THE IMPENDING SHIFT TO AN OLDER MIX OF WORKERS: PERSPECTIVES FROM THE MANAGEMENT AND ECONOMICS LITERATURES

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ABSTRACT

This paper adds a new dimension to the debate in the management literature about the merits or otherwise of employing older workers. Given the reality that we face an older workforce in the coming decades, the paper first reviews the management literature on the implications of an older workforce. This literature points to a range of benefits, and some costs, to businesses of employing older workers. A new dimension to this debate is provided by considering the age mix of a given workforce from the perspective of neoclassical economics. This framework provides us with the notion of an optimum workforce age mix. If an optimum age mix exists, the natural question that arises is: are we likely to move closer or further away from it as the available workforce ages? The paper suggests that an optimum age mix does exist, and early signs are that Australia is moving closer to it as the workforce ages. However, more empirical evidence and analysis is required before we can be confident about this prediction. The paper suggests a way forward in that regard.

Key words: Ageing population, ageing workforce, workforce age mix, older workers, Australia.

AUSTRALIA'S AGEING POPULATION

Australia's population and workforce are ageing. Australia is not alone in facing these new phenomena; other developed countries have forecast and designed a range of strategies to deal with the challenges of their ageing populations. The reasons for these ageing populations are the post World War II baby boom, followed by low birth rates in subsequent generations. This, combined with healthier lifestyles, advances in medical science and the subsequent increase in longevity, means that there are more older people than ever before (Australian Government Productivity Commission 2005) and this trend will continue for several decades.

INTERNATIONAL COMPARISON OF AGEING POPULATIONS

By 2044-2045, the proportion of those over the age of 65 years is predicted to double, meaning that one-quarter of Australians will be aged 65 years or older (Australian Government Productivity Commission 2005). Further, the median age of Australians is predicted to rise by 7 years over the next 50 years, from 36.6 years in 2005 to 43.6 in 2050 (United Nations Secretariat 2005). During the same period, the share of Australia's

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population over the age of 65 years is projected to increase from 12.3 per cent to 23.9 per cent. See Table 1, below, for an international comparison.

TABLE 1: International comparison of selected countries: Median age and share of population over the age of 65 years

Country	Median age (a)		Share of population	
			> 65 years	s (%) (b)
	2005	2050	2000	2050
Japan	42.9	52.3	17.2	36.5
Italy	42.3	52.5	18.1	34.4
Germany	42.1	47.4	16.3	28
Finland	40.9	45.6	14.9	26.4
Belgium	40.6	46.3	17	27.2
Greece	39.7	49.3	17.5	33.2
United	39.0	42.9	15.9	23.3
Kingdom				
Spain	38.6	49.9	16.8	35
Australia	36.6	43.6	12.3	23.9
United States	36.1	41.1	12.3	20
Malaysia	24.7	39.3	4.1	15.7

Source: Adapted from (a) United Nations Secretariat, (2005) and (b) United Nations (2003)

As can be seen in Table 1, by 2050 the percentage of over 65 year-olds in Australia will be higher than that of the USA and UK, but is not predicted to rise above that of many other developed countries, for example, Japan, Italy or Germany. However, while the more serious ageing challenges are likely to apply to those counties with older populations (such as Japan, Italy and Germany), the ageing of the population is not limited to developed countries. Even the 'youngest' country, Malaysia, is predicted to age, with the median age of 24.7 years increasing to 39.3 years by 2050.

IMPLICATIONS OF THE AGEING POPULATION ON AUSTRALIA'S WORKFORCE

An ageing population is important, not least because of the consequent impact upon the ageing of the workforce. Labour force participation rates are explained as the total number of people in the labour force in any population group as a percentage of the number of people in that population group (Australian Bureau of Statistics 2005). From Table 2 below, the current slowly rising labour force participation rates are predicted to fall with ageing, from the current level of 63.5 per cent to about 56.3 per cent by 2044-45 (Australian Government Productivity Commission 2005). Ageing leads to a decline in participation rates, because as people reach their mid-50s, they tend to either work fewer hours or retire altogether from the labour force.

