

Human Capital Formation and Its Consequences in Poland in the Period 2008-2050

(Tentative findings. Please do not quote.)

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Extended Abstract

This paper addresses the question of how workforce ageing influences human capital formation, human capital deterioration, and future productivity growth.

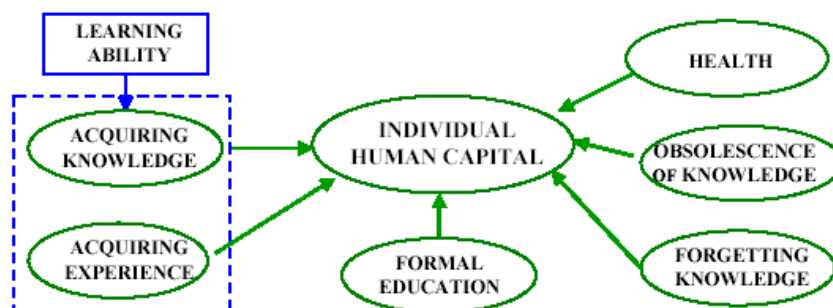
Background and Purpose of the Research

The XXI century is called by demographers the century of population ageing (Lutz, Sanderson, Scherbov, 2004). The population projections show the share of old people will increase dramatically in the future. Population ageing brings about not only the demographic consequences, but affects all aspects of society functioning. One of the most significant problems is the ageing of workforce which generates a wide range of challenges in the social and economic context. The important issue is how the process of ageing influences the human capital stock accumulated in workforce population, which is one of the main driving forces of the economic productivity growth. The shrinkage of human capital available on the labour market could cause slower or even negative economic growth in the future. The main objective of this work is to assess the influence of workforce ageing on human capital formation. The question arises if human capital resources increase or decrease together with the process of population ageing.

Method

The method presented in this paper focuses on the magnitude of human capital that has been accumulated in an individual. It takes into consideration education, acquiring knowledge and experience, knowledge becoming obsolete or forgotten, as well as the impact of health (see figure 1). The calculations in the paper are presented on example of Poland in the period 2008-2050.

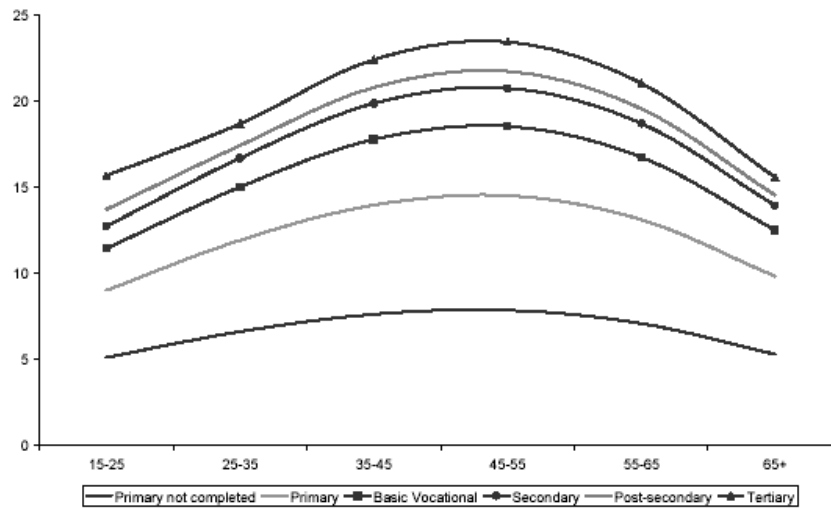
Figure 1:
Factors affecting the individual human capital.



Findings

The estimated human capital curve (based on the net effect of the various determinants of human capital) has an inverted U-shaped profile (see figure 2).

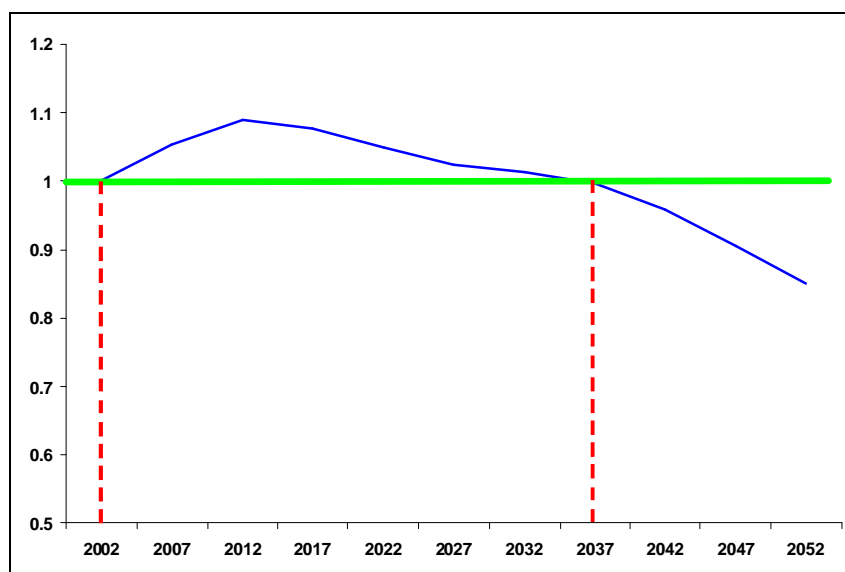
Figure 2:
Education specific human capital profiles.



Source: own calculation.

