Introduction

The fear that market economies would stagnate had been present in economic thought for almost a century when, after the First World War, the decline in the rate of growth of the populations of the then more advanced economies brought it back to centre stage. In the 1920s, although migration had fallen to between a third and a quarter of the flows of the pre-war decades, the rate of growth of the population of European countries almost halved. The acceleration¹ of the long-run decline in the birth rates was the main factor. The parallel decline in the death rates was not enough to compensate for its effects. The coincidence, in the next decade, of the lower population growth with the Great Depression² and with the development of the analysis of the non-competitive market structures, justified the new stagnationist approach to long-run growth. This revival prolonged itself into the economic literature of the 1950s.

In the meantime, two demographic shocks of different sign and size hit the more advanced economies: some of them experienced a further sharp drop in the birth rate during the Second World War, for obvious reasons; all of them reacted to the end of the war with a huge and long-lasting acceleration in the birth rates. This latter reaction, of the opposite sign to that observed after the First World War, was accompanied by the so-called ‘golden age of growth’ of the industrialised world, and a stagnationist approach was no longer mentioned.

Viewed under this perspective, the baby boom at the end of the 1940s and in the 1950s may look like an over-reaction along the long-run declining trends of both birth and mortality. Such a long over-reaction suggested that there are more interactions among economic growth, social policies and population dynamics than previously thought.

Nowadays, we might also wonder whether the two or three decades of rapid growth after the Second World War were an outlier in the very long-run process of growth; whether the current deceleration of the population growth in Japan and in Europe is the reason for their lower rate of growth; whether, in more general terms, the expected decline in population in future decades will necessarily imply a sharp reduction in the rate of growth of the industrialised economies.

The pendulum of the attention of the economists has moved back to the relationship between demography and growth. Numerous contributions

have been published on the question whether the phase of *demographic transition* to a less numerous and older population implies systematically lower rates of growth. This book, on population ageing and growth, tackles some aspects of this problem from both a theoretical and an empirical point of view as part of a larger project aimed at explicating the possible effects of an ageing population on the macroeconomic performances of social security, the labour market, and growth. Two other books in the series have focused on population ageing and social security, and on population ageing and the labour market.

The macroeconomic questions raised by the ageing of a population are well known and shared; the answers are much less so. This book adds new contributions to the spectrum of answers, based mainly on empirical findings deeply rooted in theoretical analysis. The main focus is on Japan, but we also turn our attention to Italy and the United States.

AGEING AND THE MACROECONOMIC ISSUES

Labour Supply

The decline in population implies a reduction in the supply of labour, and a change in its composition. The reduction in the actual supply of labour is expected to be offset by an increase in the participation rates of the working-age population. This is strictly tied to the likelihood of an increase in female labour force participation, and the participation of both male and female workers within the 55–65 age bracket. Wage incentives and appropriate social policies are required. Given that younger female cohorts are spontaneously participating to an increasing extent, a more rapid increase in the average participation rate would depend mainly on policies aimed at changing the attitude to work of the more mature female labour force. These changes face cultural obstacles and mismatches in the demand and supply of skills, which cannot be ignored. If these policies are not successful the only tool to increase labour supply is to allow higher rates of immigration.

The change in the composition of the labour supply is a question relating to the impact of a relatively older workforce on average productivity. The age–earnings profile that we have inherited from the past shows an increase in earnings as workers age, suggesting that productivity increases as individual workers age. Does the increasingly larger share of mature workers that we expect for the future really imply a higher average output per employee? If the answer is in the affirmative, it would compensate, at least partially, for the reduction in absolute value of the potential labour

force; but this is open to question. For example, consider the features of the new wave of technical progress through information and communication technology (ICT). These require strong efforts in the lifelong learning approach to human capital maintenance in order to allow workers to be able to fully use the new technologies. Are the industrialised countries ready to implement such human capital policies? Is the efficiency of the new production processes still based mainly on the experience the workers accumulate throughout their working life, as in the more traditional manufacturing activities? The possible mismatch between the competence required by the application of ICT and the ability of an older population to keep up with those technologies, will influence industrial relations, wage policies and, more generally, the dynamics of total factor productivity (TFP).

