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Addressing the Macroeconomic Consequences of Aging in Cyprus: The Case for Pension Reform†

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Abstract

This paper examines the challenges to the Cypriot pension system posed by aging, and builds the case for pension reform based on a small open economy overlapping generations model in the tradition of Auerbach-Kotlikoff. In the absence of reforms, the model suggests that tax increases needed to finance age-related expenditures will have devastating effects on the economy. Although the reforms envisaged in the Convergence Program would lessen the adverse macroeconomic effects, welfare declines primarily because it relies on payroll tax increases. This paper proposes to increase the retirement age in tandem with life expectancy; switch the indexation of all pension benefits to prices; realign the relative generosity of public-versus-private pension benefits; and use less distortionary consumption taxes to finance age-related expenditures. These reforms further mitigate the macroeconomic consequences of aging and safeguard households' welfare.

Keywords: Pension reform, demographic shock, dynamic general equilibrium model, Cyprus.

1. Introduction

Demographic trends challenge the long-run sustainability of the Cypriot pension system. Pension expenditures in Cyprus are poised to leap to among the highest in the EU from the current low position. Recent estimates by the European Commission's (EC's) Aging Working Group (AWG) for the pay-as-you-go (PAYG) system suggest that, without reforms, pension expenditures in Cyprus—including the general and the civil servant regimes—will rise by 12.9 percentage points of GDP by 2050,

† This paper is based on Hoffmaister and others (2007). The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management.

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compared with an average increase of less than 3 percentage points in the EU. Although the recent increase in the retirement age of civil servants will reduce the projected increase, old-age expenditure is still set to increase by 8 percent of GDP according to official estimates. In addition, health expenditures are also expected to rise by 1.1 percentage points of GDP by 2050; however, this increase is less than in the rest of the EU, where health expenditures are set to increase by 1.6 percentage points.

Against this background, the government announced in 2005 that it was increasing the retirement age of civil servants from 60 to 63 by 2008. This reform will place civil servants' retirement age in line with the average retirement age in Cyprus, and the authorities are considering extending such increases to educational services and semi government organizations. In addition, the current Convergence Program considers two waves of parametric reforms for the Cypriot pension system. Although the time line for these waves has not been spelled out, these reforms would include tightening the criteria for pension eligibility and early retirement—thereby increasing the effective retirement age to 65 years—and increasing social security contributions.

Are further reforms needed to safeguard the pension system? This paper builds the case for additional pension reform based on the potential macroeconomic impact of aging as revealed by an overlapping-generations general equilibrium model. Although others have measured the fiscal implications of aging in Europe and in Cyprus (notably the EC's AWG and the authorities' Actuarial Notes), these exercises largely involved extrapolating past macroeconomic trends in light of demographic trends. Although these results illustrate the adjustments in contributions (or benefits) needed to ensure the sustainability of the pension system, they only provide a partial view of the implications of reforms because an individual's behavior is taken as independent of the implicit changes in the incentives associated with the reforms.

The model used in the discussion below accounts for an individual's lifetime labor-leisure and consumption-savings decisions and follows in the tradition of Auerbach-Kotlikoff. In each period, and throughout a person's work life, an individual maximizes his or her utility by deciding how much time to devote to work and how much to save. An individual's productivity, moreover, changes with his or her work experience. In addition, the model captures the key institutional features of the Cypriot pension system, including the different regimes for private and public employees. The model assumes that Cyprus is a small, open economy and

thus faces an exogenously determined world interest rate, which is taken to be constant.[1] Also, the model includes (labor-augmenting) technological progress, population growth (capturing the transitional effects of the demographic shock), and micro- and macroeconomic feedback effects. This framework is thus better suited to explore the macroeconomic effects of pension reform in Cyprus than previous studies.

The model also captures the effect of aging on health care spending. Specifically, health care expenditures mirror the j-shaped profile of health care spending over a household's life: expenditures are typically a bit higher for young children than for young adults and rises sharply later in life. For Cyprus, the simulations use the health care profile observed for large European countries, scaled to match health care expenditure based on Cyprus's demographic profile.[2] This approach however is incomplete, as it does not account for the impact of medical advances and demand for new capital-intensive treatments (Heller, 2003), beyond those captured by technological advances in the economy.[3]

Following a brief description of the demographic shock, the Cypriot pension system and the model, this paper discusses the macroeconomic consequences of three policy scenarios. First, a baseline scenario provides a no-reform benchmark to contrast the macroeconomic effects of the pension reform. Second, a Convergence Program (CP) scenario captures the key features of the parametric reforms envisaged in the CP. Specifically, it considers increasing the effective retirement age from 63 years to 65 years by 2018 and raising social security contributions (payroll taxes) by 5 percentage points in 2008. Third, an additional reform scenario proposes further increases in the retirement age (gradually) to ensure that the pension system keeps up with demographic trends and finance age-related expenditure by increasing consumption taxes instead of payroll taxes, which remain constant in this scenario. It also includes switching the

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[1] For a discussion of an alternative assumption of declining world interest rates—reflecting worldwide aging patterns on capital flows as foreseen by Börsch-Supan, Ludwig, and Winter (2005)—and its impact on Cyprus, see Hoffmaister and others (2007).

[2] Specifically, the profile used is that of Spain, which is roughly an average of the profiles of France, Germany, and Italy. Over time, health care costs for individuals increase with productivity gains, and health care expenditure reflects changes in the age structure of the population.

[3] It also reflects neither the potential beneficial impact on an individual's productivity stemming from advances in health, nor the introduction of the National Health Insurance Scheme in 2008, which will phase in competition in the provision of health care.

indexation of all benefits to prices from wages and reducing the generosity of public pensions to better align these with private pension benefits.