TABLE 2: Labour force participation rates, Australia

	1983	1999	2001	2003	2004	2044-45
PERSONS (%)	60.4	63.1	63.4	63.7	63.5	56.3

Source: Australian Bureau of Statistics (2005) and Australian Government Productivity Commission 2005

There is a growing public debate about Australia's ageing workforce. The Government (see for example, House of Representatives Standing Committee on Health and Ageing 2005) and its various economic policy advice providers (such as Department of the Treasury, and the Australian Government Productivity Commission) have generally agreed there will be some negative consequences for the workforce caused by the ageing population. Common scenarios have suggested unsustainable rising health care costs, a growing dependency of the aged upon the (mostly younger) workers, and a labour shortfall of skilled workers. Supporting the general position of government and demographers, several academics have also suggested a workforce shortfall (see, for example, Henry 2003; Kendig & Duckett 2001; Macfarlane 2003; Patrickson 2003; Patrickson & Hartmann 1995, 1998). The most commonly reported solution by government, scholars and interest groups is increasing the participation of older people in the labour force and, especially, extending the working lives of older workers (Department of the Treasury 2004; Encel 2003; Keating 2004; Australian Government Productivity Commission 2005; Sheen 2000, 2001).

However, what might be the implications of an older mix of workers with different skills? One scenario is intergenerational tensions and problems. By contrast, intergenerational synergies may evolve, and skills may be complimentary. This paper, therefore, next explores the comparative advantages of employing older and younger workers.

THE BENEFITS OF OLDER AND YOUNGER EMPLOYEES

Research findings have supported the claim that employers value their older workers for a variety of reasons; yet other research has found that younger workers are preferred when it comes to actual hiring decisions. While some research has concluded that older workers are less proficient than younger workers in certain areas under certain conditions, others have found mixed reactions from employers about the strengths and weaknesses of older workers

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when compared with younger workers. It seems that age groups have their advantages and disadvantages as employees, as discussed below.

Advantages of employing older workers

Many researchers report positive perceptions from employers about employing older workers, or they report that common stereotypes (for example, older workers' slowing performance, having less flexibility or adaptability, greater amounts of illness, less potential, and less ability to learn new skills than younger workers) are not supported by research (for example, Bennington & Tharenou 1998; Fenstermacher & Kleiner 1999; Kaplan 2001; London 1996; Mallier & Shafto 1992; Moberg 2001; Paul & Townsend 1993, St-Armour 2001; Yearta & Warr 1995). From an extensive review of the literature, the most frequent references to the advantages of employing older workers (see Table 3 below) were in the following dimensions: experience and developed skills; reliability/dependability; loyalty; low turnover; attendance/low absenteeism; knowledge; and doing a better quality job.

TABLE 3: Perceived advantages of older workers

Dimension (in alpha order)	Authors
Accidents—fewer	Rix 1990; Steinberg et al. 1998; Taylor & Walker 1994; Warr 1994
Accuracy	Encel 1998, 2001; James 2001
Attendance/absenteeism	Encel 1998; Gordon 1995; Rix 1990; Shea 1991; Steinberg et al.,1998; Tabakoff & Skeffington, 2000; Warr 1994
Better quality job	AARP 1992; Etcoff 2001; Gordon 1995; House of Representatives Standing Committee on Health and Ageing 2005; Humple & Lyons 1983; James 2001
Commitment/able to be counted on in crisis situations	Encel 1998; House of Representatives Standing Committee on Health and Ageing 2005; Kaplan 2001; St-Armour 2001; Steinberg et al. 1998
Creativity/flexibility	Collinson 2003; Gordon 1995; Kaplan 2001; Shea, 1991; Taylor & Walker 1994
Experience, and developed skills	AARP 1992; Bell 2001; Collinson 2003; Encel 1998; 2001; House of Representatives Standing Committee on Health and Ageing 2005; James 2001; Lyon & Pollard 1997; Maule, Cliff & Taylor 1996; Ranzijn, Carson & Winefield 2004; Tabakoff & Skiffington 2000
Ethical decision making/honesty	Collinson 2003; Kaplan 2001; Moberg 2001
Job turnover	Encel 2001; Gordon 1995; Rix 1990; Shea 1991; Steinberg et al. 1998; Taylor & Walker 1994; Warr 1994

