

CHAPTER 2

Main Results of the Bonn–IIASA Research Project

Wilhelm Krelle

Summary

This chapter presents the main results of the Bonn–IIASA Research Project on economic growth and structural change as far as the work of the central group is concerned. First, the model is outlined. The basic assumptions about the main driving forces of the economic development (technical progress and capital accumulation) are stated, and finally the results (given in the Annexes) are discussed. They may be summarized as follows. The growth process will continue, but at a slower rate. The CMEA countries will come nearer to the OECD countries, but not much. Within the group of the OECD countries, some smaller ones will pass the USA as far as labor productivity and standard of life is concerned. Some developing countries (especially Black Africa and India) will stay behind so that the world income distribution will further deteriorate. The developing countries (with the exception of the oil-exporting countries), the USA and some European countries will keep their trade deficit, though (in the case of the USA) it will decline.

2.1. Introduction: The Model

We are concerned with medium-term forecasts of the trend of economic growth and structural change on the world level, i.e., with trend forecasts until the year 2000. These are conditional forecasts, of course; we are not prophets. The conditions are assumptions on the future time paths of the driving forces of economic growth. They depend on the success of the different governments in creating favorable economic conditions within their countries (or, in the case of

CMEA countries, in organizing their economies efficiently) and in taking advantage of world trade and international division of labor. Given the size and development of these driving forces, we may estimate the future development of GDP or NMP, its sectoral composition, exports and imports and their commodity composition, the general price level, the price levels of groups of commodities, and the exchange rates by means of a world model which consists of linked national models (or, in the case of developing countries, models for groups of countries). The countries and groups of countries considered in the project are given in Annex 1 at the end of the book. The model is outlined in Annex 2 at the end of the book. Here we only present the general construction principles of the model and the underlying motivations.

One basic theoretical construct of the model is a *production function* for each country of the Cobb–Douglas type:

$$Y^* = \tau L^{\alpha_1} K^{\alpha_2} (IM_R)^{\alpha_3}, \quad \alpha_i > 0, \quad \sum_i \alpha_i = 1 \quad (2.1)$$

where Y^* is total production after netting out domestic secondary inputs, τ is an index for the state of technology, L = labor employed, K = capital, IM_R = imported secondary inputs (energy, raw materials, half-finished goods, etc.). $w_\tau = (\tau - \tau_{-1})/\tau - 1$ is the rate of technical progress.[1]

It is necessary to defend the choice of this approach (which uses a very simple functional form) in the light of other much more sophisticated approaches. We have to consider the aim of our research. We want to forecast the medium-term trend of economic development, not the short-term economic results, say, GDP or NMP in the next or next but one year. In this case we would have to use much more complicated functions. But for medium- and long-run trends, this type of function is most appropriate.[2]

Another basic assumption is the *monetaristic approach*: money supply (we choose M2 as the money concept) and the velocity of money determine the *domestic price level*, given real production. The velocity of money is explained by a function, the most important arguments of which are the capital output ratio, labor productivity and the foreign debt ratio with respect to production. The *nominal rate of interest* is explained by the rate of inflation, the rate of interest abroad (we took the US rate as a proxy), the savings ratio, the foreign debt ratio and the rate of change of the exchange rate. The *exchange rates* of all countries should be explained simultaneously. This approach is presented by Dr. Welsch in Chapter 8. Unfortunately, we could not solve the total system numerically with this complicated exchange rate subsystem. Thus we had to simplify the approach. We explained the trend of the exchange rate by variants of the purchasing power parity theory. This should be improved later.

For *CMEA countries* we estimated the price level by the ratio of the nominal wage rate (which is a decision variable of the government or of the planning office and forecast exogenously) and the real wage rate which follows (among others) from labor productivity. This is an endogenous variable.