BANK OF JAPAN

Does Demography Really Matter?

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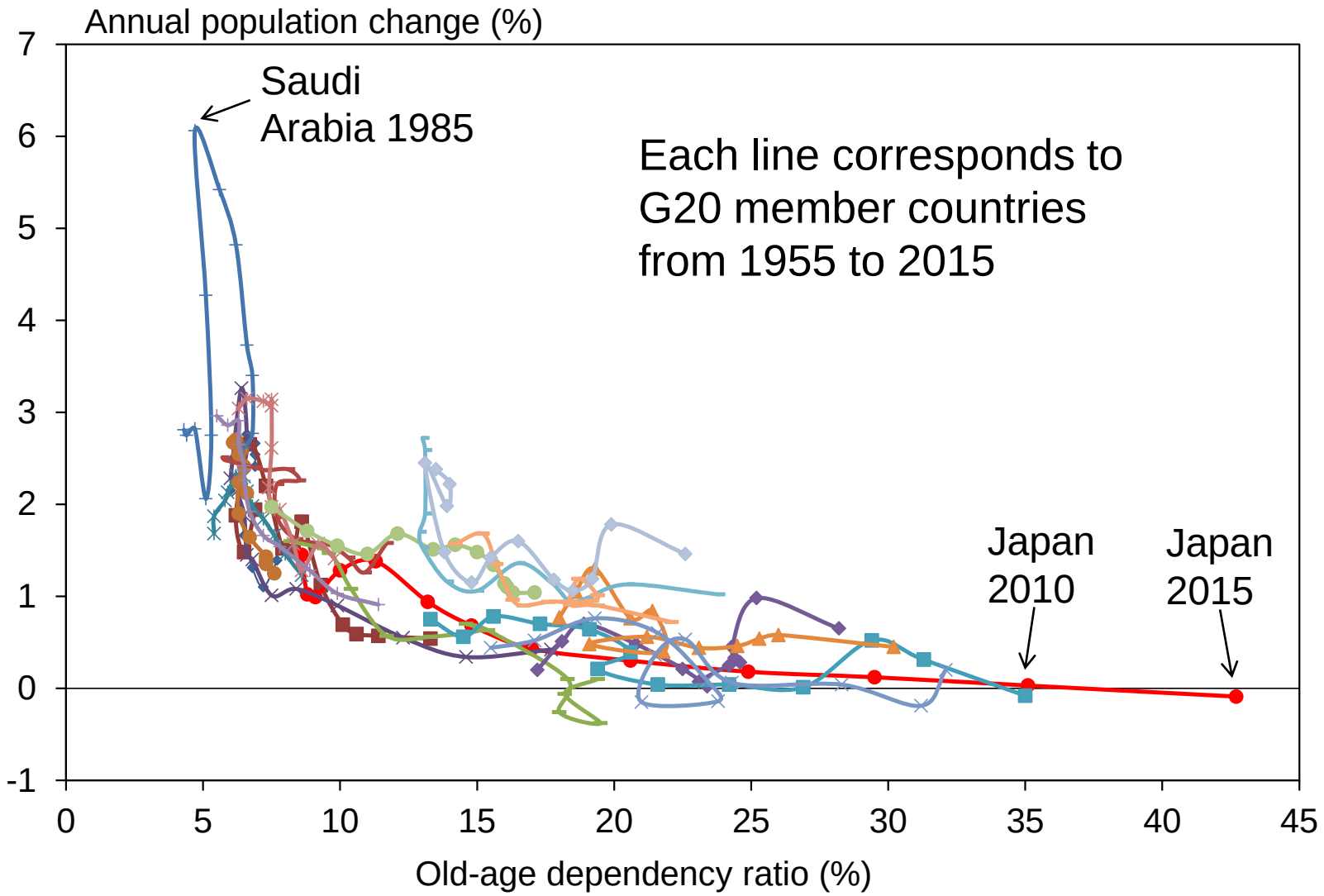
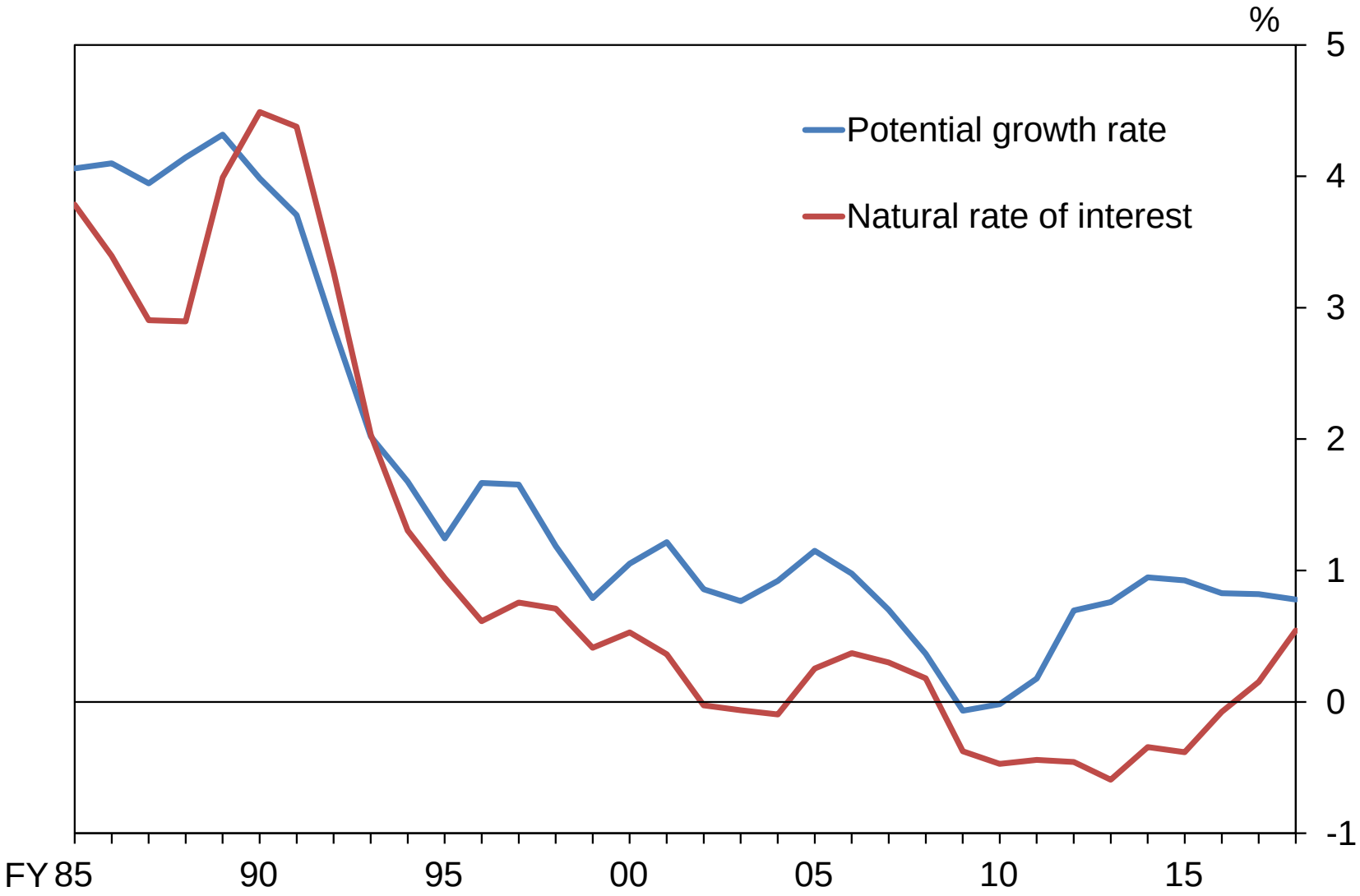
Japan as a front-runner of demographic change