The policy conclusions are clear: deep pension reforms are required to address the macroeconomic effects of aging. In the absence of reforms, the tax increases needed to finance increasing age-related expenditures will have devastating effects on the economy and household's welfare. The reforms envisaged in the Convergence Program serve to mitigate the macroeconomic effects of aging but fall short on two accounts. First, the fiscal savings generated by these reforms are short lived because of rising life expectancy. And second, relying on payroll tax increases to finance additional spending is particularly harmful to the economy and households' welfare because the tax burden falls disproportionately on workers. Additional reforms—such as further increasing the retirement age, switching the indexation of pension benefits to prices, and aligning the generosity of public pension benefits with private pension benefits—are needed to counter the fiscal consequences of the demographic shock. Moreover, macroeconomic outcomes and households' welfare are better served by relying on consumption taxes—whose burden is shared more broadly among households.

2. Demographic shock

Cyprus is expected to age substantially (Figure 1). The share of people over 65 years of age will double by 2050, and the absolute number of people over the age of 80 is set to quadruple between 2004 and 2050, more than tripling their share in the total population, from about 2½ percent to over 8 percent. Mirroring this, the share of the working-age population (age 15–64) is set to decrease from about 68 percent to 61 percent over the same period.[4] These aging trends are in line with, though slightly less severe than, those in the EU.

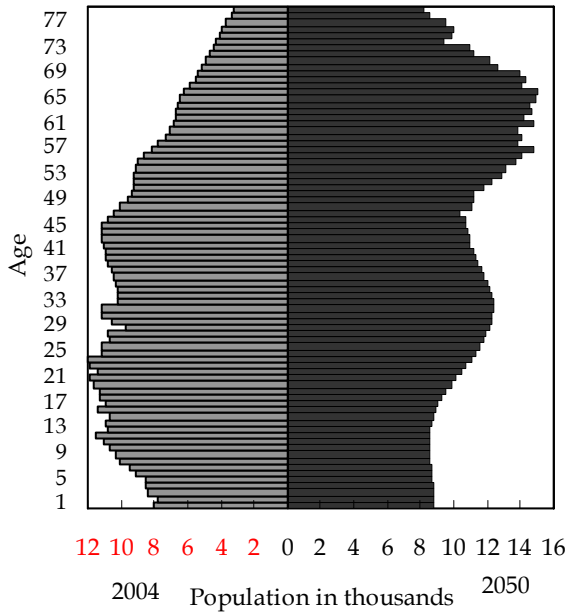
Just as in many other countries, declining fertility rates and increasing life expectancy are underlying these aging trends. In particular, while as late as 1980 the Cypriot fertility rate was 2.5 births per woman, by 2005 it had dropped to 1.5, and is projected to remain at this level in the medium term. Also, life expectancy at birth increased from 70 years for men and 73 years for women in 1970 to, respectively, 77 years and 81 years in 2005.

[4] The population forecasts used in this study correspond to those in Eurostat's baseline projection.

Moreover, further gains in life expectancy of about five years are expected by 2050.

FIGURE 1

Age Pyramid for Cyprus, 2004 and 2050



Source: European Commission, Aging Working Group.

TABLE 1

Cyprus: Population Projections and Immigration (thousands, unless otherwise stated)

	2005	2010	2020	2030	2040	2050
Total population	739	784	866	921	952	975
Immigrant population [a]	103	134	188	234	281	329
Share of immigrants (percent)	13.9	17.1	21.8	25.3	29.5	33.7

Note: [a] Reflects projected immigration flows starting in 2005 and is estimated as the difference between the baseline population projection and the zero-net-migration scenario.
Sources: Eurostat and authors' calculations.

These population projections assume a substantial amount of immigration. Cumulative net arrivals are projected to exceed a quarter of a million people during the first half of this century (Table 1). With no immigration, the population would decrease by 2050, exacerbating the aging problem

correspondingly. Instead, in the baseline projection, the population of Cyprus grows by 33.5 percent by 2050.

3. The Cypriot pension system [5]

The pension system comprises the General Social Insurance Scheme (GSIS), the Government Employees' Pension Scheme (GEPS) and a few smaller schemes. In 2005, total pension expenditure in Cyprus was about 8.5 percent of GDP. Expenditures in the GSIS will grow from 6.3 percent of GDP in 2005 to 12.6 percent in 2050 (Republic of Cyprus, 2005). Although the PAYG GSIS has an element of prefunding—as it runs a surplus and accumulates reserves—the authorities estimate that social contribution rates (payroll taxes) will have to increase by about 5 percentage points to 22.9 percent by 2050. Expenditures in the GEPS are set to grow from 2.2 percent of GDP in 2005 to 4.1 percent of GDP in 2050 (Republic of Cyprus, 2005).[6] The GEPS is financed by (reduced) contributions of public sector employees and tax revenues. The current pension system was established in September 1980,[7] and its components are briefly discussed in turn.

3.1. The general social insurance scheme (GSIS)

The GSIS is a universal, compulsory pension scheme and by far the largest component of national pension expenditures. It accounts for about three-fourths of total old-age pension expenditure. It is funded by tripartite contributions totaling 16.6 percent of earned income (Table 2). Contributions, however, are capped, as income in excess of C2,077 per month is not subject to compulsory contributions. Past favorable demographic trends have generated large surpluses; reserves have reached the equivalent to 37 percent of GDP, or about eight times the annual pension outlays. Almost the entire reserve is invested in central bank bonds.

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[5] For a discussion of how the Cypriot system compares with OECD countries, see Hoffmaister and others (2007).

[6] As noted above, these estimates suggest that age-related expenditures will increase by about 8 percent of GDP.

