NOTES

Vested interests, ageing and growth

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Abstract

Along which mechanisms could ageing have an impact on economic growth? Ageing could spur growth when a larger fraction of the workforce becomes more experienced, but it could also retard the growth process when vested interests erect barriers to change. Our main contribution in this note is a theoretical analysis that shows how and when older generations are motivated to erect such barriers. A preliminary empirical analysis suggests that a larger share of people aged 65 and over is associated with lower productivity growth, while the reverse relationship holds for the fraction of people in the 50-64 cohort.

Introduction

The rapidly ageing population in the Netherlands and many other OECD countries is expected to have considerable impact on economic development. Hence, the economic consequences of ageing are already receiving ample attention in the literature. Available studies concentrate mainly on whether we can 'afford to grow old'. Some of the questions dealt with include the viability of pay-as-you-go systems, the intergenerational consequences of pension schemes, and the impact of ageing on (aggregate) savings behaviour.[1] Another potentially important question that has received virtually no attention, however, is whether ageing affects productivity growth. On the one hand, ageing may positively affect economic growth when older and more experienced workers are more productive (the *experience* effect). On the other hand, ageing could retard productivity growth when switching to a new technology becomes increasingly costly or – more generally – when change is increasingly held suspect with age (the *resistance* effect). Here, we take a first step towards analysing the relationship between demographic composition and productivity (growth).[2]

This note is organised as follows. We begin by setting out the general idea that ageing is related to vested interests and technological progress. We next discuss a formalisation of this basic idea. Briefly stated, we focus on costs and benefits associated with the adoption of a new technology, and argue that older workers are more likely to resist adoption simply because their remaining lifetime to recoup switching costs is shorter than for young workers. We also report on some first explorative empirical results of the effects of ageing on technological progress. The final section concludes.

Ageing and technological progress: the basic idea

Of the two effects of age structure we postulate – the experience and resistance effects – the former is well-known and well-embedded in the empirical literature.[3] We therefore focus on the basic idea behind the resistance effect. This idea is simple. Technological change can 'creatively' destroy existing rents. Those enjoying the rents are likely to defend their vested interests. Successful defence of vested interests hampers technological change and thereby growth. The final step that links ageing to growth is that older workers are more likely to defend their vested interest.

The first step in our argument is that technological change can destroy existing rents.[4] The perspective we take in this paper is one in which we argue that the adoption of a major new technology is costly. Jovanovic (1997), for example, argues that adoption costs outweigh invention costs roughly by a factor 20 or 30 to 1. Also, evidence that diffusion lags for new technologies are long, suggests that sizeable adoption costs are at work. As opposed to common approaches (for example, Parente 1995, and Parente and Prescott, 1994), we focus on the costs that workers have to bear as they spend time getting used to a new technology. An example is a training programme for a new technology that is offered to employees during normal leisure hours instead of during working time. Training that takes place during working hours effectively reduces production time, so that firms bear the costs in terms of foregone production. Training that takes place outside of normal working hours leaves the employee with less leisure time. The net return on adopting a next-generation technology is thereby lowered for the employee. A complementary perspective relates to technology-specific learning-by-doing. Once learning-by-doing is specific to a certain class of technologies, the adoption of a new class of technologies makes the accumulated ability with the previous technology obsolete (*cf.* Helpman and Rangel, 1999).

The second step in our argument is that agents evaluate the benefits of adopting a new technology against the costs of losing the existing rents. Once this trade-off becomes negative, agents will try to hamper technological change. This can take many different forms. History is full of examples of workers violently resisting new modes of production.[5] In modern times one might think of organisations lobbying for legal measures to protect vested interests. An example of the latter are the special production requirements for brewing beer that apply in Germany: these rules significantly depress productivity

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(*cf.* Baily and Gersbach, 1995). Alternatively, one can think of the diverse lobbying activities against genetically modified food, or the opposition in many firms against the introduction of a new software standard. In the latter example, especially workers with much specific experience have often succeeded (by a wide variety of subtle means, at least temporarily) in keeping the older software as the standard.