Dimension (in alpha order)	Authors
Knowledge/expertise	Bell 2001; de Pommereau 1997; Encel 1998; James 2001; Kaplan 2001; Sterns & Miklos 1995
Loyalty	Bell 2001; Collinson 2003; Encel 1998; 2001; Humple & Lyons 1983; Lyon & Pollard 1997; Steinberg et al. 1998; Walker, 1997
Maturity	AARP 1992; Etcoff 2000; House of Representatives Standing Committee on Health and Ageing 2005
People management/ influence on younger workers/mentoring roles	Collinson 2003; James 2001; Sinclai, 1998; Steinberg et al. 1998; Tabakoff & Skiffington 2000
Productivity	House of Representatives Standing Committee on Health and Ageing 2005; Landau & Werbel 1995; Taylor & Walker 1994; Walker 1997
Reliability/dependability	Collinson 2003; Encel 1998; 2001; Etcoff 2000; St-Armour 2001; Steinberg et al. 1998; Sterns & Miklos 1995; Tabakoff & Skeffington 2000; Taylor & Walker 1994; Walker 1997
Trainability	Kern 1990; Taylor & Walker 1994
Work ethic	Bell 2001; House of Representatives Standing Committee on Health and Ageing 2005; Humple & Lyons 1983; Gordon 1995; Lazarus & Lauer 1985; Shea 1991; Sterns & Miklos 1995

Etcoff (2000) argued that employers rated older workers as more dependable, making better decisions and doing a better quality job, while Landau and Werbel (1995) found sales productivity of insurance salespeople increased with their age. James (2001: 16) argued that many young people 'lack personal development and even basic meeting and organisational skills'. A survey of sales and marketing executives rated 55-65 year old salespeople higher than their 25-39 year-old counterparts:

"...on almost every front, including ability to meet sales goals, knowledge of product, commitment to serving clients, and creativity in solving problems. Older workers...may also be smarter and more goal driven than their younger counterparts... are more likely to be honest with clients and demonstrate loyalty and commitment to the client and their companies' (Kaplan 2001: 58).

Humple and Lyons (1983) agreed with these findings of a stronger sense of loyalty, and a deeper sense of the work ethic for a fair day's pay. Greater pride in craftsmanship or quality of work was a characteristic of older workers and, the authors argued, they made a greater attempt to work harder to make up for self-perceived failures or inadequacies.

Lazarus and Lauer (1985: 58) agreed, summarising their position as: '...older workers have a decidedly stronger work ethic and more positive attitude toward work than their younger counterparts'. Gordon (1995) found older Australian workers were more skilled, have better work attitudes, lower turnover and better punctuality than younger workers. Discussing the findings of a ten-year study of older workers carried out by Cambridge University, Encel (1998: 47) noted: 'experience gives increased ability to deal with new and unexpected situations; speed declines with age, but accuracy increases; and 'unconscious optimisation', ie, the ability to compensate for changes which impair performance, appears to improve with age'.

According to HRM professionals surveyed in the USA, there were ten reasons to hire older workers, namely, they: (i) were more willing to work different schedules; (ii) serve as mentors; (iii) have invaluable experience; (iv) have a stronger work ethic; (v) are more reliable; (vi) add diversity of thought/approach; (vii) are more loyal; (viii) take work more seriously; (ix) have established networks; and (x) have higher retention rates (Collinson 2003). Further, Encel (1998: 27) reported findings that 'older workers were excellent or very good on: attendance and punctuality; commitment to quality; loyalty to employer; practical knowledge; solid experience; and reliable performance'.

Advantages of employing younger workers

In contrast, research has argued younger workers are valued more than older workers by employers (for example, Department of Parliamentary Services 2005, 1998; Min & Kleiner 2001; Australian Government Productivity Commission 2005; Reark Research 1990; Rix 1990). Table 4, below, details much of the literature about the perceived advantages of employing younger workers, with the most frequent references to: flexibility; training; adaptability or willingness to change; and more relevant skills.