There are not only supply-side effects of a declining population. We should not ignore the possibility that there may also be demand-side effects, such as reduced stimuli to radical product innovations, which would reduce the rate of invention of new products, and the frequency of starts of new product cycles. This reduced rate of product innovation might not compensate for the saturation of the more mature product cycles. If we view the long-run growth process as the result of subsequent starts of different product cycles, the reduction in the start rates implies a reduction in the long-run growth.

Capital Accumulation and Technical Progress

Let us consider the supply effects. If the higher intensity of utilisation of the working-age population, and the possible better quality of the labour supply is not enough to compensate for the decline in the level of potential employment, the expectation that technical progress will expand the production possibility frontier that demography narrows would rely only on the quantitative and qualitative aspects of the capital accumulation process, and on the nature of technical progress. If more capital-intensive production processes are required to help productivity growth to compensate for the decline in the labour input growth, the fact that the reduction in the size of the labour force releases resources should not be ignored. Evaluating the actual amount of resources released requires considering the behaviour of the capital depreciation rate: the more rapid the technical progress, the shorter the average economic life of capital and the fewer the resources released by the decline in employment.

The other side of the coin is the spontaneous effect of ageing on saving propensity. The decline in the fertility and mortality rates have opposite effects on the dependency ratio. Currently, the dependency ratios in the industrialised countries are more or less the same as they were a century

ago. Of course, the crucial difference is the relative size of young and old-age dependency. In future decades, the strong increase in the elderly dependency ratio will substantially outweigh the reduction in the young dependency ratio, even though two factors are counteracting the downward trend in the young dependency ratio. First, at the current immigration rates, the reduction in the fertility rate seems to have reached its floor, at least in the fastest-ageing countries such as Japan and Italy.³ Second, the young are systematically delaying the age of entry into the labour market.

The young and elderly components of the dependency ratio are expected to have different effects on saving rates through the life-cycle planning of consumption and the attitudes towards the future expressed by the intertemporal preferences of the economy as a whole. Lower young dependency is very likely to imply a reduction in the propensity to consume. Higher elderly dependency implies either a higher propensity to consume, if we consider only the effect of asset decumulation, or a lower propensity to consume if we consider the strong precautionary motivation for saving that elderly people tend to show, in view of their longer life expectancy as retirees, and the implicit higher probability of old-age disability. Moreover, it is likely that a more mature working-age population, expecting to live longer, will save at a higher rate. As a whole, population ageing is likely to exert a larger number of effects with a positive sign on saving, but we know very little about the relative sizes of the negative and positive effects.

If the empirical answer is that the positive spontaneous impacts of ageing on saving are not enough to compensate for the negative ones, should governments enact policies aimed at stimulating saving or should they act to stimulate productivity growth directly? The question is even more intriguing if we consider technical progress to be endogenously determined. This alternative nature of technical progress allows different inter-generation distributions of the burden of capital accumulation. In other words, should the current generations bear the burden of reducing the social and political impact of the future intrageneration redistribution of consumption implied by the ageing of the population, or could it be spread more evenly over current and future generations?

Pension System Reforms

In the absence of a clear answer to this question, governments, with different degrees of awareness, seem to behave according to the following reasoning: in the next decades, population ageing will bring about, *ceteris paribus*, a reduction in consumption per capita with respect to output per employee; as a consequence, the ultimate goal of the pension reforms is to reduce the ratio of the average benefit to the average output per employee; this aim can

be pursued through a reduction in the entitlements, changing the rules of the benefit determination, and/or an increase in the 'size of the cake', increasing the relative weight of the funded pillar of the pension systems *vis-à-vis* the unfunded one; this change is expected to increase the propensity to save, hence the long-run productivity growth.

If the increases in the propensity to save and the output per employee are not significant, the redistributive tensions will show up along two different channels. First, countries with a large share of the unfunded pillar will face political and social tensions; they will need a parliamentary vote in order to redistribute consumption, but parliaments will by then comprise a larger share of representatives of the elderly part of the population. Second, countries giving importance to the funded pillar will face a downward shift in the price of assets held by the elderly, in order to adjust the value of the asset decumulation required by an ever-increasing elderly population to the value of the new saving of a dwindling younger generation.