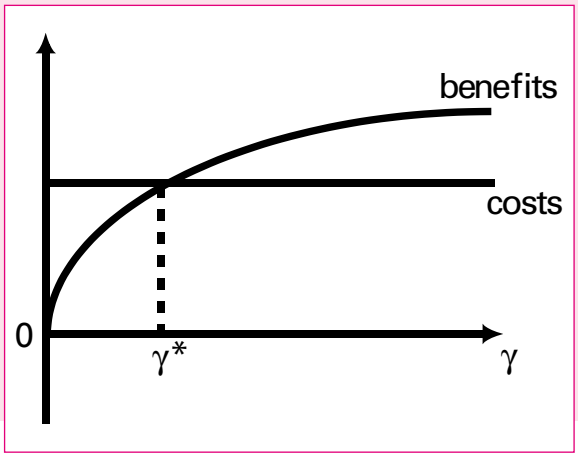
The idea that successful resistance hampers technological progress needs no further elaboration. But the final step in our argument that links resistance to ageing does need elaboration. We argue that older workers are the most likely to have an incentive to defend their vested interests. First, the greater the work experience, the more likely it is that specific knowledge is developed (Helpman and Rangel, 1999). Hence, older workers have more to lose. Second, older workers – by definition – have less time left to actively participate in the workforce. This implies that they have less time left to recoup the investments that have to be made to adopt a new technology. Older workers, therefore, most likely have (fully rational) incentives to block a new technology.

A narrow formalisation of the relationship between ageing and growth

The idea behind the resistance effect can be formalised in many different ways. We choose to focus on the adoption costs and benefits for the workers.[6] Our main idea can most easily be presented by a graph. Figure 1 illustrates the costs and benefits associated with the adoption of a new technology. Costs and benefits are on the vertical axis; the size of the innovation is on the horizontal axis.

Suppose that the costs of becoming acquainted with a new technology take the form of a fixed schooling effort that is borne by the employees (think of a training programme taking place during leisure hours). This is represented by the horizontal line in the figure. Adoption of a new technology translates into higher wages, which rise with the size of the innovation. These benefits are represented by the upward sloping curve in the figure. When the size of the innovation is equal to γ^*, the individual is indifferent towards adoption. For larger (smaller) innovations, the employee is in favour of (against) technology adoption.

Figure 1 Adoption costs and benefits



The formalisation of our story then goes as follows. The net benefits from adopting a revolutionary new technology are unevenly distributed among workers when workers are heterogeneous with respect to age. More specifically, we assume that older workers are more hesitant to adopt a new technology since they have to go through a costly learning process, whereas they are not able to reap the full benefits from working with the new technology. Young workers are more willing to accept a new technology since they can recover the cost of training more easily, simply because their remaining lifetime is longer. Once a majority of the workers calculates that the net benefits of the new technology are negative, they will block the new technology by a majority vote over the allowance for the new technology. Although we model the decision to adopt a technology by voting, one might as well think of it as a decision influenced by resistance activities. In the most general interpretation, these activities include threats of worker disobedience, threats of consumer boycotts, loss of political sympathy, etc.

What do the data reveal?

Is there any evidence of a resistance effect along with the experience effect? The empirical literature is largely silent on the relationship between technology adoption and ageing. An exception is Lindh and Malmberg (1999), who analyse the impact of ageing on macroeconomic performance. They use as a starting point the seminal paper by Mankiw *et al.* (1992) on the empirical performance of the neo-classical growth model. In this framework, cross-sectional differences in (transitional) growth rates are – *ceteris paribus* – explained by differences in initial per capita GDP (to capture convergence), differences in investment rates in physical and human capital, and differences in population growth. Lindh and Malmberg augment this model by introducing a variable that captures the age-composition of the economy. The empirical results reveal a significant effect of the age composition on transitional growth (labour productivity growth that is corrected for transitional growth[7]). More specifically, they find a significantly positive effect of the share of people aged 50-64 and a significantly negative effect of the share of people aged 65 and over. The results are reasonably robust to various changes in the specification of the regression equation and estimation technique.

We re-estimated the empirical model in Lindh and Malmberg (1999) for a different (and more easily inter-

pretable) dependent variable: labour productivity growth. In our preferred testable regression model we explain economic growth in a five-year panel of OECD countries over the 1950-1990 period from a catch-up variable (measuring the productivity difference with respect to the US), the adjusted investment rate (the natural log of the gross investment rate, minus the natural log of population growth, plus the rate of capital depreciation) and the population shares of different age-cohorts.[8] Results can be summarised by the following equation:

Table 1 Dependent variable: labour productivity growth

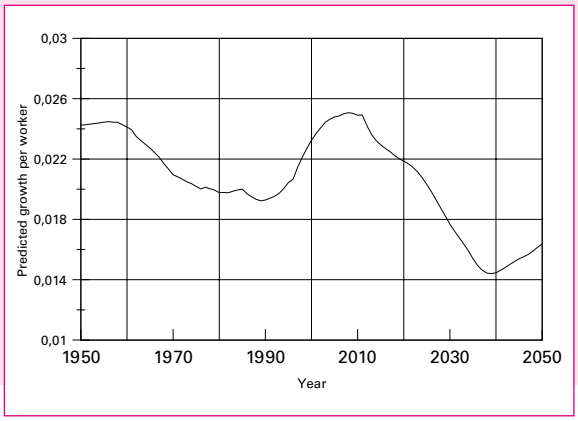
constant	0.007
	(0.181)
catch-up	– 0.027
	(– 10.584)*
adjusted investments	0.009
	(1.878)*
fraction aged 15-29	– 0.012
	(– 0.958)
fraction aged 30-49	0.012
	(0.889)
fraction aged 50-64	0.048
	(3.924)*
fraction aged 65+	– 0.034
	(-5.090)*
R^2	0.574
F-statistic	39.719
N	184

