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Ageing and Productivity: Introduction

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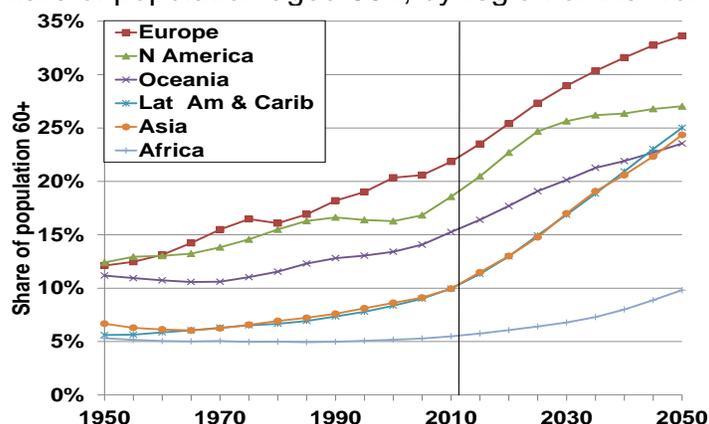
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## Ageing and Productivity: Introduction

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Population aging is perhaps the most significant feature of global demography, with every country projected to experience an increase in the share of people aged 60 and over in the coming decades. The UN<sup>3</sup> projects that by 2050 there will be 2 billion people aged 60 or over, compared with 680 million today, with the number of those aged 80 and over projected to increase at an even faster rate. Although population aging has been most widely discussed in relation to Europe and North America, Asia and Latin America will reach those regions' current 60+ shares within a few decades (see Figure 1).

**Figure 1: Population aging is taking place everywhere**  
(Share of population aged 60+, by region of the world)



Source: UN, World Population Prospects (2011)

In both popular and academic discourse, the rising proportion of older people has set off a series of alarms. Books with titles such as *AgeQuake*, *Gray Dawn*, and *Workforce Crisis* have sought to alert readers to the potential problems that aging might bring. *The Economist* weighed in with a cover story, “The End of Retirement”. Peter G. Peterson, a past US Secretary of Commerce and CEO of the now-defunct Lehman Brothers, went so far as to describe global aging as a “threat more grave and certain than those posed by chemical weapons, nuclear proliferation, or ethnic strife”.<sup>4</sup>

The concerns being expressed stem from several observations:

- Fertility is falling in most countries, and the share of the population that is below age 14 (and even the share of people aged 15-29) is shrinking in many countries,

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<sup>3</sup> United Nations Population Division (2011). *World Population Prospects: The 2010 Revision*. All of the demographic data in this introduction are from this source.

<sup>4</sup> Peterson, Peter G., “Gray Dawn: The Global Aging Crisis”, *Foreign Affairs*, January-February 1999.

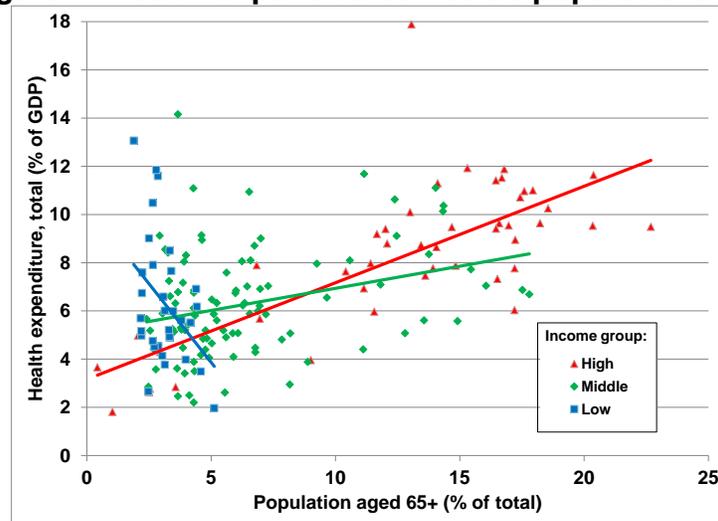
with corresponding shifts in current and projected workforce, and potentially output, growth.