In other words, if the policies aimed at increasing both labour force participation and productivity growth fail, then the demographic shock translates into the choice between a political risk and a financial market risk. Are they diversifiable risks, or are they two corner solutions? The current common opinion seems to be based on the second assumption. At least in principle, financial markets allow returns higher than the rate of growth of the economy, so we should put all our eggs in one basket; this, moreover, would allow the diversification of the demographic risk through the financial and direct investment in the emerging countries still lagging behind in their demographic transition.

This is a very abstract solution. Countries with a largely pay-as-you-go system are already far ahead in the process of ageing and the cost of withdrawing from such a system would be very high. Thus a diversification of the two risks is more likely. On the one hand, governments will have to accept an increasing share of immigrants who will be fully integrated into domestic institutions. On the other, the residual impact of the consumption redistribution will be spread throughout the international arena through deficits in the foreign current account, compensated by outflows of capital that react to the domestic returns reduction. This international redistribution of production activity will be reflected in a GDP growth that is smaller than than GNP growth.

THE MAIN FINDINGS OF THE BOOK

Nothing particularly new has been added to the background situation as outlined above. What is really new is the effort made by the contributors to

this book to draw answers to the questions raised from a well-detailed empirical analysis. Part I is devoted to the analysis of the long phase of stagnation of the Japanese economy. In Chapter 1, 'Economic growth under the demographic transition: a theory and some international evidence', Fukuda and Morozumi move from the working assumption that the rapid growth of the East Asian countries in the past decades has been supported by the sharp decline in the birth rate, which has reduced the dependency rate, hence increased the propensity to save. Now the birth rate has stopped declining, whereas mortality rates are expected to continue decreasing, thus increasing the dependency ratio. The authors build an overlapping-generations model, where the young workers' propensity to save depends on their life expectancy. The theoretical result is that the strength of the statement that demographic decline implies growth rate decline is reduced if the young save more and feed a more intensive capital accumulation. This result granted, the authors challenge their theoretical conclusion on empirical grounds. Econometric cross-country estimates do not contradict their working assumption: the rate of growth of the population has a negative impact on the rate of growth of the economy, but the old-age dependency ratio has a positive effect, and the young dependency ratio a negative one. Moreover, the cross-country behaviour seems to suggest that if private saving is invested either abroad or in the financing of the larger public budget deficit, the positive impact on growth is reduced. As a consequence, the prospective impact of demographic transition on the economic growth of the Japanese economy will be the result of the balance between those two opposing effects.

In Chapter 2, 'The 1990s in Japan: a lost decade', Hayashi and Prescott take a different point of view. Two main factors have been at work on the supply side of the Japanese economy during the 1990s: the decrease in the rate of growth of TFP, and the progressive reduction in the working time of Japanese workers (from 44 hours a week to 40). The authors check their working assumptions through the calibration of a neoclassical growth model on the data of the pre-1990 Japanese economy, and show that their model predicts the slowdown of growth that has been experienced in the 1990s, the increase in the capital output ratio, and the decline in the rate of return to capital. The relevance that their model gives to TFP in explaining Japan's growth decline suggests that, in order to support growth, Japan does not need to increase the capital to labour ratio, hence does not need to increase the saving rate. However, it does need to improve the efficiency of the overall economic system, by reducing the area of rent positions sheltered from market competition, and the amount of subsidies paid to inefficient firms and to declining sectors.

Whereas Hayashi and Prescott identify the diminishing contribution of

TFP as a factor in the growth of the Japanese economy, in Chapter 3, Kurokawa, Minetaki, Nishimura and Shirai ('Effects of information technology and ageing work force on labour demand and technological progress in Japanese industries: 1980–1998') try to show why TFP growth has diminished. First of all, they build an extensive database for both the ICT capital stock of the different industrial sectors, and the labour inputs, disaggregated with respect to age and education. On the basis of their extensive empirical analysis they conclude that the new ICT capital stock services are substitutes for young workers with low education, and complements of workers with high education. Older workers with low education have become to a larger extent a quasi-fixed factor of production. With the new ICT technology, the long on-the-job experience of the older workers no longer represents a comparative advantage for the quality of Japanese products. The empirical analysis concludes that the productivity slowdown is the result of the inflexibility of older workers, the obsolescence of the management *vis-à-vis* the technology evolution, and the small externality effects of the new ICT that these factors imply. In other words, the change in the composition of the labour force, implied by the ageing of the Japanese population, does not fit too well the observed change in technology.