TABLE 4: Perceived advantages of younger workers

Dimension (in alpha order)	Authors
Ability to learn new	AARP 1992; Reark Research 1990, Steinberg et al. 1998
skills/creativity	
Adaptability/willingness to	Griffiths 1997; Hansson, et al. 1997; Ranzijn, Carson & Winefield
change	2004; Rix 1990; Steinberg et al. 1998; Yeatts, et al. 2000
Aggressive spirit	Reark Research 1990; Steinberg et al. 1998
Education quality/relevance	AARP 1989; Australian Government Productivity Commission
	2005
Flexibility	AARP 1992; Encel 2001; Griffiths 1997; Hansson, et al. 1997;
	Ranzijn, Carson & Winefield 2004; Steinberg et al. 1998; Walker
	1997; Yeatts, et al.,2000
Illness and injury—less	Encel 2001
Less expensive to hire	Bennington & Tharenou 1998; Steinberg, et al. 1998; Kidwell 2000
Mental alertness	O'Neill 1998; Steinberg et al. 1998
New technology	AARP 1989; Griffiths 1997; Hansson, et al. 1997; Min & Kleiner
knowledge/skills	2001;O'Neill 1998; Taylor 2003; Walker 1997; Yeatts, et al. 2000
Physical abilities (some)	Encel 2001; O'Neill 1998
Training—faster response; less	Encel 2001; Griffiths 1997; Hansson, et al. 1997; Kern 1990;
expensive; take less time to	Steinberg et al.,1998; Taylor & Walker 1994; Yeatts et al. 2000
learn	

In terms of the perceived advantages of younger workers, O'Neill (1998) identified that younger workers had more or better vision, hearing, strength and endurance, and cognitive processing and intellectual capital (except for general knowledge and verbal ability). Employers rated younger workers as being more creative and easier to train (Steinberg, Walley, Tyman & Donald 1998), and younger workers (aged 23-29) were strongly favoured for being ambitious, mentally alert, hard working and creative. Further, employers perceived younger workers as being less cautious, higher in physical capacity, more interested in learning technological skills, less accident prone, in better health, less resistant to change, and more trainable (Taylor & Walker, 1994).

To summarise at this point, much research has been conducted into the benefits of older workers, and less conducted for younger workers. However, both age groups have their strengths and weaknesses as employees. For example, James (2001: 17) quoted Veronica Sheen, Deputy Executive Director of the Council on Ageing (Australia) as saying, 'young people work faster, but they make more mistakes. Older people take longer to train, but they do things more thoroughly and produce a higher standard of work'. Naturally, older workers will have more experience, but the importance is the relevance and currency of such experience. In contrast, younger workers will have higher educational attainment rates (Australian Government Productivity Commission 2005), but less experience. Finally and importantly, not all individuals will perform at the same level or standard, nor will they 'age' at the same rate. Perceptions of advantages of older or younger workers, therefore, need careful application. Nonetheless, the question remains—is there an optimum mix of ages for the workforce which maximises the contribution of both age groups?

NET COST OF OLDER WORKERS

Older workers are commonly thought of as costing more because they earn higher salaries, retire early, are difficult to retrain and prone to higher rates of absenteeism and work injuries than younger workers (Brooke 2003). Evidence from the UK concluded that the human resource costs of employing older workers were outweighed by the benefits—older workers save the company money in recruitment and training (Employers Forum on Age and Age Concern 1997). Brooke (2003) undertook similar research in Australia, finding the net human resource costs (the sum of the benefits minus the costs of older workers aged 45 years and over compared to the rest of the workforce aged 44 and below) were positive for employing older workers. In terms of the net benefit to employers of older or younger workers, Brooke (2003) calculated that a net benefit (\$1956) occurred through recruitment and training costs over the costs of absenteeism and work injuries of older workers.

INTERGENERATIONAL SYNERGY

The concept of an age-mixed workforce implies that employers will need to draw upon the advantages of both older and younger workers. From the previous discussion, not only is the employment of older age groups a real possibility and a potential tool in the solution to the labour shortfall, but also it may be possible to combine older and younger workers' skills to complement each other. Thereby, the increased HR costs of the younger workforce may be balanced by their currency of skills and knowledge, in turn balanced by the experience and stability of older workers (Brooke 2003).

