

*Innovation and Future Growth*  
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## **1. Welfare: Growth and the International Distribution of Income**

Measuring welfare by the ratio of gross domestic product (GDP) of an economy divided by its population, the growth of GDP minus population growth is measure of the welfare development. Using data for a large number of countries all over the world ranging from 1950 to 2007 shows a relatively similar development of western industrialized countries, and increasing welfare gap of economies from Africa and from Latin America, and a rather prosperous growth of the Asian Tigers as well as some transition countries after the fall of the wall. In terms of world income distribution, this lead to a twin peak structure two clubs, a few high welfare countries in the club of riches and a large number of countries in the class of comparatively low welfare countries. This pattern is at most only partially in line with the convergence hypotheses from traditional Growth Theory which highlight capital accumulation as the main driving force of growth.

## **2. Technological change: innovation and the technological gap**

In view of this evidence, empirical analyses identified technological change as the main driving force of economic growth and the New Growth Theory by addressing the endogenous generation of technologies and innovations has be able to find an explanation of the empirical fact of non-convergence. A world technological frontier and related to that pattern of catching-up, falling-behind and forging-ahead were identified. Investment into knowledge-based capital and the important role of learning were suggested as key factors (and overtook physical capital as most important production factor). Welfare development has been shown to be closely related to degree by which economies have been able to apply them.

## **3. Where we come from: Long-run tendencies**

Looking at the long-run trends of the change of total factor productivity and labor productivity (as measures of technological change and improvements) one finds a decline over time – the change is usually positive but over time this rate becomes smaller. Interesting and remarkable is here that this decline is observed since 1970 and it is not only a reaction on the 2008 financial crisis. This development is suggested to be an indication of the exploitation of technological opportunities – and this is sustained by further indicators much closer to innovation such as an increase in costs per innovation and a decline in innovation activities, innovation incentives and in new (high tech) firm founding. In view of that the general pattern is suggested to be roughly in line with prediction from the Long Wave Approach.

## **4. Where we go to: Generic changes, GPTs and Windows-of-Opportunity**

Accepting the view of Long Waves, the current situation is interpreted as the interregnum between two major technological regimes or general purpose technologies (GPT). Generic changes can be expected (and are envisaged as digitalization (e.g. the German Industrie 4.0), renewable energies (e.g. the German Energiewende) ...). These potential new GPTs open up (new) windows-of-opportunities which give also lagging countries a chance to jump towards the world technology frontier and to enjoy higher levels of welfare but may also be related to drawbacks of labor saving change and inequality enhancing pattern. Appropriate policy of Schumpeterian and of Keynesian flavor being enabling and preventive is to be considered.