[7] The previous system—based on flat-rate contributions and benefits—had been in place since the late 1950s. It established retirement at 65 years of age (lowered to 63 years in 1991) and provided a subsistence-level benefit, which, in essence, was preserved in the form of the basic pension in the current system.

The old-age pension benefit under the GSIS comprises earnings-related basic and supplementary pension benefits. A points-based system governs the calculation of these benefits (for details, see Appendix 1). Over an individual's work life, the number of points accrued is determined by the ratio of wages earned to basic earnings. In each year, the first point year accrues to the basic pension and additional points count for the supplementary pension. An important difference between the basic and supplementary benefits is that the former is computed each year based on the corresponding basic earnings, while the latter is computed once, given the basic earnings at the time of retirement, and subsequently adjusted by inflation. In other words, the basic pension is indexed to wages as basic earnings are, and the supplementary benefit is indexed to prices.

TABLE 2

Contribution Rates to the Social Security Fund (percent of earnings)

General social insurance scheme [a]	16.6
Employee	6.3
Employer	6.3
Government	4.0
Government employee pension scheme [b]	3.2
Employee	3.2

Notes: [a] Income in excess of £C2,077 monthly is not subject to compulsory contribution.
[b] The government does not contribute a fixed share of earnings. Benefit payments exceeding employees' contributions are financed through the budget.
Source: The Ministry of Labor and Social Insurance.

Currently, the basic pension is about 27 percent of the average insurable earnings (up to C24,924 per year). This is about 20 percent of the average income earnings. The supplementary benefit virtually doubles this amount, and thus the after-tax replacement rate is close to 60 percent. Individuals who have worked at least 10 years and contributed to social security for 3 years are eligible for old-age pension benefits at age 65.[8] Still, individuals who have contributed to social security for 28½ years can retire at 63, and many do so: the average retirement age is close to 63. To be eligible for the basic pension, average annual income during an individual's work life must be at least 25 percent of the basic earnings, and

[8] In addition to the number of years in the work force, the eligibility criterion also includes other credits, including, credit for military service and education.

the insurable life must be at least three years.[9] Also, note that there is an upper limit on this annual pensionable income (£C24,924 in 2005). Beyond that level, the social pension contributions stop, and insurable points are not earned.

3.2. The government employees' pension scheme (GEPS)

The GEPS is a compulsory pension scheme for public sector employees and the second-largest social insurance expenditure. In 2005, it accounted for about 25 percent of the total social insurance expenditure, covering about 30,000 people. It is funded by employee contributions—0.75 percent of earning up to the maximum insurable earnings and 1.75 percent above that level—and shortfalls in contributions are financed by the public purse. The GEPS has a retirement age of 60, which is set to increase to 63 by 2008. For certain careers, such as police, the retirement age is 55. Furthermore, civil servants are allowed to retire five years early without an early retirement penalty. The average age of retirement of government workers is 57.

The retirement pension benefit under the GEPS comprises the basic pension, a monthly pension, and a onetime lump-sum payment at retirement. Besides the basic pension, which is computed in the same manner it is for private households, public sector employees receive an additional monthly pension benefit that is calculated as a fraction of the last salary before retirement (for details, see Appendix 1); this monthly benefit is indexed to wages. Moreover, at retirement, government employees receive a lump-sum payment equal to 28 times their final monthly salary if they have served at least 400 months; a prorated amount is paid to those with shorter service.

Employees of the semi government institutions have their own pension schemes. The semi government employees pension schemes, which cover employees of public utilities, local governments and similar entities are funded by the respective employers. In other words, shortfalls in these pension schemes will also be reflected in the government's budget. However, these represent a much smaller portion of old age spending.

[9] Provided that the average salary is at least equal to the basic earning.

3.3. Other components

These components comprise the Special Allowance to Pensioners, the Social Pension Scheme, and Voluntary Provident Funds. These are considerably smaller as a share of total pension expenditure, and are as follows:

The Special Allowance (between C456-620 per year) is granted to anyone whose pension income is below C6,500 (about two to three times the basic pension). This allowance is financed by tax revenues, the allowance accounts for 6 percent of total pension expenditures by the government.

The Social Pension Scheme is designed to provide a minimum standard of living to those who for whatever reason did not take part in the GSIS; it provides a minimum-subsistence standard of living. The amount of pension is set at 81 percent of the basic social insurance pension, which itself is about 25 (20) percent of the median (mean) labor income. The pension is also financed by tax revenues, the pension amounts to 3 percent of total pension expenditures by the government.

Voluntary Provident Funds are employer- or profession-based defined-contribution savings schemes that provide a lump-sum payment upon retirement. These are not widely available: for the majority of participants in the GSIS, the universal pension was their only pension income. Less than 43 percent of pensioners benefit from additional pension income.

4. Model overview and demographic transition

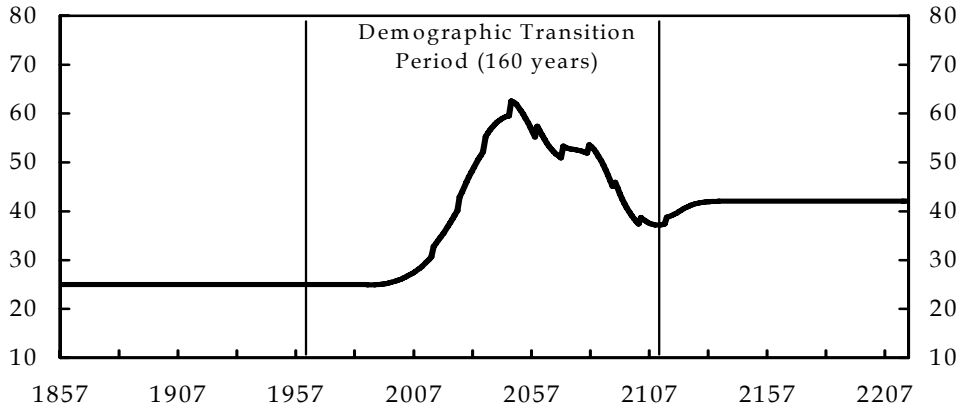
As noted above, the macroeconomic effects of the demographic shock in Cyprus are examined using an overlapping-generations model in the Auerbach-Kotlikoff tradition.[10] In this model, overlapping generations of households, atomistic firms and the government populates the economy. Households consume and accumulate assets during their lifetime, work during their youth and middle age, and retire when old. Firms produce a single good using labor and capital. The government collects income, consumption, and payroll taxes to finance public expenditures and pension benefits and to redeem public initial debt. Although the general equilibrium structure is standard, the model incorporates specific features