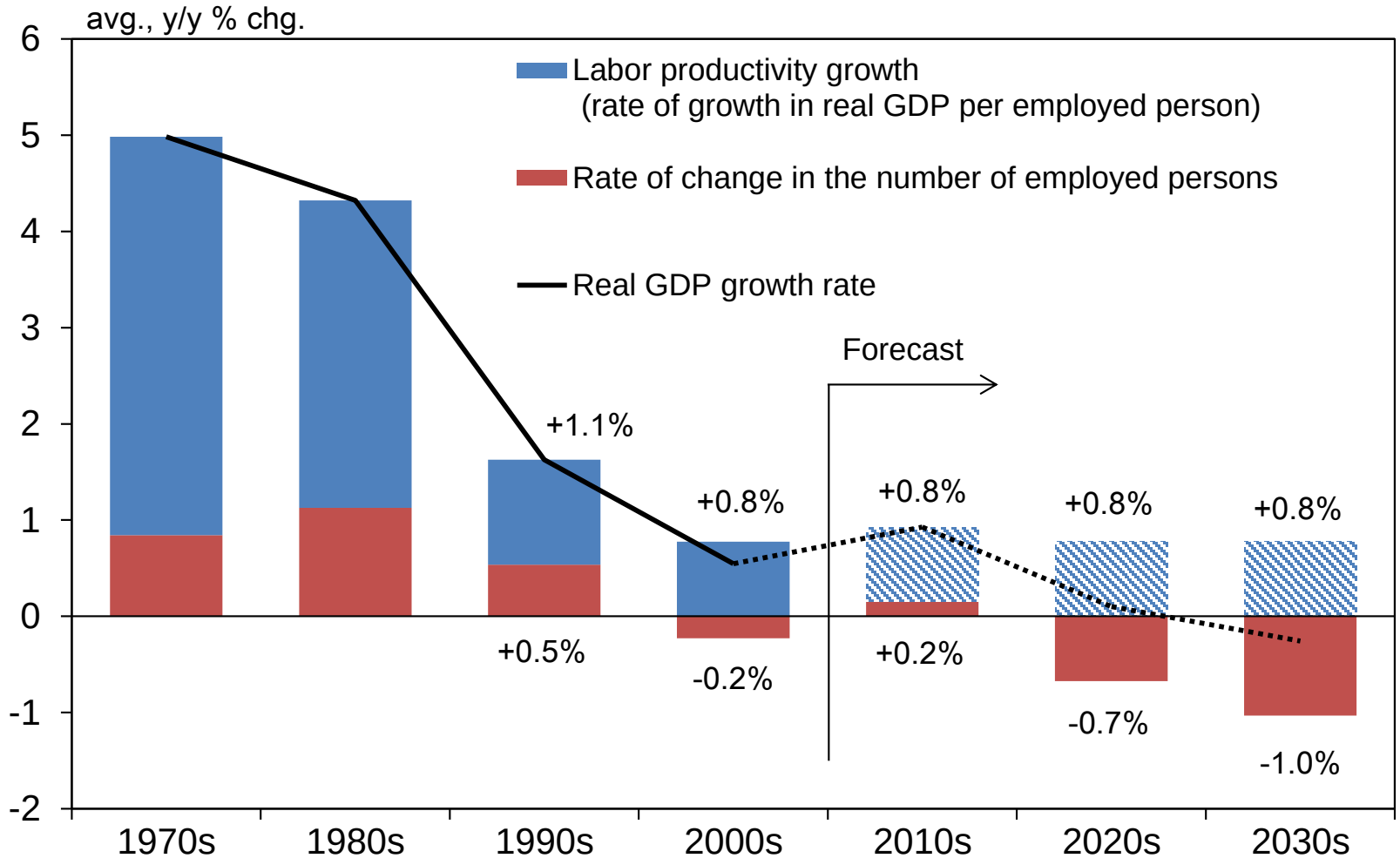
Notes: 1. Old-age dependency ratio = elderly population (aged 65 and over) / working-age population (aged 15 to 64)
2. Annual population change is the average annual rate of population change in five-year intervals.
Source: United Nations.