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However, managing intergenerational workers may present come challenges (Patrickson & Ranzijn 2004; Walker 1997). Patrickson and Ranzijn (2004) argued future employers would be managing up to four generational cohorts of workers as the workforce ages. Such intergenerational differences in lifestyle patterns, family circumstances, career experiences and expectations, they suggested, are likely to present challenges to future management. One of these challenges will be to manage such differences while still valuing the individual and their different contributions, simultaneously maintaining effective aged-mixed teams.

Given the demographics of the ageing workforce, is there an optimum age mix that maximises any intergenerational synergy? If so, are we likely to move closer or further away from it as the available workforce ages? The notion of an optimum workforce age mix will be discussed in the next part of this paper, combining ages and skills that maximise the benefits of employing older and younger workers.

WORKFORCE AGEING AND NATIONAL ECONOMIC WELL BEING

We turn now to a neoclassical economics perspective on the impending shift to an older mix of workers. Let us start with the big picture—the macroeconomic framework—and later drill down to the level of the individual firm.

It is important for the discussion in this paper to distinguish between two effects of population ageing: an older mix of a given workforce size, and a falling ratio of workers to consumers. The latter is the most easily identifiable and predictable cost of ageing for national economic well being and has been the focus of policy action in ageing countries. The extent to which the ratio of workers to consumers falls depends on several factors: the fall in the working age population as a proportion of all consumers, the change in labour force participation rates (LFPRs) of various age groups over time, including their hours worked, and the change in the unemployment rates of the various age groups in the workforce. In Australia, for example, if we hold the latter two factors constant at their current levels, the falling population share of workers implies that the ratio of workers to consumers can be expected to fall by around 15 percent between now and 2050 (Guest & McDonald 2002).

This is probably a worst case scenario because it holds constant the LFPRs of older workers which are almost certain to rise in the future for several reasons, as noted by the Australian Productivity Commission (2005). One is that younger cohorts of the population are better educated than their predecessors, which means that when they are older their LFPRs will be higher than current older cohorts, because better educated people participate at higher rates in the labour market. Other reasons include: attitudes towards older workers are likely to become more favourable when there are relatively more older people in the population, workplaces are likely to be re-engineered to better suit older workers, and older people are likely to enjoy better health and, therefore, be able to work for longer. To the extent that these factors increase LFPRs of older workers, the fall in the ratio of workers to consumers will be mitigated. Nevertheless, there will be some fall in this ratio even under the most optimistic scenarios.

How will this affect national economic well being? The answer to that depends on the way in which an ageing population and an ageing workforce affects labour productivity, which we define as average output per worker (or per hour worked) and will refer to as productivity for

shorthand. The effect of ageing on productivity remains an elusive question—unresolved in theory and empirically. For a synthesis and critique of the literature, see Chapters 4 to 7 in Birdsall, Kelley and Sinding (2001) and Chapters 1 to 8 in Mason (2001).

There are some links between ageing and productivity that are likely to be positive, and some negative. On the positive side, some economists have argued that firms face stronger incentives to innovate in the face of scarce labour (Habakkuk 1962; Romer 1990), which would lead to higher productivity. Also, to the extent that population ageing is due to falling fertility rates, it may boost human capital creation that would boost productivity. The argument here is that lower fertility is associated with a greater investment by parents in the education per child, on average, which implies greater human capital creation (Becker, Murphy & Tamura 1990). Potential negatives of population ageing for growth could arise from a loss of economies of scale, an older and perhaps less dynamic workforce which inhibits innovation, and a reduction in the supply of new researchers as a result of slower population growth (Jones 2002).

THE ECONOMICS OF THE WORKFORCE AGE MIX

Let us return to a distinction drawn at the beginning of the previous section—that is, between an older mix of a given workforce size and a falling ratio of workers to consumers. We have so far been discussing the effect of the latter on national well-being, along with the effect of ageing on labour productivity and, therefore, on national well being. A separate issue concerns the age mix of a given workforce. Here we will be discussing what happens at the level of a representative firm. We will then assume that aggregate output of the economy is simply the aggregate of the output of these representative firms; that is, the behaviour at the firm level can be simply scaled up in determining the economy-wide response.¹

