examines a measure of the ‘fiscal cost’ of employing a worker, including pension contributions as well as income tax and other levies.

The note is the seventh in a series describing the World Bank’s Pension Reform Indicators and Database. The full set is discussed in the first, overview note.

Measuring retirement incentives

Most studies of incentives to work use a simple indicator – the replacement rate – which measures the relationship between incomes in and out of work. This has been widely used to look at the effects of unemployment benefits and social assistance on people’s labor-market behavior.

Figure 1 shows this measure using the example of Canada. Across the horizontal axis, the chart shows the age at which the individual exits the labor market, covering a broad range from age 55 to 70. On the vertical axis is the pension ‘replacement rate’: the pension relative to earnings. These results are for an average earner. The example individual is assumed to have worked and contributed in each year from age 20 until the age of labor-market exit indicated on the chart.

The light gray line shows the replacement rate from the pension system that is immediately available when the individual leaves the labor market. It is not possible to claim any pension until age 60, so the immediate replacement rate is zero before that point. At age 60, it is possible to claim the public, earnings-related pension. The
replacement rate at this age is low: around 20%. This is because the benefit level is automatically reduced to compensate for the longer period over which the pension is paid. Between age 60 and 65, the replacement rate increases because the benefit decrement is smaller. At age 65, there is a big jump in the replacement rate because the individual then becomes eligible for the basic and means-tested retirement benefits.

![Replacement rates: Canada](image)

Source: Apex models

More complete measures of retirement incentives are therefore based around the concept of ‘pension wealth’: the present value of the lifetime flow of pension benefits. (The concepts of replacement rates and pension wealth are discussed in more detail in the third briefing note in this series, ‘Adequacy (1): Pension entitlements, replacement rates and pension wealth’.)

It is the change in pension entitlement from working an additional year that is central. Table 2 shows the main factors that might affect the pension incentive to leave the labor market, looking at the effect of working an extra year on pension entitlements. In each case, it is assumed that workers delay claiming the pension. If they are able to combine work and pension receipt, then there is no pension effect on incentives to retire. The effects on pension incentives to retire are grouped into three kinds of change. They are shown for the four most common types of pension plan designed to provide income replacement rate in retirement, the first and second pillars of the World Bank’s pension taxonomy (on which see the briefing note in this series on ‘Pension indicators: Reliable statistics to improve pension policymaking’).

The first pair of effects in Table 2 arises from the longer working period. This changes pension rights in many different ways. In all kinds of pension schemes, the extra year’s contribution usually brings some extra pension entitlement. In most defined-benefit (DB) and points schemes (and occasionally with notional accounts), the right to retire depends on the number of years of contributions. So the extra year’s contributions may help the individual meet these qualifying conditions. These first two factors — shown in the first two rows of Table 2 — relate to the additional pension entitlement earned during the year.

In contrast, the next two factors, although again affected by a longer working period, result from changes to the value of pension entitlements already accrued. In DB plans, earlier years’ earnings are typically ‘valorised’ to allow for changes in costs and standards of living from the time that entitlements were earned to the time that

It should be clear that a simple analysis of replacement rates at different ages fails to capture the full impact of the pension system on incentives to retire or to remain in work. The comparison between incomes in and out of work presented above is a static one. But work decisions made at one point affect future pension entitlements: the analysis needs to be dynamic. The period over which pensions are paid also clearly changes as people withdraw from the labor market at different ages.
pensions are claimed. The parallel effect in a defined-contribution (DC) scheme is that the balance in the individual account that had built up at the beginning of the year earns investment returns during the year. In notional accounts, the same thing happens but using the notional interest rate. In point schemes, the corollary is the uprating of the value of the pension point, which increases previously accrued entitlements. These factors are shown in the third row of Table 2.

Finally, some DB and points schemes calculate the entitlement on a subset of years of earnings (‘best’ or ‘final’ pay, for example). In these cases, individual earnings might (even after valorisation or uprating of the point cost) be higher than in an earlier year. Similarly, some countries have a maximum number of years of accrual. So an extra year of work might not bring any extra entitlement, but an earlier year with lower earnings might drop out of the pension formula. These effects are shown in the fourth row of Table 2.