Negative effects of demographic change



Note: Figures for FY2018 are the values in 2018/Q2.
Sources: Bank of Japan; Okazaki, Y. and N. Sudo. (2018) “Natural Rate of Interest in Japan — Measuring its size and identifying drivers based on a DSGE model —,” Bank of Japan Working Paper Series, No.18-E-6.

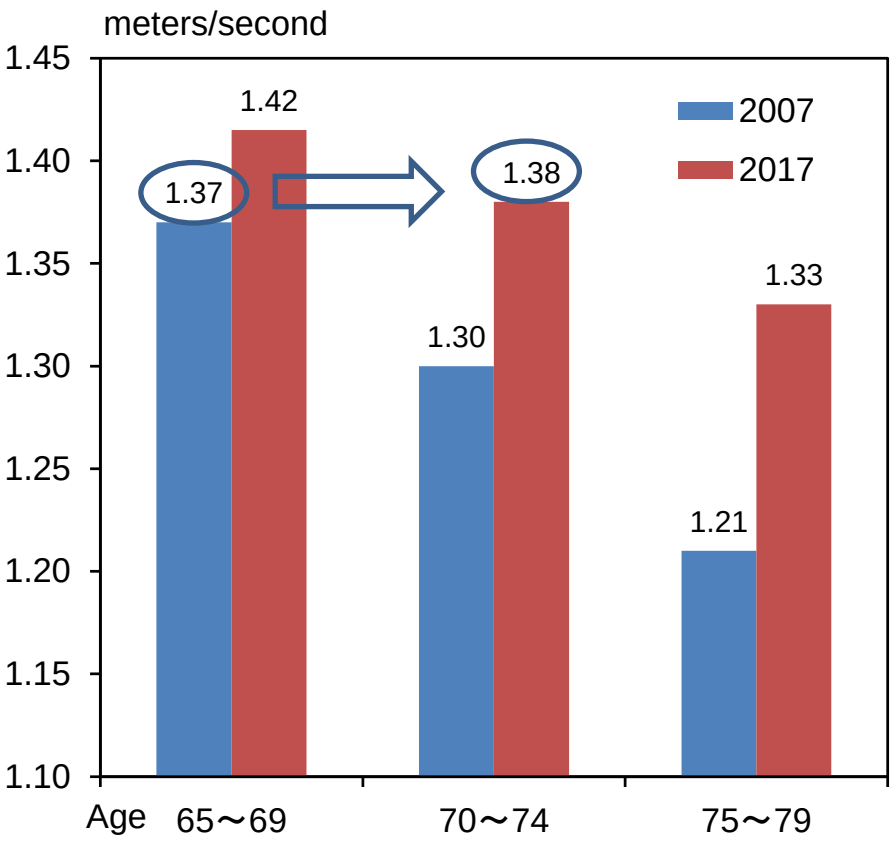
Back of envelope calculation of Japan's real GDP growth prospect



Note: Fiscal-year basis. The rates of change in the number of employed from 2018 onward are calculated using the population outlook (medium variant) and projected labor force participation rates (assuming the labor force participation rate for each age/sex group remains the same as in 2017). The labor productivity growth from 2010s onward is assumed to remain the same as in 2000s.
Sources: Cabinet Office; Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research.