Productivity of older and younger workers

One channel through which the workforce age mix can affect a firm's output is well-accepted in the economics literature. This is simply that the productivity levels of workers differ according to their age. The reasons typically given for this are that it takes time for workers to accumulate education, experience and skill through learning-by-doing. Hence older workers tend to be more productive than younger workers. One piece of economic evidence for this is the higher wages and salaries that older workers are paid, although it is acknowledged that there are factors other than productivity differences that account for the wage-disparities between younger and older workers, such as seniority-based pay schemes. However, it also appears that wages per hour worked decline somewhat as workers reach their 60s. We may infer from this that productivity tails off a little beyond middle-age—although we must be careful not to confuse cohort effects with pure age effects here. For example, as noted above, younger cohorts of workers today, especially women, have much higher education levels than their predecessors. For this reason alone we would expect to observe higher productivity of older workers in the future than we do today. Similarly, some of the observed wage disparity between older workers and younger workers today may simply be due to the different

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¹ The notion of a representative agent—consumer or firm—is a device often used in macroeconomic analysis because it enables standard microeconomic behavioural assumptions to be applied in order to draw inferences about the behaviour of the macroeconomy. This device is not without its problems however.

characteristics among cohorts. Hence, and for other reasons,² we may find that in the future wages do not decline nearly as much as workers enter their 60s and beyond. It follows that an older age mix of a given workforce will tend to raise a firm's productivity. This is one effect of the workforce age distribution on productivity.

Ingergenerational synergies: the perspective from the field of economics

There is potentially another age distribution effect, however, that has only recently been identified. It is based on the idea that workers of different ages are complementary to some degree, rather than perfectly substitutable as is typically assumed in macroeconomic modeling of demographic change. Examples of complementary, or synergistic, age-dependent skills discussed in the first part of this paper include the physical strength, higher education levels and skills currency of young workers that complement older workers' skills, including more experience, maturity of judgement, reliability, and managing people, including mentoring younger workers. This would imply that even though 35 year olds may have the same marginal productivity as 65 year olds, as reflected in equal wage rates, employing either two 35-year-olds or two 65-year-olds would yield less output than employing one of each. See Lam (1989) for the initial conceptual development, and for empirical simulations see Guest (forthcoming), and Prskawetz and Fent (2004).

The notion of synergies or complementarities of workers by age gives rise to the possibility of an optimum age mix of a firm's workforce. Among other things, a firm has to decide what output to produce and what level of labour input to employ to produce that output level. There is an incentive to find the age mix of the workforce that can produce a given output at least cost. This will be the age mix that yields the highest labour productivity and is described as the optimum age mix of the firm's workforce.

The dual notions of complementarity and marginal productivity

It can be shown that the optimum age mix of a given workforce depends on two factors: the relative marginal productivity of workers by age and the degree of substitutability (or the inverse: complementarity) between workers by age (Lam 1989). These concepts can be unpacked as follows. Suppose that there are two types of workers: old and young workers. The marginal product of young workers is the additional output produced by adding another young worker holding constant the number of old workers and the quantities of all other inputs. The marginal product of old workers is calculated analogously. The degree of substitutability is measured by a parameter known as the elasticity of substitution. In this context it means, loosely speaking, the degree to which old workers can be substituted for young workers, and vice versa, while producing a given output at the least cost. A high degree of substitutability implies that the characteristics of old and young workers are sufficiently similar that a small change in their relative wages requires a large change in the mix of old and young workers to produce the same output at minimum cost—that is, a large change in the optimum mix of old and young workers. A low degree of substitutability implies that young and old workers are relatively complementary, which implies that a large change in their relative wages would induce only a small change in the optimum mix of the two workers.

² These are the same factors that were argued above to lead to higher LFPR of older workers in the future. These same factors, it can also be argued, will tend to boost the productivity of older workers.