In Chapter 4 ('Demand saturation – creation and economic growth'), Aoki and Yoshikawa look for an explanation of the slowdown of growth in Japan not on the supply side, but on the demand side. Technical progress behaviour should not be approached through the concept of TFP. Technical progress proceeds in steps marked by innovations capable of creating demand, which validates the introduction of new products. As the new products mature, demand for them tends to reach saturation point, and the return to capital invested in those industries diminishes even if the quality of the mature products is improved and their production processes restructured. The rapid growth in the East Asian countries in the 1990s, and in Japan in the 1950s and 1960s, was a result of the appropriate combination of income distribution and new product introduction. In a sense, the authors try to map the Keynesian principle of effective demand onto the domain of medium–long-run economic growth. Whether the ageing taking place in Japanese economic society has something to do with the saturation of demand for current products or the reduction in new ones is a question which is alluded to, but not pursued.

Part II comprises three chapters dealing with the impact of demographic transition on the different kinds of pension systems, and the possible effects of their reform for income distribution and growth. In Chapter 5, ('Distributional impact of social security reform') Bosworth, Burtless and Sahm use a small neoclassical growth model combined with a microeconomic

model based on several different age profiles of individual earnings to simulate both the distributional and scale effects of different kinds of reform of the pension system. Those effects are simulated in two different contexts (static and dynamic), and are evaluated in terms of lifetime income. The static simulations merely show the distributional impacts of the reforms among both young and old generations, and workers with high or low age profiles of earnings. The dynamic ones allow the induced higher savings and the implied increase in the resources available for future generations to be measured. Higher payroll taxes on the current generation, lower future benefits, and a larger share of total retirees' income due to the return on individual retirement accounts are the candidate reforms capable of increasing national savings through higher private or government savings. Higher national saving implies a more rapid growth of real wages (through an increase in the capital to labour ratio), but a reduction in the rate of return to capital, which changes the proportion of total retirees' income coming from either social security or individual accounts, given the different distributional rules: defined benefit versus defined contribution.

The different performances of the funded and unfunded pension systems depend on the different return to social security and to financial assets. They are both subject to risk: first a social and political risk, more uniformly spread over a relatively higher number of generations; the second, a market risk, possibly more concentrated on particular generations. In Chapter 6 ('Asset accumulation and retirement income under individual retirement accounts: evidence from five countries'), Burtless considers the risk component associated with the defined-contribution individual retirement accounts; the previous chapter ignored this factor. The main financial risks refer to the behaviour of the rate of return during the period of asset accumulation, to the rate at which the accumulated assets are transformed in pension annuities, and to the inflation risk during the retirement years. Burtless shows that the return on individual accounts can be a good one, but with a large variance of possible outcomes, according to the cohort the worker belongs to. The wide spread of results is based on the computation of the return the workers would have, had they invested for 40 years in individual accounts starting at different dates between 1927 and 1962. These computations apply to different financial portfolios, and to different industrial countries. To give a very simple example of the risk associated with the individual accounts, a Japanese worker who has invested in a conservative portfolio (50 per cent equities, 50 per cent bonds) for 40 years, and retires in a given year in the 1990–2002 period, may have a replacement rate of pension to his/her peak wage of between 24 and 103 per cent.

However, economic policy for ageing societies aims at a more differentiated pension system, reducing the promised benefits, increasing contribu-

tions and offering options for withdrawing from pay as you go. The hope is for a positive effect on saving, which supports higher growth. The Italian experience is quite interesting from this point of view. Baldini, Bosi, Guerra, Mazzaferro and Onofri deal with the process of reforms of the public pension system enacted in Italy between 1992 and 1997, in Chapter 7 ('Pension reforms, tax incentives, and saving in Italy'). They analyse the effects of those reforms on the individual behaviour of households, and conclude that, apart from a stronger short-run impact, the compensating increase in private wealth was about half the size of the change in net social security wealth induced by the reforms. This compensating increase is, however, concentrated among the middle and older age groups, while the young do not seem to have reacted significantly to the reforms, even if they are the generations most affected. Actually, the replacement rate in Italy is still relatively high, and the workers benefit from a system of compulsory precautionary saving. Contrary to the idea that pension funds do not take off owing to a lack of tax incentives, the authors show that the incentives are strong enough, even in an international comparison with the United Kingdom or the United States.