[10] See Auerbach and Kotlikoff (1987). For a more recent survey of this literature, see Kotlikoff (2000); numerical methods to solve these models are described in Heer and Maußner (2005) and Judd (1999).

of the Cypriot pension system. Specifically, as discussed above, it includes separate old-age pension regimes for private and public sector employees. The former reflects the points-based system and the indexation mechanisms of the basic and supplementary pension benefits, as discussed above. The model includes labor-augmenting productivity growth in line with historical trends.[11]

FIGURE 2

Dependency Ratio in Model (Percent) [a]



Note: [a] Defined as the ratio of the population over 30 years of age to that between the ages of 23 and 63.
Source: Authors' calculations.

5. Policy scenarios and simulation results

5.1. Policy scenarios

As noted above, three scenarios are used to assess the medium- and long-run consequences of aging on the economy (Table 3):

i. **Baseline.** Individuals enter the workforce at age 23 and, having worked for 40 years, retire at age 63. After retiring, private and public sector employees receive their corresponding pension benefits for the rest of their lives. At the outset, the retirement period is 18 years, corresponding to a life expectancy of 80 years.

[11] For a detailed description of the model and its calibration, see Hoffmaister and others (2007).

The retirement age remains constant, and thus the retirement period increases with life expectancy projections (a year per decade). The pension system remains unchanged and consumption taxes are adjusted—while holding other tax rates constant—to keep public debt unchanged in percent of GDP; non-age-related public expenditure remains constant as a share of GDP.[12]

ii. **The Convergence Program (CP).** This scenario captures the key features of the parametric reforms envisaged in the CP. Specifically, it considers raising the effective retirement age from 63 years to 65 years and adjusting social security contributions (payroll taxes) by 5 percentage points. As in the baseline, consumption tax rates are adjusted to keep the public debt constant. These reforms are announced in 2008, and, effective immediately thereafter, payroll taxes are increased. Starting in 2013 (2018) individuals work one (two) more year(s) before retiring. Indexation of pension benefits remains unchanged.

iii. **Additional reforms.** As improvements in life expectancy are envisaged for the next several decades, this scenario proposes to further raise the retirement age gradually to ensure that the pension system keeps up with demographic trends. Specifically, after the retirement age reaches 65 years in 2018, for the next 60 years it increases one year per decade until it reaches 71 in 2078. Note that these increases keep the share of the retirement period in life expectancy roughly unchanged from its level in 2005. In contrast to the CP scenario, expenditure increases are further limited by switching the indexation of all pension benefits to prices in 2008, while consumption taxes (instead of payroll taxes) are used to finance the rise in age-related expenditures; public debt remains constant as a share of output. In addition, in lieu of a full harmonization of public and private pension systems—as in Italy's 1992 Amato reform (OECD, 2005) or Portugal's 2005 reform (Guichard and Leibfritz, 2006)—a gradual reduction of the lump-sum payment can help align the public pension benefit more closely with that of the private sector. Specifically, this scenario gradually reduces the lump-sum payment awarded to public sector employees at retirement from 28 months to 12 months of pay.

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[12] To comply with the Maastricht debt criterion, public debt can be lowered by prefunding the demographic shock, that is, by increasing tax rates ahead of time, and/or by reducing non-age-related public expenditure.

TABLE 3

Cyprus: Pension Reform Scenarios

	2005	2008	2013	2018	2028	2038	2048	2058
Social security contribution rate (percent)								
Baseline	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
Convergence Program [a]	16.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
Additional reforms	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
Retirement age (years)								
Baseline	63	63	63	63	63	63	63	63
Convergence Program	63	63	64	65	65	65	65	65
Additional reforms [b]	63	63	64	65	66	67	68	69
Retirement period [c]								
Baseline	18	19	19	20	21	22	23	24
Convergence Program	18	19	18	18	19	20	21	22
Additional reforms [b]	18	19	18	18	18	18	18	18
(Retirement period, share in percent of life expectancy)								
Baseline	21	22	22	23	24	25	26	27
Convergence Program	21	22	21	21	22	23	24	25
Additional Reforms	21	22	21	21	20	20	20	20
Benefit indexation								
Basic pension								
Baseline	Wages	Wages	Wages	Wages	Wages	Wages	Wages	Wages
Convergence Program	Wages	Wages	Wages	Wages	Wages	Wages	Wages	Wages
Additional reforms	Wages	CPI	CPI	CPI	CPI	CPI	CPI	CPI
Supplemental pension								
Baseline	CPI	CPI	CPI	CPI	CPI	CPI	CPI	CPI
Convergence Program	CPI	CPI	CPI	CPI	CPI	CPI	CPI	CPI
GEPS								
Baseline	Wages	Wages	Wages	Wages	Wages	Wages	Wages	Wages
Convergence Program	Wages	Wages	Wages	Wages	Wages	Wages	Wages	Wages
Additional reforms	Wages	CPI	CPI	CPI	CPI	CPI	CPI	CPI
Additional reforms	CPI	CPI	CPI	CPI	CPI	CPI	CPI	CPI

Notes: [a] Social security contributions for public sector employees also increase 5 percentage points to 8.2 percent in 2008.