A formula for the optimum age mix of the workforce

The formula for the optimal mix of workers is given in Lam (1989) as:

$$\frac{\pi_j}{\pi_i} = \left(\frac{\alpha_j}{\alpha_i}\right)^{\sigma}$$

where, σ is the elasticity of substitution, π_j and π_i are the optimum workforce shares of age group j and i, respectively, and α_j and α_i are parameters reflecting the marginal productivity of workers of age j and i, respectively. Let us take a simple numerical example, with our earlier assumption of two age groups—young and old. Suppose that the marginal product of old workers is twice that of young workers – hence let α_j =2 and α_i =1. Also suppose that the elasticity of substitution between young and old workers, σ , is equal to 1. Then it would be optimal to have twice the proportion of old workers than young workers—that is, 66.7 percent of old workers and 33.3 percent of young workers. If instead the firm's workforce was split evenly between young and old workers, the same total number of workers would produce less output than they would if they split optimally. It would also take a greater number of workers to produce the same output as it would with the optimal age mix. To further illustrate how the formula works, if old and young workers were more easily substitutable the optimum share of old workers would be higher. For example, if instead σ =2, then it would be optimal to have four times the proportion of old workers (80 percent) as young workers (20 percent).

Are we moving closer to the optimum, or further away?

What are the implications of this principle in the face of population ageing and, in particular, workforce ageing? As the workforce ages, firms will find themselves employing more older workers. The economic mechanism by which this will occur is the adjustment of relative wages of older and younger workers. That is, relative scarcity of younger workers will force up their wages relative to older workers and lead firms to choose to employ fewer younger workers relative to older workers. In other words, relative wages will adjust to ensure that the available workforce, with an older age mix, will find employment.³ The question, therefore, arises as to whether an older workforce is closer to the optimum age mix of the workforce or further away from it.

If we are moving closer to the optimum, we will derive a dividend in terms of aggregate labour productivity and, therefore, economic well being. This would be a free lunch in the sense that it would not cost any resources. On the other hand if we are moving further away from the optimum, we would incur a deadweight loss in terms of labour productivity and economic well being. This would be a cost to society. The magnitude of such a dividend or deadweight loss depends on the two factors identified above in the formula for the optimum age mix. One is the degree to which younger and older workers can be substituted in producing a given output. The other is the relative productivity of younger and older workers.

Simulations of two ageing countries—see Guest (forthcoming) for Australia, and Prskawetz and Fent (2004) for Austria—suggest that population ageing is likely to move the workforce age mix closer to the optimal mix, implying a dividend rather than a cost. It bears emphasising, however, that the size of this dividend is very difficult to ascertain because of lack of evidence about the elasticity of substitution between younger and older workers.

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³ Unemployment may still persist, although it is likely that it will be lower than today as the available labour supply falls relative to labour demand in response to population ageing.

CONCLUSION

This paper has provided two perspectives on the imminent ageing of the workforce facing most developed economies. The management literature points to a range of issues that emerge as a consequence of the ageing population and workforce. From a review of the literature, it is evident that older and younger workers are not perfectly substitutable, and that there are differing advantages of employing older or younger workers. Some of these differences will be complementary; some will not. Care needs to be taken to not assume all those belonging to an age cohort perform or behave in the same way, or possess the same skills, including the benefits associated with employing them. However, the notion of an optimum age mix of the workforce emerges as a point of interest.

A neoclassical economics perspective looks to production theory to shed light on the issue. The critical variables here are the relative productivity levels of workers of different ages, holding other inputs constant; and the degree to which workers of different ages can be substituted in response to changing relative wages. The critical assumption here is that workers of different ages are not perfectly substitutable; rather they are complementary or synergistic. The degree of substitutability—or, inversely, complementarity—affects the optimum age mix of the workforce. In theory, workforce ageing could either generate a dividend or impose a cost in terms of aggregate labour productivity, although simulations in prior studies suggest that a dividend is the more likely outcome, albeit of very uncertain magnitude.

Further empirical work is clearly needed to investigate the degree of substitutability of workers by age. A good start would be to collect data on the workforce age distributions, and the economic performance, of a large sample of firms along with data on as many control variables as possible. This would allow some inferences to be drawn about the relationship between the workforce age distribution and firm performance. For example, do firms with older workforces perform better than firms with younger workforces, other things being equal? A next step would be to econometrically estimate the production relationship (production function in the jargon) between a firm's output and its labour inputs by age groups. This would enable an econometric estimate of the key substitutability parameter, allowing firms to estimate the effect on their output of a given change in their workforce age mix.

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