The production function

If the problem cannot be approached via a measure of capacity, how can the definition and measurement of the potential output be arrived at more directly from an analysis of the historical record of the performance of the economy?

The technique used involves a variation on the economists' device of "the production function." By this is meant a set of functional relationships between each of the productive factors and the output of the economy. As noted above, output is the aggregate of the economy—including government, agriculture, all of the various other private industries, nonprofit organizations, individual households, distribution, finance, and services—in a word, all that is covered in the now conventional measure of output, the gross national product. This measure is used here in real terms adjusted to constant 1954 dollars.

In the past, production functions have been developed covering manufacturing (24), agriculture (25), and for somewhat larger aggregates (26). An extensive literature has developed on the theory of production functions and the interpretation of the results of fitting them to statistical data for individual industries, sectors or the economy as a whole (27). Since the economy is made up of literally hundreds, if not thousands, of industries or separate economic sectors, of several million business firms, at least a minimum of 100,000 governmental units, and somewhere in the neighborhood of 55 to 60 million household units, as well as numerous foreign entities having an impact on our economy, the process of deriving a meaningful aggregate production function involves heroic simplifications. Any attempt at aggregate or national economic analysis inevitably faces this problem, which, in the literature, has led to elaborate investigations of theories of aggregation and the construction of index numbers.

While these problems in aggregation and index number construction are not discussed here at length, it must be recognized at the outset that existing measures of total output and inputs are compromises arrived at in the search for the best measures possible at the present time. The question to be answered is whether or not the utility of such devices of aggregate analysis is sufficiently great to offset any lack of precision such compromises entail. This study is founded on the conviction that the price is not too great—that useful analyses of the economy as a whole can be made if the qualifications arising from aggregation are kept constantly in mind.

Production in the individual plant versus the total economy

The characteristics of the aggregate production function for the economy developed below will be clearer if its relationship to the productive process in an individual plant is outlined briefly. In such a small unit—small compared to the total economy—production consists of a series of processes of combining and coordinating materials, forces, services in the creation of valuable goods or services. These valuable goods or services are called output, while the materials, forces, and services used up in their creation are called inputs. These terms have different meaning in the case of the individual establishment than when used with reference to the economy as a whole. In the individual case, a good or service can be an output of one establishment but an input to another. In aggregate output, measured by