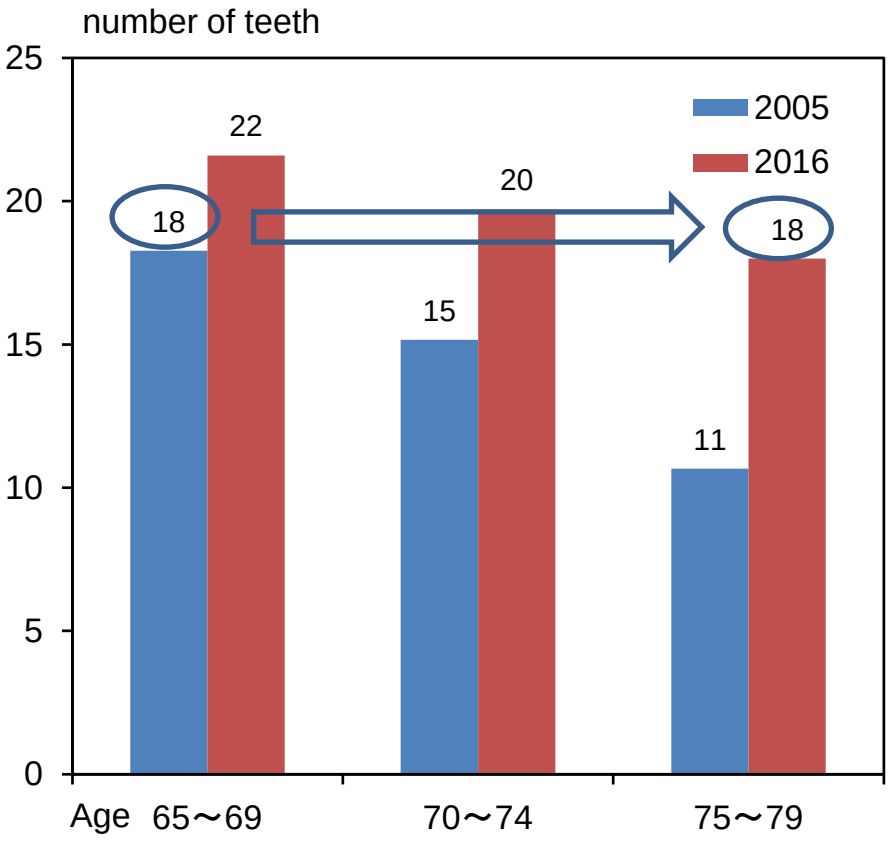
Evidence of rejuvenation

Average walking speed



5 years' rejuvenation since 2007!