Independently of the financial risk associated with the asset value of the funded pillar of the pension system, ageing is expected to imply a reduction in the return to domestic capital investment; this possible general drift is likely to be contrasted by international capital movements towards a higher return in the 'younger' countries. Part III is devoted to the analysis of the influence of demographic transition on international trade, capital markets, and exchange rates. In Chapter 8 ('Incorporating demographic change in multi-country macroeconomic models: some preliminary results') Bryant and McKibbin insert demographic components (birth rates, mortality rates, age-earnings profiles) into a macroeconomic model of two open economies: a simplified version of the world economy. The agents of each region of this world economy model behave according to the life-cycle theory of consumption and capital accumulation, where demographic variables influence human capital. The authors simulate the effects of symmetric or asymmetric demographic shocks. An asymmetric demographic shock like the post-Second World War baby boom years, followed by the progressive ageing of the population, produces a long phase of higher growth (hence higher consumption per capita), higher interest rates and depreciation of the currency of the country hit by the shock. That phase is followed by another long period of adjustment to the baseline path, where growth (and consumption per capita) slows down, interest rates decrease and the currency appreciates. The shock takes about a century to be reabsorbed. The path of absorption of the shock is quite different according to the role that the age-earnings profile is allowed to play in determining the human capital evolution.

SUMMARY

The positive shock on the birth rate in the decades after the Second World War went hand in hand with the most important phase of growth ever experienced by the industrialised countries. Japan and Europe are currently experiencing the incipient phase of demographic transition after the baby-boom shock, associated with a decade of stagnation in Japan and a slower medium-term growth in Europe. In both cases, the demographic explanation is likely to be deeply rooted in the background, but it does not seem to be the dominant one. As for the future, given the expected size of the ageing process, demographic transition is likely to work as a more important attractor for the economic growth of the most rapidly ageing countries. The chapters presented in this book show that this does not necessarily imply a long-run wave of dramatic decline in growth for those countries. Immigration and integration of foreign workers, deeper integration of capital markets with agreed mechanisms to reduce their volatility, higher domestic participation rates and, more relevant, a stronger rate of increase in technical progress would allow the strength of the demographic attractor to be reduced.

The chapters presented in this book suggest that economic policy has to face two different kinds of challenge. First, how to let the various factors work out all their positive effects. As for the increase in the participation rate, there is general agreement both on the goal and on the measures to be taken. It is likely to be a medium-run process, emerging as the younger cohorts age. There is less agreement on how to support higher long-run growth. More market efficiency is necessary to allow productivity to accelerate, but is it enough? An ageing population is bound to imply an increase in the propensity to consume, even if, as the contributions to this book argue, to a lesser extent than is usually thought. Nobody denies that long-run economic policy should aim to reverse the decline in the propensity to save; nonetheless, in countries like Japan, Italy and Europe in general, where populations are already ageing, there are strong doubts about the opportunity to implement such policies in the short and medium terms. The second kind of challenge is how to make the redistribution of consumption, which the ageing process necessarily requires, socially and politically viable. There is general agreement on the transformations required by the current pay-as-you-go pension systems to make them more equitable. Less agreement can be found about the extent to which they are to be transformed into individual funded accounts. The contributions to this book supply tools for the analysis of the redistributive impact among and within the generations. However, they cannot say anything about whether those measures will actually keep potential social and political tensions under control.

NOTES

1. See Angus Maddison, *The World Economy: A Millennial Perspective*, Paris: OECD, 2001.
2. See Joseph A. Schumpeter, *History of Economic Analysis*, New York: Oxford University Press, 1954, vol. III, ch. 6, § 1.b.
3. This does not prevent the birth rates from further declining during the transition to a lower share of 25–45 year olds.