[b] The retirement age continues increasing to 70 (71) years of age in 2068 (2078) so that the retirement period remains unchanged at 18 years.

[c] Computed as the difference between the life expectancy and retirement age plus one.

Sources: Convergence Program of the Republic of Cyprus 2006–10; Eurostat and authors' estimates.

TABLE 3 (contd)

Cyprus: Pension Reform Scenarios

	2005	2008	2013	2018	2028	2038	2048	2058
GEPS lump sum payment (maximum, in months)								
Baseline	28	28	28	28	28	28	28	28
Convergence Program	28	28	28	28	28	28	28	28
Additional Reforms	28	28	24	20	12	12	12	12
Memorandum item:								
Life expectancy in years [d]	80	81	81	82	83	84	85	86

Notes (contd): [d] Corresponds to the total life expectancy of an individual who is 50 years old in the year indicated by the column.

5.2. Simulations[13]

In what follows, the macroeconomic effects of the policy scenarios are discussed in turn. Figure 3 depicts the simulations for all policy scenarios—variables are displayed as deviations from trend[14]—and Table 4 summarizes the main results.

5.2.1. Baseline

The macroeconomic consequences of an unreformed system are severe. The simulations suggest that pension expenditures will increase by about 10 percent of GDP by 2050. The economy will suffer, as this increase in expenditures will require sharp increases in consumption taxes so that public debt remains constant as a percent of GDP.

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[13] The simulations reflect two sets of conditions that solve the household's objective—maximizing lifetime utility—under standard dynamic optimization techniques. The first set refers to household's consumption-leisure decision in a specific year (intratemporal first-order conditions). The second set governs the household's consumption-savings decisions over time (intertemporal first-order conditions, or Euler equations). Each set of equations reflects whether a household is in the labor force or not, and the peculiarities of the pension rule. Thus, when the household retires, there is no labor supply choice, by definition, and only the consumption-savings decision remains. For further details, see Hoffmaister and others (2007).

[14] Specifically, all variables expressed in per capita terms (except hours worked) grow along the trend at the rate of labor augmenting technological progress, 2½ percent per year. For further details, see Hoffmaister and others (2007).

TABLE 4

Key Simulation Results (change from 2007 to 2050)

Policy Scenario	Age-Related Expenditure	Tax Rates		Public Pension Generosity [a]	Macro Effects
		Consumption	Payroll		
	(Percent of output)	(Percentage points)		(Percentage points)	
Baseline	10	10	0	-1	Severe
Convergence Program	8	3	5	-6	Less Severe
Additional reforms	4	2	0	-42	Moderate

Note: [a] Calculated as the change in the ratio of the net present value of public pension benefits (at time of retirement) to that of private pension benefits.
Source: Authors' estimates.

From its current level, the consumption tax rate at its peak (about 2050) rises by about 10 percentage points and in the long run is only about 1 percentage point higher. Through 2050, output growth and GDP per capita suffer, even though consumption per capita remains robust. As the share of the workforce in the population declines, aggregate hours of work per capita decline sharply by 2050. Since the capital-labor ratio is pinned down by the (constant) interest rate, the capital stock falls. As forward-looking households live longer, they save more to finance a longer retirement. This improves the current account balance (CAB) during the demographic transition;[15] large CAB surpluses turn Cyprus into a net creditor country.

Private sector employees will see their pension benefit increase because the decline in the basic pension benefit will be more than offset by an increase in the supplementary pension. The pension benefit increases over time as generations of households entering the labor force exert more work effort to increase savings and finance longer retirement periods. In particular, these households intensify their work efforts mostly in their middle ages, when their labor skills peak, and thus raise the threshold for supplementary points (basic earnings). Their basic pension declines as they work less during the initial years in the workforce (relative to their lifetime work effort) and thus accumulate fewer basic points. But their supplementary pension increases—more than offsetting the decline in the basic pension—as households intensify work effort late in their work lives when their wage incomes exceed basic earnings, resulting in a further

[15] This mirrors the accumulation of assets in countries with aging populations (Börsch-Supan, Ludwig, and Winter, 2005).

accumulation of supplementary points. Also, the ratio of the present value of public-versus-private pension benefits (relative generosity) remains roughly unchanged at 1.8. In other words, the pension benefits for public households exceed those of private households by 80 percent.

5.2.2. The convergence program

Although the macroeconomic results under the CP are better than those in the baseline scenario, quantitatively the differences are not substantial. Between now and 2050, output, hours worked, and the capital stock (all in per capita terms) suffer less under the CP than before; they are about 5 percent higher than in the baseline scenario. Compared with the baseline, the CP reforms generate a reduction of about 2 percentage points in old age spending at the peak of the demographic shock; pension expenditures in 2050 will thus rise by about 8 percent of output from their current level.[16] As noted above, this increase is financed by a permanent 5 percentage point hike in payroll taxes and, at the peak of the demographic shock, by an increase of about 3 percentage points in the consumption tax rate (about 7 percentage points less than in the baseline). The consumption tax rate declines on impact because of the boost to tax revenues provided by the hike in the payroll tax rate. Households foresee rising consumption tax rates and anticipate consumption; thus, consumption per capita increases. Afterward, consumption per capita declines as the consumption tax rate increases. In the long run, the consumption tax rate declines by about 4 percentage points compared to the baseline. The boom in consumption on impact reduces the CAB surplus relative to the baseline scenario.