Notes: independent variables are in logs;
t-values are in parentheses.
* = significantly different from zero at 0.10 level

To summarise, countries tend to grow faster when their initial productivity level is relatively low (implying convergence among the OECD countries), when investment rates are higher, when the 50-64 cohort is larger, and when the 65+ cohort is smaller.

Our interpretation with respect to the age-structure variables is as follows. For the 50-64 cohort, the experience effect dominates. The 65+ cohort is representative for the resistance effect. It is, admittedly, not entirely clear how that mechanism works. Along with simple 'don't-rock-the-boat-kinds-of-forces' (Mokyr, 1990, pp. 12) the formal model provides two hints. First, while active in the labour force, the 65+ cohort might have retarded change, which pops up later in the data on growth. Second, the elderly might use the voting mechanism to steer policy to less growth-promoting activities. Some direct support for the latter interpretation is provided by Poterba (1996), who deals with the relationship between educational spending and demographic composition. He finds evidence of generational competition in the allocation of public funds. Educational spending per child in 48 US states in the post-war period is negatively related to the fraction of elderly. Consequently, ageing would translate into reduced educational expenditures per child.[9] We hasten to add, however, that the claim that a Poterba-effect is at work – an intergenerational struggle for public funds leading to lower growth in ageing societies – needs further investigation.

Figure 2 Ageing and growth



Taking the results as they are, we can use the findings to project future labour productivity growth in the Netherlands. Keeping the relative productivity distance towards the US and the adjusted investment rate as given, we plug in the projected population shares (taken from the CBS) of the various age-cohorts and calculate labour productivity growth from the regression equation in the table above.

Figure 2 clearly shows that in the next decennium the ageing process supports economic growth, as the most experienced 50-64 cohort becomes larger. This effect is reversed over the 2010-40 period: the fraction of 65+ increases, and labour productivity growth is reduced by approximately 1%-point around 2040. So, at the time when growth is most needed to finance the expenditures for the elderly, a new slowdown is setting in.

Conclusion

This note asserts that ageing could matter for economic growth. We have discussed some of the potential mechanisms that may give rise to a positive or negative relationship between productivity and the demographic composition of an economy. The available empirical evidence suggests that the share of people aged 65 and over hampers productivity growth, while the fraction of people in the 50-64 cohort contributes favourably to productivity growth. Clearly, more theoretical and empirical research is needed to establish robust relationships between ageing and productivity. The policy relevance of this research hardly needs explanation, given the developments that await us in the coming decades.

Regulatory taxation of large energy users reconsidered

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Abstract

Energy policy in the Netherlands with respect to the basic industries has been restrained. National energy taxation is considered to be unsuitable for large energy users because of its international reallocation effects. However, alternative measures such as energy restrictions and marginal taxation induce low average and high marginal energy costs and consequently generate small displacement effects, together with large energy savings. A system of tradable permits not only has the advantage of low average and high marginal costs, but also keeps one firm from investing in relatively expensive energy-saving options while other firms refrain from exploiting their relatively cheap saving options.

Introduction

The commitment of the Dutch government to the Kyoto agreement with respect to the emission of greenhouse gases has been seriously challenged. High economic growth, reduced energy prices and failing environmental policy has boosted greenhouse gas emissions since 1990. Indeed, CO2 emissions have increased by about 8% between 1990 and 2000. This development is entirely at odds with the agreed-upon reduction of greenhouse gases of 6% between 1990 and 2010, and leaves the government with the almost impossible assignment of reducing CO2 emissions by 14% before 2010. The upgrading of environmental policy instruments is therefore of paramount importance.

National environmental policy is heavily restricted by the openness of the economy because the policy may generate substantial displacement effects. The Steering Committee on Regulatory Taxation of Energy has revealed that this is particularly true for the basic industries (Wolfson1995). Although the reallocation of basic industries would have a minor impact on economic growth, it wouldn't help diminish the global emissions of greenhouse gases, either. The conclusions of the Steering Committee have considerably influenced energy policy. Energy taxation policy for large energy users has been abandoned because of the displacement argument. Instead of reliance upon financial measures, the government

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