- When the youth population share is stagnant and the elderly population share rises, the relative size of the working-age segment of the population (ages 15-64) necessarily declines. Empirically, the ratio of the working-age population to the non-working-age population has been falling in Japan and Europe and is beginning to fall in the United States. This ratio is about to reach a peak in China, and it will soon be falling rapidly, both there and in Russia. Brazil is not far behind, with the ratio there projected to peak around 2020.
- The working-age cohort produces the lion's share of a country's economic output. When that share is smaller and there are relatively more people (young or old) who are economically dependent on working-age groups, a country's output per capita may grow more slowly or even decrease, or it may become more difficult to channel sufficient resources to the elderly to support them.
- Older people have skills and capacities, based on experience, that many younger workers lack, but in some instances they may be less productive than younger workers. In some cases, firms may find they are paying more for labor, by retaining older workers, than would be economically efficient.
- Working-age people are the prime savers in an economy. Older people typically draw on savings to support themselves. But if large numbers of older people are liquidating their assets at the same time, asset values will tend to decrease, undermining stocks of wealth throughout the population.
- Public pension systems, particularly those that operate on a pay-as-you-go basis, are under stress. Some countries are already funding pensions to some extent from general funds (which was typically not the intent), because current contributions to the country's pay-as-you-go pension system are inadequate. In Brazil, a country that is only beginning to experience a rapid rise in its elderly population share, pensions already account for 13% of all public spending. In Italy, for every 100 workers, there are 71 pensioners. And in addition to Brazil and Italy, France and Germany also spend more than 10% of GDP on public pensions, with Japan not far behind.<sup>5</sup>
- The elderly tend to put greater demands on health care systems. With health expenditure already accounting for substantial portions of GDP in many high-income countries and in some middle-income countries as well, these greater demands will be all the more stressful (see Figure 2).

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<sup>5</sup> *The Economist*. "Brazil's Pension System: Tick Tock: The Senate debates a small measure to help disarm an economic time bomb". March 24, 2012. <http://www.economist.com/node/21551093>

**Figure 2: Health expenditures rise as populations age**



Source: World Bank, *World Development Indicators 2012*. Data for 2010.

Academic papers have been more sedate, highlighting the potential of changes in behavior and of policy reform to address the challenges of aging.<sup>6</sup> First, individuals' behavior may evolve, particularly in response to incentives regarding labor force participation and saving. Second, firms can actively choose to take advantage of an older workforce by implementing retraining programs, adjusting to different capabilities and schedules, investing in worker health and promoting early detection of disease, and fostering work environments that encourage the continued productive participation of older workers. And finally, policy makers can take major steps to address the viability of pension systems, and to improve access to quality health care for workers of all ages. Some analysts have suggested that increased immigration of working-age individuals could counterbalance the growing share of older people, but this is unlikely to be possible, for social and political reasons, on a scale large enough to counteract the potential economic effects of population aging.

It is worth noting here that doomsday scenarios based on demographic change are hardly new. Paul Ehrlich's controversial 1968 book, *The Population Bomb*, is a well-known example. But rather than the impoverishment of the world as a result of population doubling from 3 to 6 billion from 1960 to 2000, income per capita more than doubled in that time frame.<sup>7</sup> And instead of increasing immiseration, the world has seen huge advances in health and education: Between 1970 and 2010, life expectancy at birth rose from 59 to 70, and infant mortality fell from 95 infant deaths per 1,000 live births to 38. The primary school gross enrollment rate was already high (89%) in 1970, but the corresponding rate for secondary school increased from 40% to 70% over this period.<sup>8</sup> These markers of economic and social progress, which have come about even as population has grown tremendously, have been spurred by technological advances,

<sup>6</sup> See, for example, Bloom, Canning, and Fink (2011) 'Implications of Population Aging for Economic Growth', *Oxford Review of Economic Policy*, 2010, Vol. 26(4): 583-612.

<sup>7</sup> World Bank (2012). *World Development Indicators 2012*.

<sup>8</sup> Ibid.

institutional innovations, and changes in behavior. Thus, for many economists, doomsday scenarios associated with population aging seem likely to be another example of overblown concern.

Several core issues raised by population aging were examined in a conference on “Ageing & Productivity”, held in October 2011 at the University of St. Gallen, Switzerland. Most of the papers from that conference appear in this issue of *Labour Economics*.

Taken as a whole, the papers are methodologically quite novel. Several take advantage of matched employer-employee datasets to study the implications for productivity, pay, and profitability of age and other employee characteristics, and employer characteristics related to scale, capital intensity, and technological modernity. In addition, many of the papers are focused on specific rapidly aging countries, mostly but not exclusively in Europe.

