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## Technological Forecasting &amp; Social Change



# The economics of the light economy<sup>☆</sup>

## Globalization, skill biased technological change and slow growth

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## ABSTRACT

The paper provides an interpretative framework and structured empirical evidence of the processes leading to the emergence of a light and slow growth economy in advanced countries. The interpretative framework rests upon the grafting of a) the Schumpeterian hypothesis about the role of creative reaction as the main determinant of the rate of technological change b) in a dynamic version of the Hecksher–Ohlin analysis with c) the Kuznets approach on the strict complementarity of structural and technological changes, and d) the new approach about the direction of technological change biased towards the most intensive use of locally abundant production factors. The analysis of the stylized facts and the empirical evidence confirms that the twin globalization of product and capital markets brought about by the entry of new labor abundant countries in international markets had profound effects on advanced countries leading to the introduction of skill biased technological change with the consequent decline of the role of the manufacturing industry and the emergence of a strong knowledge intensive business service sector. The new biased direction of technological change accelerated the substitution of both capital and unskilled labor with skilled workers with the ultimate effect of reducing the stock of working capital and hence the rates of growth of advanced economies. The slow growth is a physiological feature of the new emerging light economies that rely upon knowledge intensive but capital saving technologies.

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## 1. Introduction

Slow growth has been characterizing advanced countries since the late 1990s. A variety of interpretations and explanations have been elaborated. A general consensus about the pathological character of the slow growth has emerged. Macroeconomic and fiscal policies aimed at reducing the deficit

of public administrations and even their debt levels have been suggested. Increased liberalizations of both final goods markets (product markets) and intermediate and capital goods markets (factor markets) have been advocated and often implemented, with little positive effects.

This paper elaborates and tests an interpretative framework that calls attention upon the tight relationships between globalization of both product and capital markets, the rate and direction of technological innovations and structural change. According to this framework the slow growth is the physiological result of a major re-organization of the economic systems of advanced countries and their evolution into light knowledge intensive economies, that rely upon knowledge intensive but capital saving technologies.

In the economics of growth much analysis of the aggregate performances of the advanced economies in the last decades has been paid to explaining the causes of the slow growth of the advanced economies paying very little attention to the role of

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the radical changes that have been taking place at the meso level. In the economics of innovation and technological change much attention has been paid to the analysis of the causes and consequences of the rate of introduction of innovations as well as on the direction of technological change and the parallel changes in labor markets. Less attention instead has been paid to the relationship between the new directed technologies and the new structure of advanced economic systems. Yet the direction of technological change has important consequences also on the structure of an economic system in terms of sectoral composition [29,30]. This in turn affects the international specialization of each country and its economic growth. The paper elaborates an analytical approach where the international institutional changes affect both the rate and the direction of both technological and structural changes, the role of a country in the international division of labor and ultimately its aggregate performances. This framework is applied to provide an interpretative framework of the stylized facts about the evolution of the advanced economies since the last decades of the XX century and supported by structured empirical evidence.

The analytical framework relies upon the grafting of three distinctive and yet separated theoretical pillars of the economics of innovation: the Schumpeterian hypothesis that innovation is a form of creative reaction stirred by un-expected changes in product and factor markets, the Kuznets hypothesis that structural and technological changes are two intertwined facets of the same process of economic change and the new induced technological change approach according to which technological change is biased towards the use of production factors that are locally more abundant. The integration of these three complementary approaches enables to substantiate the dynamic version of the Heckscher–Ohlin frame so as to provide a coherent interpretation of the interaction between changes in the international division of labor, endogenous changes in the rate and direction of technological and structural changes, changing specialization and role in the international division of labor and macroeconomic performances.

The basic hypothesis is that the entry of new labor-intensive economies in product markets has induced advanced economies to implement a new knowledge-intensive technological system that uses much less capital substituting both unskilled labor and capital with skill-intensive labor and a new specialization in the generation and exploitation of technological knowledge.

This analytical framework enables to elaborate an interpretative framework of the main stylized events that have characterized the advanced economies since the last decades of the XX century. The twin globalization of product and capital markets stirred radical technological and structural changes and reshaped the international division of labor, with the ultimate effect of engendering: i) a persistent decline in the price of manufactured goods, ii) reduction in the levels of capital intensity in advanced countries and iii) a new specialization in knowledge intensive activities characterized by high levels of skilled-labor intensity. The fall in the levels of prices of tangible goods and the decline in the capital intensity associated with the new emerging knowledge economy reduced the value added of the production processes into which advanced countries specialize, favoring the emergence of a light and slow growth economy.

The consequent slow growth of the light economy, specialized in knowledge rather than capital intensive economic activities, is likely to last as long as the decline of

the manufacturing sector and the disposal of excess capital from advanced countries to industrializing ones. When the transformation will end approaching a new long term configuration based upon a tiny manufacturing industry and a large share of employment in knowledge intensive business services, the knowledge economies will be able to experience faster rates of growth based upon total factor productivity growth.

The rest of the paper is structured as follows. **Section 2** provides the analytical framework and elaborates the hypothesis. **Section 3** applies it to elaborate an interpretative framework of the recent evolution of the advanced economies. **Section 4** presents the empirical evidence. The conclusions summarize the result and highlight the implications and consequences for both economic analysis and policy.

## 2. The analytical framework

Much theorizing assumes as a starting point of the analysis the increasing levels of globalization under way since the late 1990s and more specifically the globalization of product markets brought about by the entry in international markets of new large and labor abundant economies.

According to the traditional interpretative framework based upon the static version of the well-known Heckscher–Ohlin model, the entry of new labor abundant competitors should have pushed advanced countries to increase the production of capital-intensive goods and reduce the production of labor-intensive ones. Labor abundant newcomers should have on the opposite increased their specialization in labor intensive goods and rely upon imports from advanced countries in capital intensive ones. According to the Heckscher–Ohlin model, the entry of new labor-abundant countries in international product markets should have brought about a drastic fall in the prices of labor-intensive manufactured goods but an increase, in relative terms, of the price of capital-intensive goods, with positive effects on the terms of trade of advanced countries.

The empirical evidence suggests that these dynamics have not been taking place. Quite on the opposite, the capital intensity of advanced incumbents declined as well as the labor intensity of newcomers. Labor abundant countries became net exporters of both capital and labor intensive products. The prices of both capital intensive and labor intensive products declined and the balance of payments of advanced countries exhibited a persistent and even increasing deficit. These contradictions require an explanation that can help to grasp the persistent slow growth of advanced economies.

Unlike previous experiences in economic history, however, the current globalization process concerns both product and financial markets. The globalization of international product markets has changed the fundamentals of the division of labor undermining the competitiveness of advanced countries and pushing them towards a new specialization. The globalization of capital markets has favored the growing outflow of capital both via foreign direct investment and the international mobility of finance. The twin character of the current globalization pushed the emergence of a new systemic gale of radical, capital saving and skill intensive, technologies associated with structural changes that enabled advanced countries to change their role

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