Average number of teeth

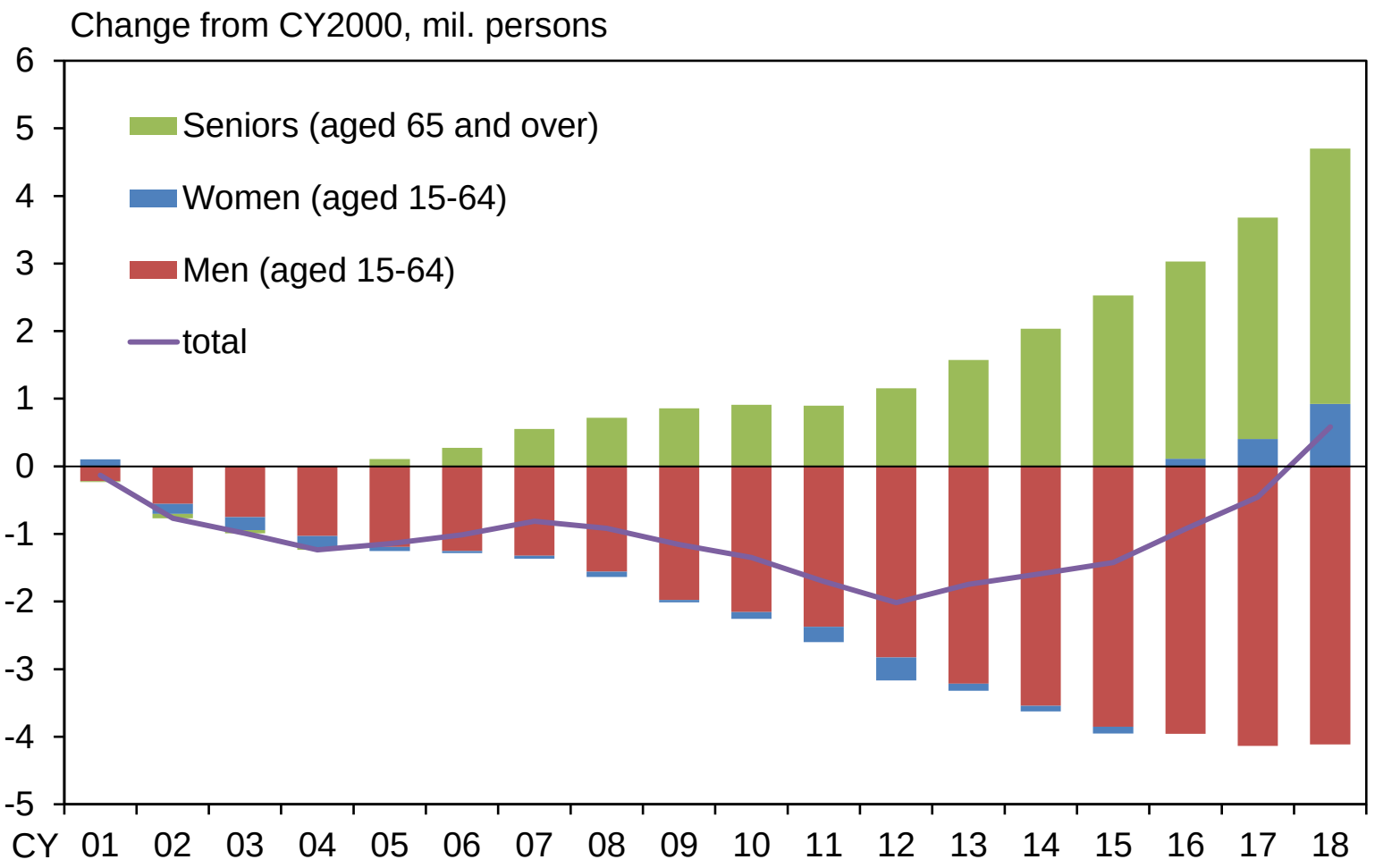


10 years' rejuvenation since 2005!

Note: Average walking speed is the arithmetic average between male walking speed and female walking speed.
Sources: National Center for Geriatrics and Gerontology; Ministry of Health, Labour and Welfare.