Bernhard Mahlberg, Inga Freund, Jesús Crespo Cuaresma, and Alexia Prskawetz examine age profiles of productivity and wages in Austria between 2002 and 2005, using a matched employer-employee dataset covering a broad range of economic sectors. In contrast to widespread belief, and acknowledging that determining causal connections is difficult, they find that having a larger share of younger employees (defined as less than age 30) is, *ceteris paribus*, associated with lower productivity and wages, while having a larger share of older employees (defined as age 50+) is not. They find no evidence that older workers are overpaid relative to their productivity. These results conform closely to those reported by Hellerstein, Neumark, and Troske in their pioneering work on the age trajectories of pay and productivity across Israeli and US firms.<sup>9</sup>

David A Green and W Craig Riddell analyze data from the 1994 and 2003 International Adult Literacy Surveys for Norway, Canada, and the United States. Their cross-sectional analyses show that literacy declines modestly with age. They also show, based on quasi-longitudinal analyses, that these declines reflect sharper declines with age that are offset by cross-cohort declines in literacy. These findings are reminiscent of George Borjas’s path-breaking analyses of immigrant assimilation,<sup>10</sup> which showed that cross-cohort declines in “immigrant quality” increased the steepness of immigrants’ cross-sectional age-earnings profiles. The authors’ results apply to all three countries and are potentially highly consequential, insofar as literate workers are a crucial factor underlying productivity, especially during periods of rapid technological change. The results are also potentially important for the targeting of programs for increasing literacy.

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<sup>9</sup> Hellerstein, J.K. and D. Neumark. 1995. “Are Earnings Profiles Steeper than Productivity Profiles? Evidence from Israeli Firm-Level Data.” *Journal of Human Resources* **30**. 89-112; Hellerstein, J.K., D. Neumark and K.R. Troske. 1999. “Wages, Productivity, and Worker Characteristics: Evidence from Plant-Level Production Functions and Wage Equations.” *Journal of Labor Economics* **17**. 409-446.

<sup>10</sup> Borjas, George. 1985. “Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants”, *Journal of Labor Economics*. Vol. 3, No. 4. 463-489.

Vincent Vandenberghe uses firm-level panel data from Belgium (from the Bel-first database) to examine the effect of the age and gender of employees on firms' profits. Although a greater share of older men among a firm's employees is not detrimental, the opposite is true of older women employees – and this finding pertains as well to services. In addition, the service sector, which employs a very large number of women, does not seem to be taking steps that would counteract the current lower productivity of female workers. The results have major implications for public policies: if labor shortages become acute, they may be partially alleviated by taking measures that could boost the productivity of older women.

Anna Lovasz and Mariann Rigo study the impact on the value of workers' skills of changed production methods associated with Hungary's transition to a market economy that began in the early 1990s. They do this by analyzing a nationally representative, employer-employee matched dataset, the Hungarian Wage and Employment Survey, covering the years 1986 to 2008. They find that older workers suffered the most, that the effects of skill obsolescence were particularly acute among the most-skilled workers and those in foreign-owned companies, and that policies are needed to provide training for older workers in response to sudden changes that devalue their skills. In general, experience matters greatly, but when that experience is concentrated in skills that are no longer in great demand, and when younger workers enter the workforce with more up-to-date skills, both firms and society as a whole can benefit by shoring up the skills of those who would otherwise be left behind. This paper highlights the vulnerability of older workers' human capital to economic change.

Laura Romeu Gordo and Vegard Skirbekk advance a line of research initiated by Autor, Levy, and Murnane<sup>11</sup> and use the German Qualification and Career Survey to study the effect of technological change on job content and how workers of different ages adapt. In particular, they examine changes in task use (i.e., changes in the mix of skills workers use in their jobs) in Germany between 1986 and 2006. They point out that earlier studies found that younger workers had greater abilities in both physical tasks and cognitive tasks with intense use of fluid abilities. This would imply problems for older workers if they are in fact less able to adapt to technological change that includes a shift toward tasks that are more cognitively demanding. The authors find, however, that those older workers who have remained in the labour force have actually adapted well to technological changes, as evidenced by the fact that they have experienced greater growth in tasks with intense use of cognitive abilities. This is a partial explanation of the larger increase of wages for older worker in this period, as compared with younger workers.