The second type of change to pensions from working a year longer stems from the shorter duration of retirement. In every kind of pension scheme, the individual must, of course, forgo a year’s benefits if he or she retires a year later. However, there are often adjustments to the value of benefits to reflect this. In DB and points schemes, this comes through ‘actuarial’ adjustments for early or late retirement. In DC schemes and notional accounts, the route is through the annuity calculation whereby the accumulated balance is converted into a retirement-income stream. This calculation reflects the expected duration of retirement.

<table>
<thead>
<tr>
<th>Pension incentive to retire in different kinds of pension plan</th>
<th>Defined benefit</th>
<th>Defined contribution</th>
<th>Points</th>
<th>Notional accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longer working period</strong></td>
<td>Extra year’s entitlement</td>
<td>Extra year’s contributions</td>
<td>Extra year’s entitlement</td>
<td>Extra year’s entitlement</td>
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<td></td>
<td>Extra year towards qualifying conditions</td>
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<td>Extra year towards qualifying conditions</td>
<td>Extra year towards qualifying conditions</td>
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<tr>
<td></td>
<td>Valorisation of earlier years’ earnings</td>
<td>Investment returns on accumulated balance</td>
<td>Uprating of pension-point value</td>
<td>Notional interest on accumulated notional capital</td>
</tr>
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<td></td>
<td>Higher earnings replace earlier, perhaps lower, earnings in benefit formula</td>
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<td>Higher earnings replace earlier, perhaps lower, earnings in benefit formula</td>
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<tr>
<td><strong>Shorter retirement duration</strong></td>
<td>Forgo a year’s benefits</td>
<td>Forgo a year’s benefits</td>
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<td>Forgo a year’s benefits</td>
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<td></td>
<td>&quot;Actuarial&quot; adjustment</td>
<td>Lower annuity factor</td>
<td>&quot;Actuarial&quot; adjustment</td>
<td>Lower annuity factor</td>
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<td><strong>Delay in claiming</strong></td>
<td>Probability of dying</td>
<td>Probability of dying</td>
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<td></td>
<td>Discounting</td>
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The final element of the pension incentive to retire reflects further costs to the worker of delaying the pension claim. The worker might die during the year, and so receive nothing from the pension system. This is not taken into account in DC and most notional-accounts schemes, because annuity calculations are made at retirement and so implicitly assume the worker is still alive to claim the pension. The second is discounting. Money in the future is worth less than money now because of the opportunity cost of forgoing consumption. Taking into account all these multiple factors affecting pension entitlements, as outlined in Table 2, the change in pension wealth is then normalised to individual gross earnings. This is used to illustrate pension incentives to retire. The change in pension wealth from working an additional year can be interpreted as an implicit tax or subsidy on continuing in work.

This measure compares directly two flows of income: one from retiring immediately, the other from working an additional year and then claiming the pension. The difference between the two income flows is earnings during the year plus the implicit tax or subsidy in the pension system, since this is measured relative to individual earnings.

**Incentives matter**

Dozens of national studies of pension systems show that older workers’ labor market choices are strongly affected by the incentives built into pension systems. These findings are confirmed by two major cross-country studies, summarized in Figure 3.

The first – by a group of national experts coordinated by Gruber and Wise – looked at 11 OECD countries. The second was carried out by two economists at the OECD, covering 20 of the organisation’s member countries. Each chart shows that the rate of labor-market exit for workers aged 60-64 (the key window for early retirement in most OECD countries) is strongly and significantly related to retirement incentives measured by the implicit tax on remaining in work.

**Example results**

Before turning to cross-country analysis, it is useful to consider a single country example. Again, Canada is used to illustrate the complexities. Figure 4 shows the results for the different components of the pension system. Across the horizontal axis is the age of exit from the labor market, from age 55 to 65. The vertical axis shows the change in pension wealth from working an additional year. (This is simply the negative of the ‘implicit tax’ concept used in other studies.)

From 55 to 60, extra years of working adds to the earnings-related benefit an amount equivalent to around 7-7.5% of annual earnings. This does not affect the level of the basic pension, a flat-rate benefit. However, part of the additional earnings-related pension results in a lower benefit from the means-tested or targeted scheme. The increase in total pension wealth is therefore in the 4-4.5% range.