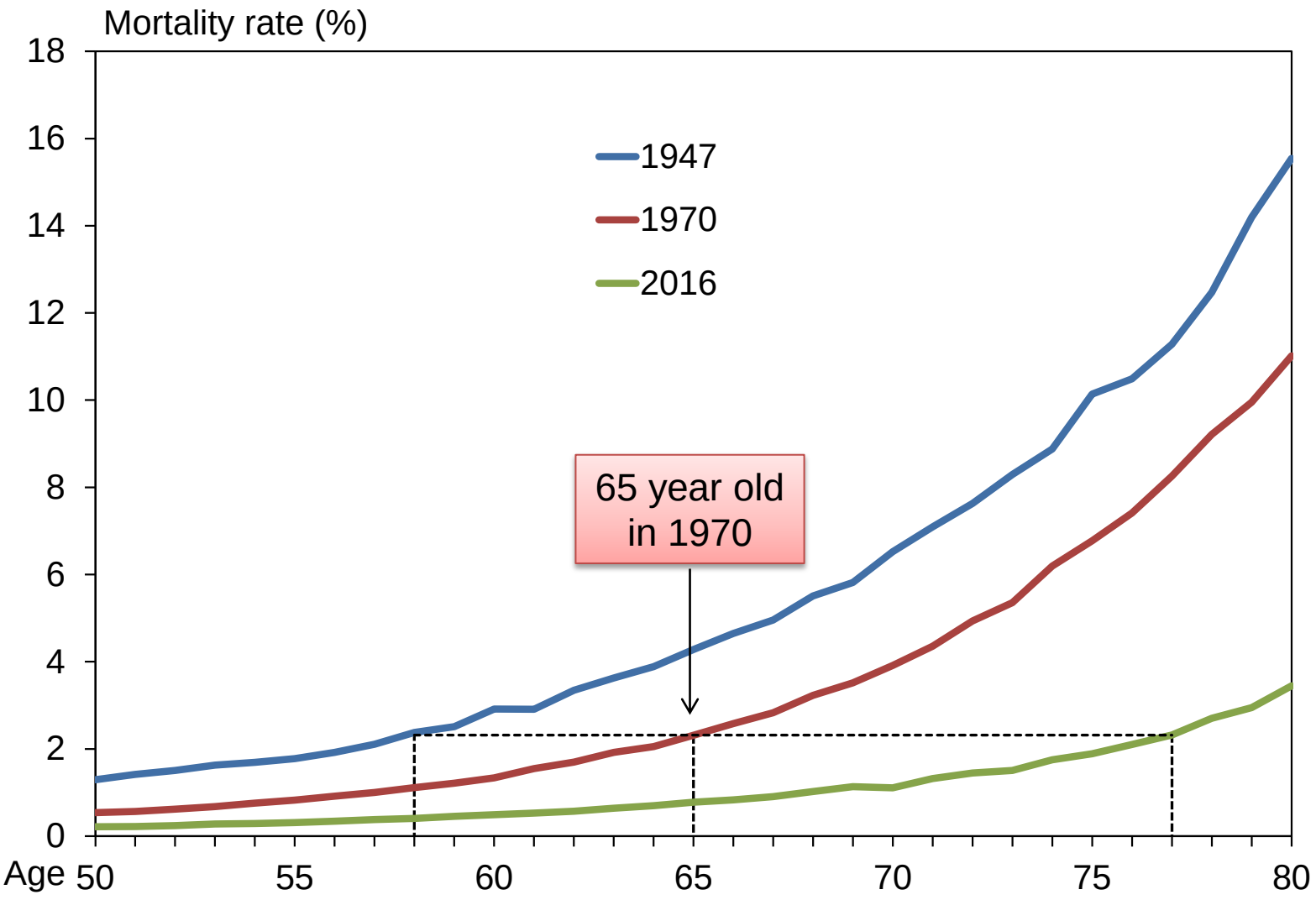
An increase in senior labor supply

Labor force participants



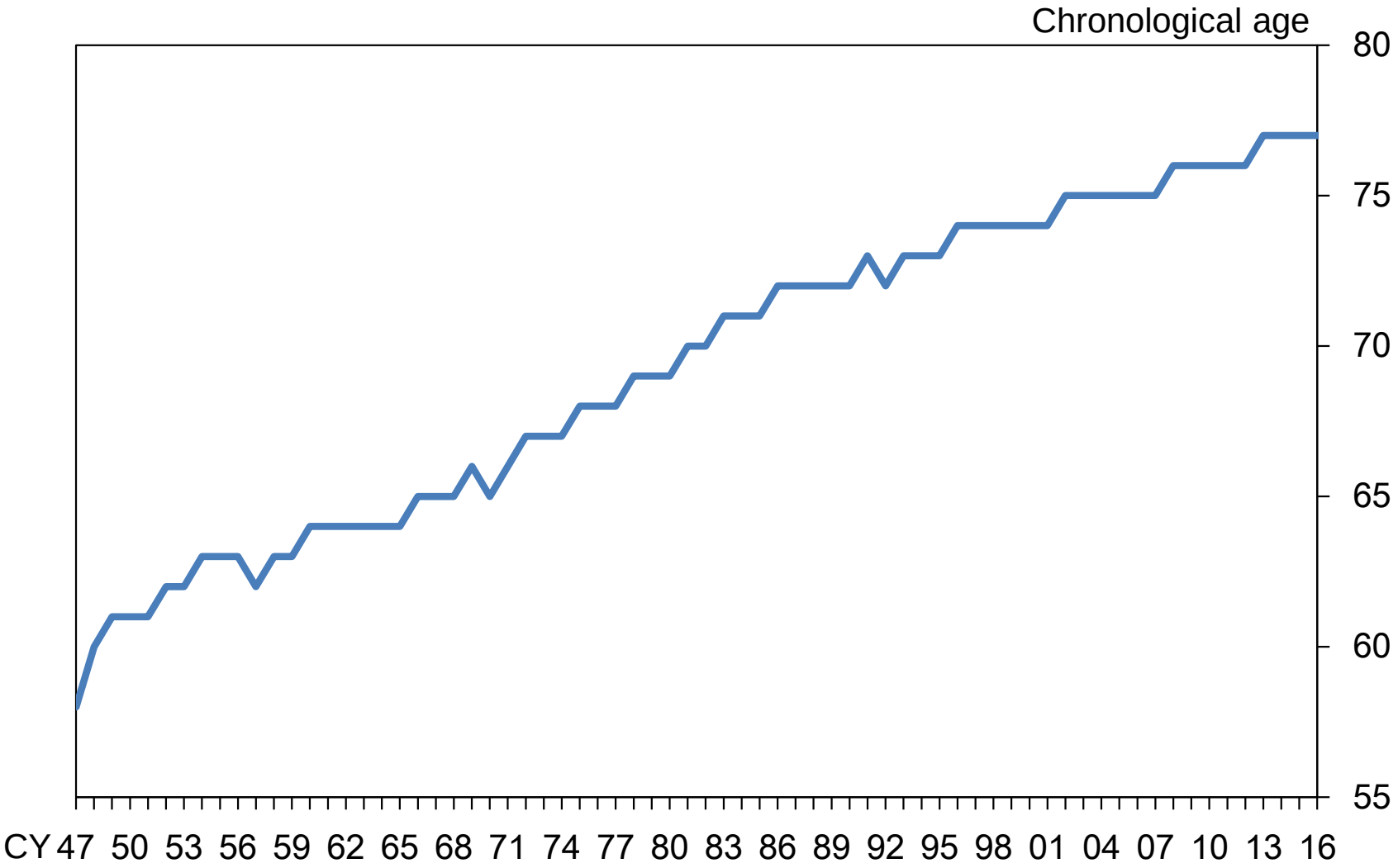
Note: Figures for CY2018 are January-October averages on a seasonally adjusted basis.
Source: Ministry of Internal Affairs and Communications.