Klaus Prettner, David E. Bloom, and Holger Strulik build on earlier studies on the nature and contribution of human capital to economic growth<sup>12</sup> and find evidence, using a

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<sup>11</sup> Autor, David., Levy, Frank. and Murnane, Richard .J. (2003). "The Skill Content of Recent Technological Change: an Empirical Exploration." *Quarterly Journal of Economics* **118**(4): 1279-1333.

<sup>12</sup> David E. Bloom and David Canning, "Health as Human Capital and its Impact on Economic Performance", *The Geneva Papers on Risk and Insurance*, April 2003, Vol. 28, No. 2, 304–315; David E. Bloom and David Canning, "The Health and Wealth of Nations", *Science*, February 18, 2000, Vol. 287, 1207-9; Lee, R. and Mason, A. (2010). "Fertility, Human Capital, and Economic Growth over the

cross-country panel dataset for 1980-2005, that greater investment in education and health can help to counter the declining labor supply that may come about because of declining fertility. This conclusion is consistent with the view that economic growth and development are not merely a function of the quantity of labour but also of its quality, which is increased by the contributions of education and health to human capital. The authors point out that lower fertility can lead to a larger effective labor force of the future, because (a) fewer children generally mean healthier and better educated children, and (b) better health, cognition, and education generally translate into more productive adults. This effective enlargement of the labor force will help offset the shrinking of it that comes from population aging.

Christian Göbel and Thomas Zwick analyze a linked employer-employee dataset for a panel of German establishments during the years 1997-2005. They do this to test the implications of different human resource practices for the shape of the age-productivity profile. Notable among their findings is that creation of mixed-age working teams is beneficial for the productivity of all workers, i.e., they find evidence of a productivity-enhancing synergy between older and younger workers. The authors also find that adoption of certain practices (e.g., equipment changes that mitigate hearing and vision problems and age-specific job assignments that are less physically demanding or in which the work environment is modified to match older workers' capabilities) can prevent the decline in productivity that might otherwise take place as workers age. By contrast, they do not find a significant effect from reducing working hours or offering training for older workers. The authors suggest that employers' successful adoption of appropriate age-focused measures helps to explain the fact that older workers' productivity is on average not lower than prime-age workers' productivity.

Miguel Sanchez-Romero, Joze Sambt, and Alexia Prskawetz build on the important recent work of Imrohorglu and Kitao (2012)<sup>13</sup> on the responsiveness of older workers labour supply and savings behavior to changes in the incentives for retirement, and corresponding aggregate impacts of those changes. The authors present an extremely careful, detailed analysis of the fiscal sustainability of Austria's pay-as-you-go pension system and the recent pension reforms in that country. The context for their study is that (a) the share of Austria's population aged 60+ is projected to increase from 21% in 2000 to 33% in 2030; (b) although normal retirement age for men is 65 (and gradually rising to that age for women), many workers retire much earlier; and (c) public pensions in Austria are among the highest in Europe. To carry out their research, the authors develop and calibrate a rational expectations computable general equilibrium model for an open economy. They find that the reforms made to date are not sufficient to deal with problems in Austria's pension system – difficulties that stem from low fertility, rising longevity, and early retirement ages. Their simulations suggest that alternative policies could overcome current incentives for early retirement, would therefore tend to lead

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Demographic Transition”, *European Journal of Population*, Vol. 26(No. 2):159-182; Lucas, R. E. (1988). “On the mechanics of economic development”, *Journal of Monetary Economics*, 22:3-42; Mankiw, N. G., Romer, D., and Weil, D. N. (1992), “A contribution to the empirics of economic growth”, *Quarterly Journal of Economics*, Vol. 107(No. 2):407-437.

<sup>13</sup> Imrohorglu, S., Kitao, S., July 2012. “Social security reforms: Benefit claiming, labor force participation, and long-run sustainability”, *American Economic Journal: Macroeconomics* 4 (3), 96–127.

workers to remain in the labour force longer, would be a key step in addressing inadequate labor supply, and would promote the fiscal sustainability of the pension system by limiting the growth of expenditures. Another result, similar to the findings of Prettnner et al. in this issue, is that higher public spending to raise educational attainment can also buttress the fiscal sustainability of the pension system.

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