At age 60, an individual becomes eligible to receive the earnings-related pension, subject to an ‘actuarial’ reduction of 6% for each year the
pension is claimed earlier than the normal age of 65. The reduction of 6% is large enough to ensure that the change in pension wealth under the earnings-related scheme is positive up to age 63. However, given the higher mortality rates as people age, the change in pension wealth under this plan is negative at ages 64 and 65.

### Pension incentives: Canada

![Change in pension wealth from working an extra year](image)

*Source: Apex models*

The reduction in pension wealth becomes greater under the targeted scheme after age 60. Although the benefit is not available until age 65, part of the reduction in benefit under the earnings-related scheme is offset by a larger entitlement after age 65 to the targeted benefits.

Adding the components up, the total change in pension wealth is negative from age 60. The degree of this disincentive to remain in work due to the pension system becomes larger from age 60 to 65.

### Cross-country analysis

The World Bank pension database will include data on changes in pension wealth for working an additional year for each single year of age from 55 to 70. Currently, the Apex models that are used to calculate the change in pension wealth are available for the 30 OECD member countries and the 8 EU member states that are not part of the OECD.

Figure 5 illustrates the results for the OECD countries. It takes the change in pension wealth for each year and averages this over the age range 60-65, which is the most common window for early retirement in OECD countries. In 19 countries, the pension system provides an incentive to remain in work between ages 60 and 65. However, there is an incentive to retire early in the other 11. It is especially large in Greece, Luxembourg and Turkey, where working an additional year after age 60 reduces lifetime pension benefits by 60% or more of annual earnings, a huge implicit tax.

### Extensions

The Apex models produce further calculations of incentives to retire that may be added to the World Bank pension database in the future.

![Change in pension wealth from working age 60-64](image)

*Source: Apex models*

The first extension is to look at the level of as well as the change in pension wealth. The level of pension wealth is akin to an ‘income effect’ in the analysis of labor supply. If people have a high level of pension wealth already, they may not wish to add to this by working an additional year even if this results in a high addition to pension wealth.
Table 6 gives a simple presentation of these results for the OECD countries. Going from left to right, countries are grouped by the change in pension wealth resulting from working from age 60 to 64: further right means better incentives. Going from top to bottom shows higher levels of pension wealth: the lower down, the greater the disincentive to remain in work.

A second extension comes from looking at the impact of the tax system. The results so far have presented pension wealth in gross terms. Taking account of taxes paid on pension benefits gives the ‘net pension incentive to retire’. Where pensions are taxed, this obviously results in a smaller change in pension wealth and a larger level of pension wealth than when taxes are taken into account.

Adding in taxes and contributions on earnings when working gives the ‘financial incentive to retire’. Results for these two additional measures are not presented here and are not currently included in the World Bank pension database.

The Apex models of individual pension entitlements include modules that calculate taxes and contributions paid by workers and pensioners. These are essential for calculating net replacement rates, for example. These models calculate the ‘effective tax rate’: that is, the amount paid in taxes and contributions as a percentage of gross earnings.

However, there are usually also social contributions that are paid by employers. A measure of the total direct tax burden on wages that includes these is commonly called the tax wedge. This is total employer plus employee taxes and contributions divided by gross earnings plus the employer contribution. The name derives from the fact that these contributions act as a wedge between the cost to the employer of the worker and his or her take-home pay.

Data on the tax wedge for OECD countries are published regularly in two OECD reports: Taxing Wages and Benefits and Wages. The most recent information, for average earners, is shown in Figure 7. (It is intended to include information for non-OECD countries in the World Bank pension database using the Apex models where available.)
The tax wedge varies enormously, even among OECD countries. It is around 20% in Korea and New Zealand and lower still in Mexico. At the other end of the spectrum, it exceeds 50% of the gross labor cost in Belgium, Germany and Hungary and is close to 50% in Austria and France.

There are also interesting differences in the structure of the tax wedge. New Zealand, for example, has neither employee nor employer social contributions. These are a relatively small part of the tax wedge in Australia, Denmark and Iceland. In contrast, employer social contributions account for more than half of the tax wedge in nine countries, most notably in France, Spain and Sweden.

As with the pension incentive to retire, there is a large volume of evidence showing that the tax wedge affects labor-market behavior and outcomes. Employer contributions, for example, have been shown to be passed on, in part at least, to workers in the form of lower wages. These levies can also reduce employment and encourage labor-market informality.

Sources and further reading


OECD (2009), Benefits and Wages, Paris.