The reform package has a different impact on private and public sector labor supply and pension benefits. For private sector households, the increase in the retirement age means that they need to save less to finance a shorter retirement period, and thus they reduce their work effort. Also, the increase in labor taxes adversely affects the incentive to supply labor. Nonetheless, the increase in the work life adds two more years of wages above basic earnings, and thus the average number of points under the basic pension rises. Thus, when the reform is implemented, the basic pension benefit increases but the supplementary pension benefit decreases,

[16] This scenario does not account for additional onetime improvement associated with a tightening of eligibility requirements envisaged in the CP. Introducing this effect in the model requires heterogeneity in individuals, which lies beyond the scope of this analysis.

FIGURE 3

Simulation Results

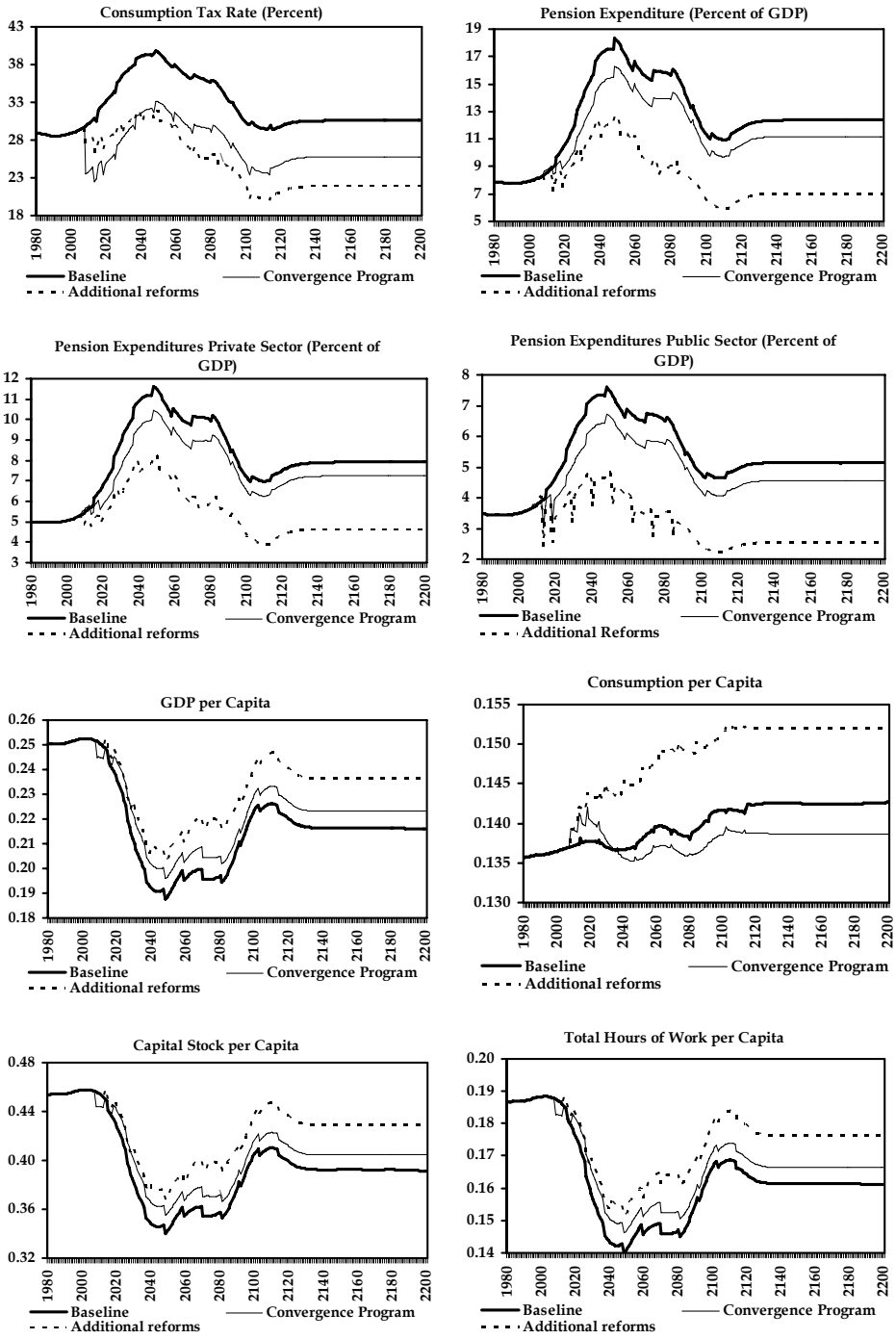
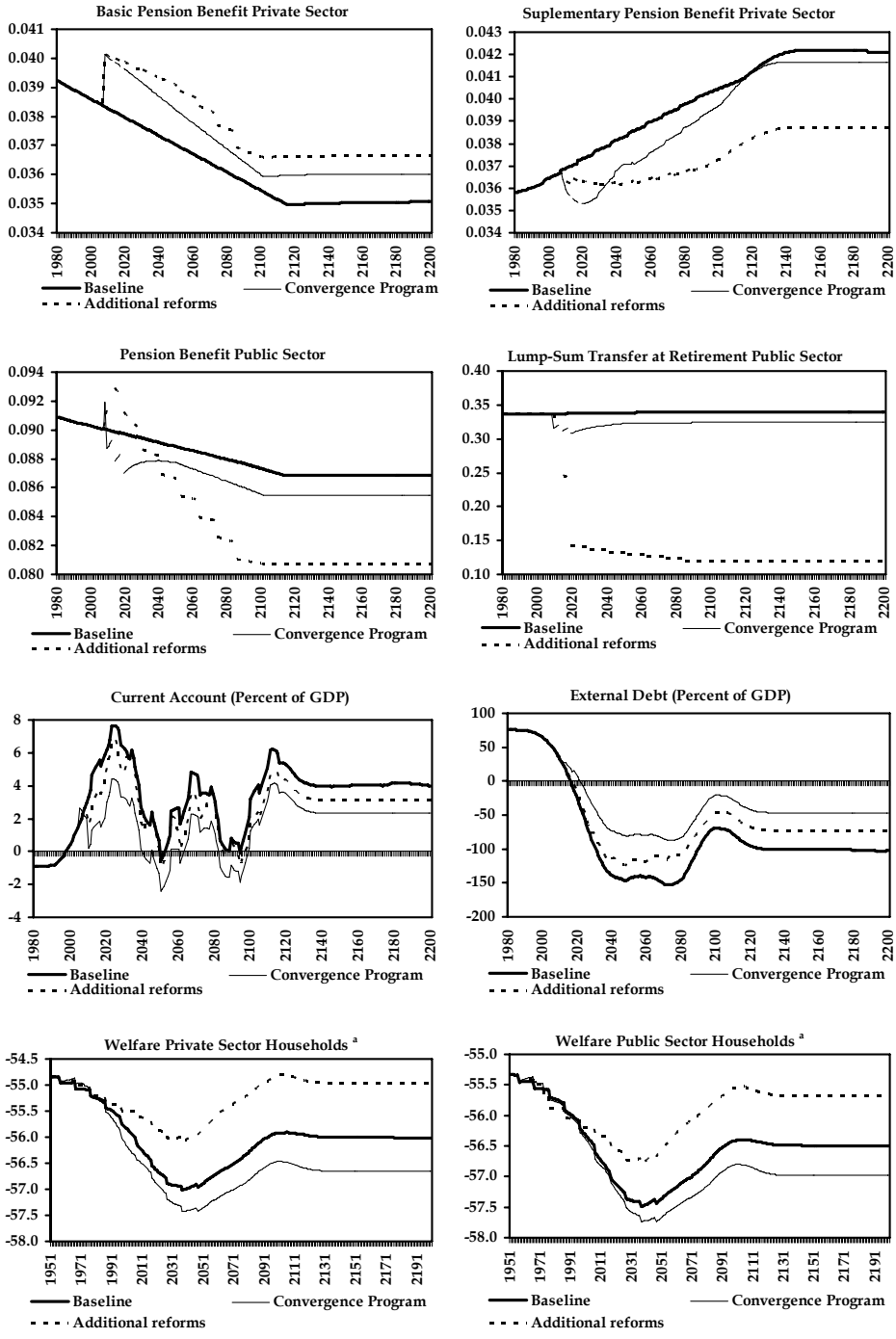