Biological age deduced from mortality rates



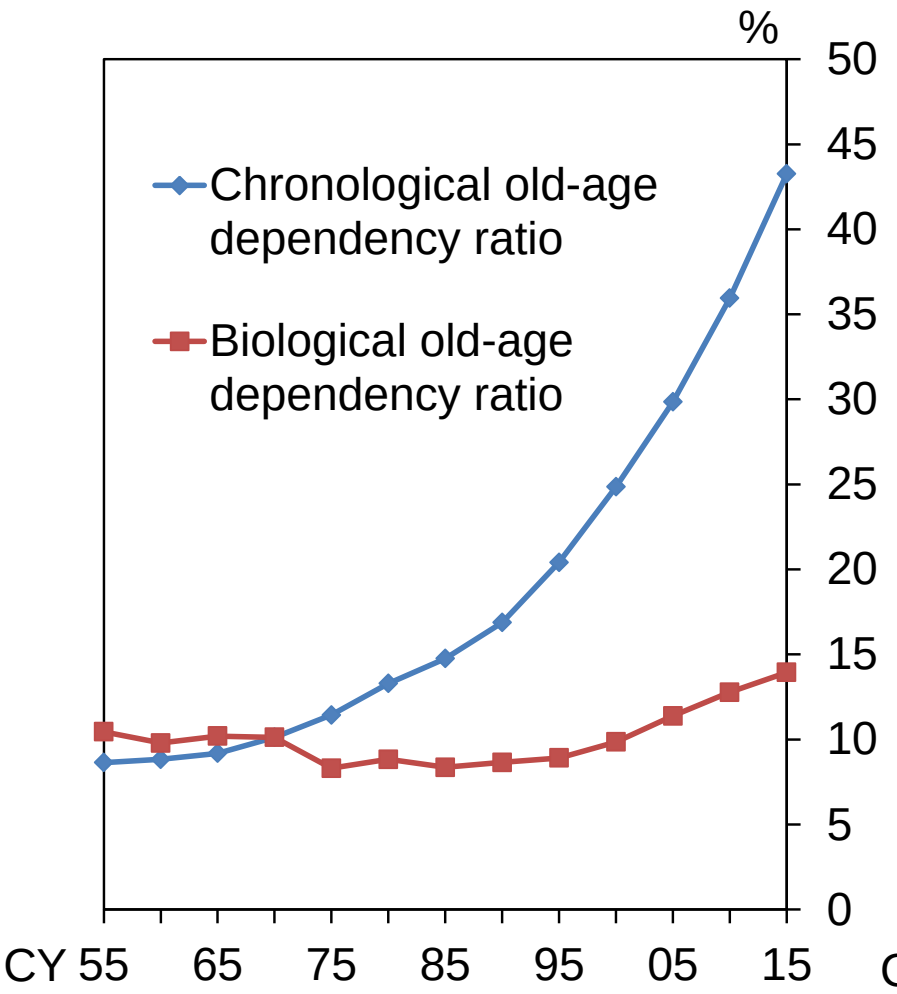
Source: National Institute of Population and Social Security Research.

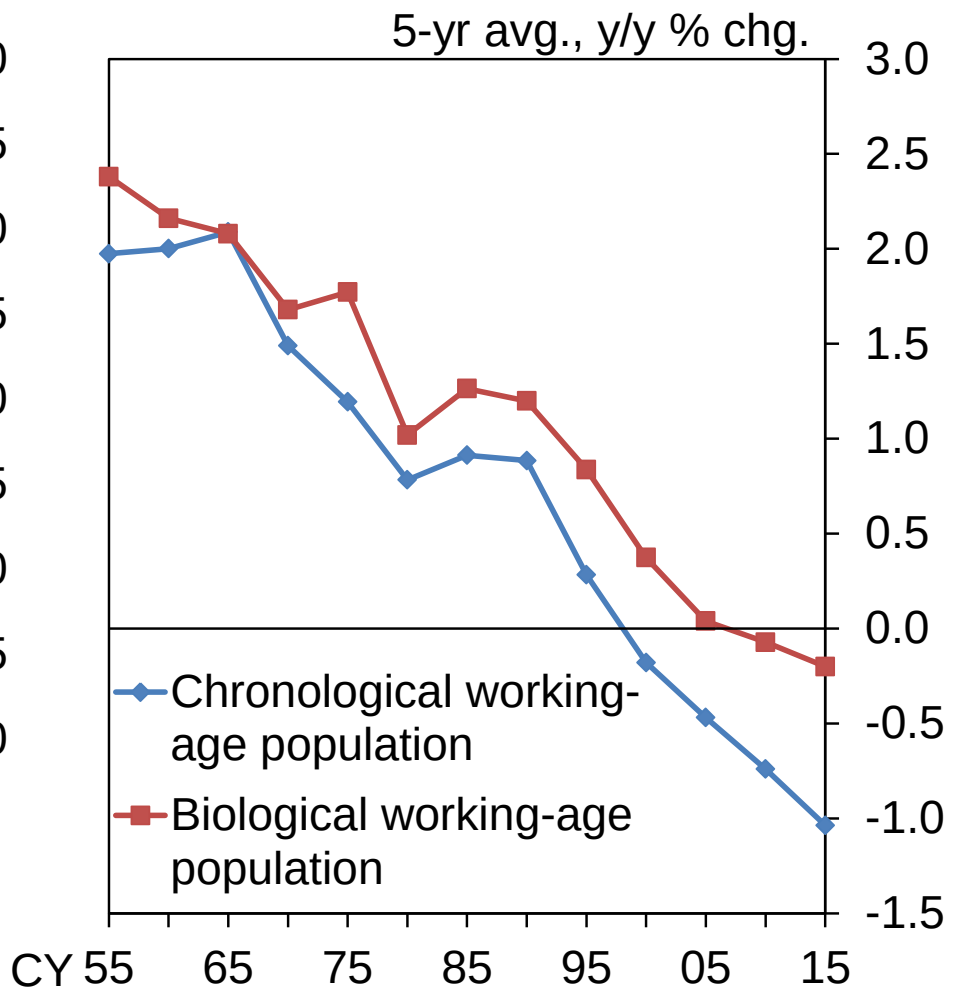
Chronological age biologically equivalent to a 65 year old in 1970



Sources: National Institute of Population and Social Security Research; Bank of Japan staff calculations based on Milligan, K. and D. A. Wise (2015): "Health and Work at Older Ages: Using Mortality to Assess the Capacity to Work across Countries," *Journal of Population Aging*, 8(1-2), pp.27-50.