The consequences of workforce ageing can be considered in the short and long term (see figure 3). In the short term, the accumulated human capital could increase in Poland if well-educated workers from large cohorts reach the age at which their human capital is the highest. However, in the long term, a decrease in aggregate human capital is expected because the working-age population shrinks. This could also affect economic growth levels in the future.

Figure 3. Aggregated human capital (workforce) in Poland. Tentative findings.



Source: own calculations.

References

- Azariadis C., Drazen A., (1990), Threshold Externalities in Economic Development, *The Quarterly Journal of Economics*, Vol. 105.
- Ayers R.U., (1994), Toward a Non-Linear Dynamics of Technological Progress, *Journal of Economic Behavior and Organization*, 24 (1), pp. 35-69.
- Bahrick H.P., (1984), Semantic Memory Content in Permastore: Fifty Years of memory for Spanish Learned in School, *Journal of experimental psychology: General*, vol. 113, no. 1, March 1984, pp. 1-29.
- Barro R.J., (1991), Economic Growth in a Cross Section of Countries, *The Quarterly Journal of Economics*, Vol. 106.
- Barro R.J., Sala-i-Martin X., (1995), *Economic Growth*, McGraw-Hill, New York.
- Becker G.S., (1962), Investment in Human Capital: A Theoretical Analysis, *Journal of Political economy*, vol. 70, no. 5, part: Investment in Human Beings, pp. 9-49.
- Becker G.S., (1993), *Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education*, Third Edition, The University of Chicago Press, Chicago.
- Bosworth D.L., (1978), The rate of obsolescence of technical knowledge. A note, *Journal of Industrial Economy*, vol. 26, pp. 273-279.
- Ebbinghaus H., (1913), *Memory: A contribution to experimental psychology*, Teachers College Columbia University, New York.
- Jaber M.Y., Kher H.V., (2002), The dual-phase learning-forgetting model, *Int. J. Production Economics*, 76 (2002), pp. 229-242.
- Kahana M.J., Adler M., (2002), Note on the power law of forgetting, Working Paper, Brandeis University.
- Kaufman A.S., Lichtenberger E.O., (2002), *Assessing Adolescent and Adult Intelligence*, 3rd Edition, Wiley Publishers.
- Krueger A.B., Lindahl M., (2000), Education for Growth: Why and for Whom?, NBER Working Paper 7591.
- Lutz W., Sanderson W.C., Scherbov S. (eds.), (2004), *The End of World Population Growth in the 21st Century. New Challenges for Human Capital Formation and Sustainable Development*, Earthscan, London.
- Jensen A.R., (1980), *Bias in Mental Testing*, Free Press, New York.
- Mankiw N.G., Romer D., Weil D.N., (1992), A Contribution to the Empirics of Economic Growth, *The Quarterly Journal of Economics*, Vol. 107.
- Matarazzo J.D., (1972), *Wechsler's Measurement and Appraisal of Adult Intelligence*, 5th ed. New York, Oxford University Press.
- Mincer J., (1981), Human Capital and Economic Growth, NBER Working Paper Series, Working Paper No.803.
- OECD, (2001), *The Well-being of Nations: The Role of Human and Social Capital*, OECD, Paris.
- Park D.C., Lautenschlager G., Hedden T., Davidson N.S., Smith A.D., (2002), Model of Visuospatial and Verbal memory Across the Adult Life Span, *Psychology and Aging*, vol. 17, no.2, pp. 299-320.
- Park G., Shin J., Park Y., Measurement of Depreciation Rate of Technological Knowledge: Technology Cycle Time Approach, *Journal of Scientific & Industrial Research*, vol. 65, February 2006, pp. 121-127.
- Polachek S.W., Siebert W.S., (1993), *The Economics of Earnings*, Cambridge University Press, Cambridge.
- Prskawetz A., Fent T., (2004), Workforce Ageing and Economic Productivity: The Role of Supply and Demand of Labor: An Application to Austria, [in:] Oesterreichische Nationalbank, Proceedings of OeNB Workshops, No. 2/2004, Vienna.
- Prskawetz A., Lindh T., (2006), The Impact of Ageing on Innovation and Productivity Growth in Europe, Vienna Institute of Demography, Vienna.
- Reynolds C.R., (1987), Demographic Characteristics and IQ among Adults: Analysis of the WAIS-R Standardization Sample as a Function of the Stratification Variables, *Journal of School Psychology*, vol. 25, no. 4, pp. 323-42.
- Romer P., (1990), Human Capital and Growth: Theory and Evidence, *Carnegie-Rochester Conference Series on Public Policy*, 32, pp.251-286.
- Schultz T.W., (1960), Capital Formation by education, *Journal of Political Economy*, vol. 68, no. 6 (Dec. 1960), pp. 571-583.
- Schultz T.W., (1981), *Investing in People. The economics of Population Quality*, University of California Press, Barkley Los Angeles London
- Skirbekk V., (2004), Age and individual productivity: A literature survey, [in:] Feichtinger G. (ed.), *Vienna Yearbook of Population Research*, Austrian Academy of Sciences Press, Vienna, pp. 133-153.
- Stroombergen A., Rose D., Nana G., (2002), Review of the Statistical Measurement of Human Capital, *Statistics New Zealand*, Infometrics Consulting Ltd.
- Wixted J.T., (1990), Analyzing the empirical course of forgetting, *Journal of Experimental Psychology: Learning, Memory & Cognition*, 16, pp. 927-935.