FIGURE 3 (contd)

Simulation Results



Note: [a] Corresponds to welfare of individual who enters the labor force in each year.

due to a lower lifetime work effort. As a result the overall pension benefit falls. In contrast, the pension benefit for public households declines unambiguously; their labor effort falls in response to higher payroll taxes because they do not see their basic pension increase, as their wages always exceed basic earnings.

These reforms also have a differential impact on the present value of pension benefits for private and public sector employees. Through 2050, the present value of pension benefits (at retirement) for private households is lower than in the baseline (as the retirement period is shorter); however, the value increases after 2050 because households adjust their labor effort and thus receive higher supplementary pensions. In contrast, the present value of pension benefits for public households is always lower than in the baseline. As a result, the ratio of public to private pension benefits declines, albeit slightly.

Despite the better macroeconomic outcomes, the reform reduces welfare for both private and public sector employees. This is because of the higher payroll taxes—whose burden falls disproportionately on workers—and the reduction in pension benefits. All future generations will be hurt unambiguously, but the welfare of some younger generations will remain broadly unchanged.

5.2.3. Additional reforms

The reforms considered in this scenario limit the increase in overall pension spending by 2050 to about 4 percentage points of GDP; in the long run pension spending falls below current levels. Also, the use of less distortionary consumption tax rises, and the more limited need to increase these tax rates, underlies the substantially better macroeconomic results: by 2050, consumption tax rate increases are limited to 2 percentage points, and hours worked, output, consumption, and capital stock (all in per capita terms) are about 10 percent higher than in the baseline. In the long run, the resulting increase in the tax base and lower pension spending results in a consumption tax rate that is about 4 percentage points lower than in the CP, and thus about 7 percentage points lower than at present. Reflecting the higher levels of consumption, the CAB is slightly smaller than in the CP.

Compared with the CP, these additional parametric reforms further increase aggregate labor supply for private and public households. The further increases in the retirement age imply that private households need to save less to finance a shorter retirement period, and thus they reduce their work effort each year. However, labor supply increases in the aggregate as the number of cohorts in the labor market rises. As in the CP, the increase in the work life adds wages that are considered in the points

system; average points for the basic pension rise, and the points under the supplementary pension decline. For public sector employees, the additional reforms reduce the labor effort in each period and thus lower their pension income: both pension benefits and lump-sum payments fall.

Welfare for both households improves because the tax rate needed to keep public debt constant declines. This occurs even though pensions become less generous for both the private and public sectors, reflecting the reduction of economic distortions from lower tax rates. Another feature of this scenario is that the mismatch between the two pension systems narrows. Specifically, the ratio of public to private generosity falls to below 1.4 by 2050. All generations of private households experience welfare gains. Public households would also experience higher welfare in the long run, but younger generations would experience some losses as they shoulder a large share of the reform burden.