Difference between chronological and biological age

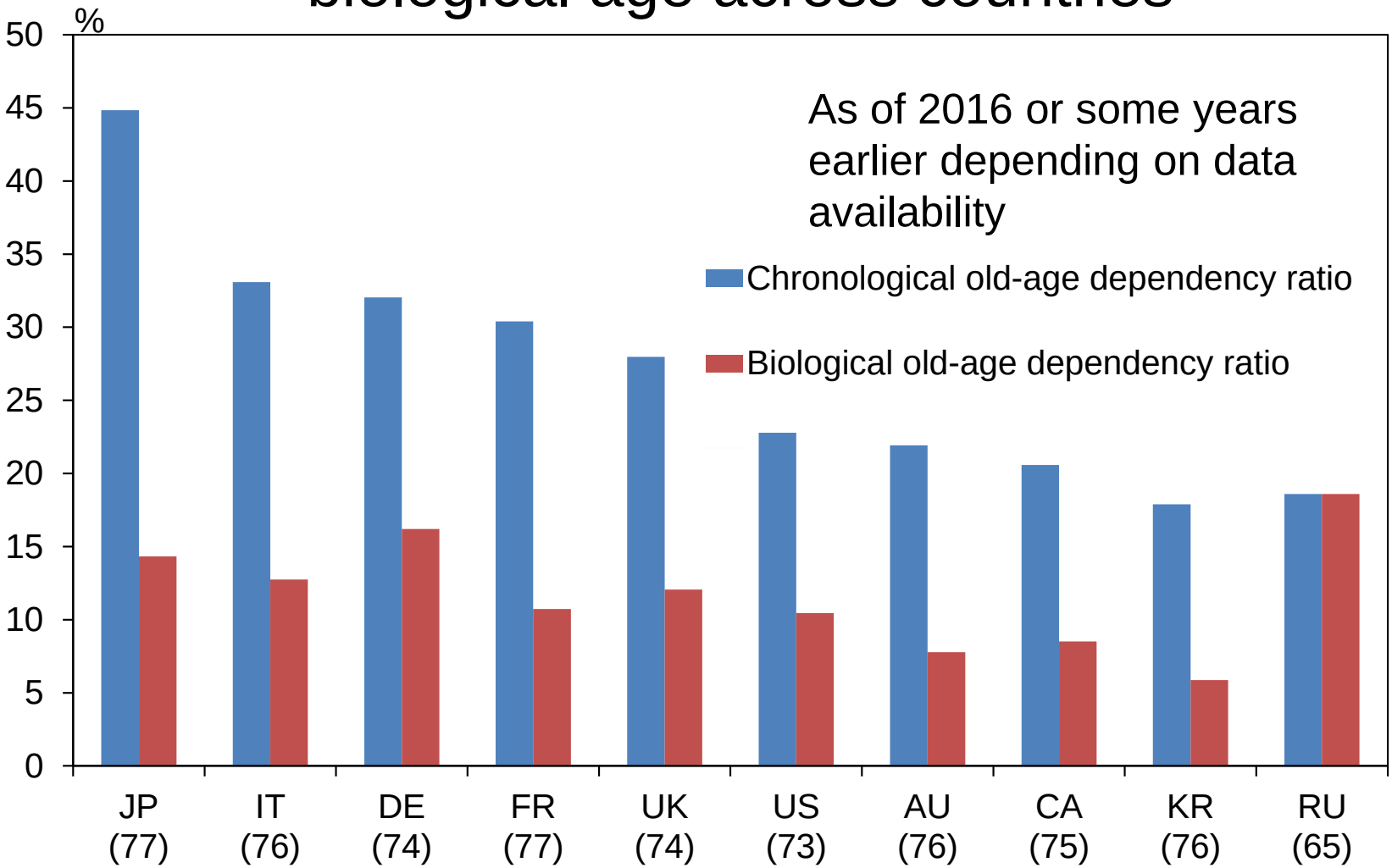




Note: Old-age dependency ratio = elderly population (aged 65 and over) / working-age population (aged 15 to 64)

Sources: National Institute of Population and Social Security Research; Bank of Japan staff calculations based on Milligan, K. and D. A. Wise (2015): "Health and Work at Older Ages: Using Mortality to Assess the Capacity to Work across Countries," *Journal of Population Aging*, 8(1-2), pp.27-50.

Difference between chronological and biological age across countries



Note: Figures in parentheses are chronological ages biologically equivalent to a 65 year old in 1970 in Japan.

Sources: National Institute of Population and Social Security Research; Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany); Bank of Japan staff calculations based on Milligan, K. and D. A. Wise (2015): "Health and Work at Older Ages: Using Mortality to Assess the Capacity to Work across Countries," *Journal of Population Aging*, 8(1-2), pp.27-50.