Chapter 3
Logistic Analysis of Business Cycles, Economic Bubbles and Crises

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ABSTRACT
The chapter deals with business cycles, economic crises and other paradoxical economic phenomena and analyses their causes by applying logistic growth models. The logistic growth model allows investigating paradoxical and untypical aspects of real capital accumulation in the situation of exhausted investment potentiality or diminishing law of returns. Logistic capital accumulation theory is based on the main principles developed in classical finance theory. In classical finance theory exponential growth or rule of compound interest serves as the main law. In logistic growth theory the density dependent growth function is being applied instead of exponential growth function. The application of logistic theory in analysis of economic phenomena such as business cycles, economic bubbles, laws of diminishing returns etc. allows generating new insights. The term -business cycle or economic cycle applied in the chapter describes economy-wide fluctuations in economic activity around a long-term growth trend. It typically involves shifts over time between periods of relatively rapid growth of economic output (boom), and periods of relative stagnation or decline (contraction). Such fluctuations are often measured using the growth rate of real gross domestic product. The logistic discounting of cash flows allowed to develop mathematical model and apply it for depicting economic phenomena named as economic bubbles or economic overheating.

INTRODUCTION
With the rapid development of economic globalization and information technology, economic forecasting is emerging as a rapidly developing field. The book “Business Intelligence in Economic Forecasting: Technologies and Techniques” seeks to identify good opportunities and take advantage of them in a fast and effective manner by selecting results of advanced science in this field. The
Logistic growth theory applied for analysis of economic growth in this chapter of the book can serve as example of new approach in forecasting of development of economic variables.

Economic growth is the increase in the amount of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP. In economics, “economic growth” or “economic growth theory” typically refers to growth of potential output, i.e., production at “full employment,” which is caused by growth in aggregate demand or observed output. Science and technical progress have significant impact on economic growth. Many economists have argued that technological progress is really nothing but quality improvements in human beings. Some economists take an even broader view and speak of the “production of knowledge” as the clue to technological progress. The production of knowledge is a broad category including outlays on all forms of education, on basic research, and on the more applied type of research associated especially with industry. It is argued that fast-growing industries tend to be those having a high research and development component in their total costs. In addition, firms within an industry that have large research and development budgets tend to experience the most rapid technological progress. The argument is that technical change and improvements must originate in inventions that lead to innovations in the products produced or in the processes whereby existing products are manufactured.

Therefore economic growth is being stipulated by realizing science achievements, by intensifying production, making it more effective, restructuring of economy and advancing economic and social progress. In recent years scientific technical industry is playing crucial role in economy structure. The share of new technologies is increasing very fast. Many economists view entrepreneurship as having a major influence on a society’s rate of technological progress and thus economic growth. Joseph Schumpeter was a key figure in understanding the influence of entrepreneurs on technological progress (Schumpeter, 1961).

Economic growth as other economic phenomena is possessed by internal laws. According Ralph Nelson Elliot, everything has the reason and ones obligation is to try to find it. There are many papers currently published in scientific journals dealing the current economic crisis and economic cycles (Kam, Wang, 2008; Cerra et al, 2009; Gradstein, 2008; Kam, Wang, 2008; Dhont, Heylen, 2009). Most of the recent studies dealing with the problems of economic growth are focussed on fiscal policies and follows monetary approach (Gmez, 2008; Terai, 2009; Agenor, 2009; Minea, Villieu, 2009; Park, 2009, Tamai, 2008). There are authors claiming weak institutions, corruption and other subjective reasons in problems of unbalanced economic growth (Gradstein, 2008; Croix et al, 2009). Some authors (Economides et al, 2008; Sung, Uk, 2008; Xie, 2008) think that foreign aid distorts incentives and hurts economic growth in developing and transition countries. Just few authors (Cochrane, 2002; Utpal, Xiaoyun, 2008, Marrero, 2008) try to find fundamental reasons causing formation of economic bubbles and business cycles.

Business cycles as we know them today were codified and analyzed by A. Burns and W. Mitchell in their 1946 book Measuring Business Cycles (Urns, Mitchell, 1946). Business cycles are economy-wide fluctuations in economic activity around a long-term growth trend. It typically involves shifts over time between periods of relatively rapid growth of economic output (boom), and periods of relative stagnation or decline (contraction). Business cycles are dated according to when the direction of economic activity changes. The peak of the cycle refers to the last month before several key economic indicators—such as employment, output, and retail sales—begin to fall. The trough of the cycle refers to the last month before the same economic indicators begin to rise. Because key economic indicators often change direction
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