6. Summary and policy conclusions

Aging severely challenges Cyprus's economy and fiscal accounts. The outlook of an unreformed social security system is bleak. Consumption tax rates will need to rise by about 10 percentage points to finance age-related expenditure increases of about 10 percent of GDP. As a result, average output growth will fall from roughly 3½ percent in the last 10 years to about 1½ percent in the decade ending in 2030. Pension benefits in the public sector relative to those in the private sector would remain roughly unchanged and more generous.

The reforms envisaged in the Convergence Program would soften the adverse macroeconomic effects but lower economic welfare. As a result of the increases in payroll tax rates (5 percentage points) and the retirement age, the needed rise in consumption tax rates is lower (about 3 percentage points), and so are the macroeconomic consequences. And, while declining, public sector pensions remain generous (about 75 percent higher than in the private sector). More worryingly, welfare will decline for future generations due to the reliance on payroll taxes, whose burden falls disproportionately on workers.

Additional parametric reforms are thus needed to address the macroeconomic consequences of aging, including the reduction in welfare. As gains in life expectancy continue, the burden of financing a longer retirement period renders the Convergence Program's reforms insufficient. Keeping up with demographic trends will require further increases in the retirement age to stabilize the retirement period as a share of life expectancy. Switching the indexation of all pension benefits to prices will

further limit increases in age-related expenditures, and financing these expenditures with consumption taxes (instead of payroll taxes) will safeguard the net-of-tax wages. Consumption tax rate increases are limited to about 2 percentage points. Also, realigning the relative generosity of public and private pensions can be achieved by lowering the lump-sum payment awarded at retirement to a maximum of 12 months; this will reduce the relative generosity by about 40 percentage points by 2050, which will be still almost 40 percent higher than private sector benefits. In contrast with the CP, welfare improves for future generations due to a reduction of age-related expenditure pressures and the reliance on consumption taxes—whose burden is spread more evenly across all age groups, thus reducing deadweight losses.

The results point to the vulnerability of the Cypriot pension system but the reform strategy should be mindful of the uncertainty involved. The additional reform scenario illustrates what is needed to counter the macroeconomic impact of aging given a particular long-run population and world interest rate projections. These projections are, however, inherently uncertain. For instance, lower world interest rates would worsen the impact of the demographic shock—as it increases real wages and pension benefits and reduces the returns on savings. Thus a more ambitious reform effort would be called for (see Hoffmaister and others (2007)). One way of addressing uncertainty is to formulate the reform strategy as follows: implement the additional reform scenario but condition future increases in the retirement age—those after the initial increase to 65 years of age—to be automatic (say, on a 10-year basis) and determined by the actual evolution of life expectancy and other demographic factors underlying the dependency ratio.[17]

Setting in place the needed pension reforms is urgent. Deep parametric reforms are needed for the old-age pension system to catch up, and keep up, with the fiscal challenge posed by demographic trends and minimize the adverse macroeconomic outcomes. These reforms will involve substantial adjustments to the social security system and changes in households' incentives to work, consume, and save. These changes point to the desirability of phasing in reforms gradually and grandfathering workers' rights. This is feasible, however, if the decisions to reform the system are set in place promptly.

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[17] This strategy would be in the spirit of the Swedish system (OECD, 2005), in which automatically changes in benefits are automatically linked to the evolution of demographic trends.

Appendix

Details of Cypriot pension benefits

A.1. GSIS

The old-age pension GSIS benefit is computed as follows:

$$Pension_{T+i}^{GSIS} = Basic_{T+i} + Supplementary_{T+i},$$

where T and i denote the retirement year and the number of years since retirement. These components reflect an individual's work life and annual income earnings,

$$Basic_{T+i} = \alpha_B \times \left(\frac{Pts_{LowerBand}}{InsurableLife} \right) \times BasicEarnings_{T+i}, \text{ and}$$

$$Supplementary_{T+i} = \alpha_S \times Pts_{UpperBand} \times BasicEarnings_T \times \left(\frac{CPI_{T+i}}{CPI_T} \right),$$

where

- α denotes the replacement rate and the subscript denotes the benefit component (0.6 for the basic component and 0.015 for the supplementary component);[18]
- *BasicEarnings* corresponds to the statutory earnings set each year and expressed as an annual amount (in 2005, it was set at £C79.9 weekly, or £C4,155 annually), which is indexed to wages;
- *Pts* represents cumulative points earned toward each pension component: $Pts = \sum_{t=1}^{T} pts_t$

  Points per year are calculated as $pts_t = wages_t / BasicEarnings_t$, with the first point accruing to the lower band (basic pension) and remaining points accruing to the upper band (supplementary pension);

[18] α_B increases by 0.1 for each dependent child and by 0.2 if an individual is married.

- *InsurableLife* is the number of years in the workforce since an individual's sixteenth birthday (or since October 5, 1964, whichever is fewer;[19] and
- *CPI* is the consumer price index.

A.2. GEPS

The old-age pension GEPS benefit is computed as follows:

$$Pension_{T+i}^{GEPS} = Basic_{T+i} + Public_{T+i},$$

$$Basic_{T+i} = \alpha_B \times \left(\frac{Pts_{LowerBand}}{InsurableLife} \right) \times BasicEarnings_{T+i},$$

$$Public_{T+i} = \alpha \times Salary_{T-1} \times \left(\frac{Wages_{T+i}}{Wages_{T-1}} \right).$$

The replacement rate α is equal to the number of months of service, up to a maximum of 400 months, divided by 800. In addition, at retirement government employees receive a lump-sum payment

$$Lump\ Sum_T = \lambda \times Salary_{T-1},$$

equal to 28 (λ) times their final monthly salary if they have served at least 400 months; a prorated amount is paid to those with shorter service.

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[19] If an individual's wages exceed *BasicEarnings* every year, the basic component of the pension would be $Basic_{T+i} = \alpha_B \times 1 \times BasicEarnings_{T+i}$.

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