# DOWNLOAD PDF HAWKINS-SIMON CONDITION IN INPUT-OUTPUT ANALYSIS

## Chapter 1 : Importance of the hawkins-simon conditions

*For details see Input Output Analysis. The linear equations can be expressed in terms of matrices. Suppose an economy has n industries each producing a single unique product. (There is a generalization of input output analysis, called activity analysis, in which an industry may produce more than one product, some of which could be pollutants.) Let the product input requirements per unit of product output be expressed as an nxn matrix A.*

One of the most interesting developments in the field of modern economics is the model of industrial interdependence known as input-output tableau. It owes its origin to Prof. Input-output analysis is of special interest to the national-income economist because it provides a very detailed breakdown of the macro-aggregates and money flows. This model is widely used in planning and forecasting. Leontief imagines an economy in which goods like iron, coal, alcohol, etc. For the production of iron, coal is required. Let us imagine, following Leontief, a simple economy in which there are two industriesâ€"agriculture and manufacturing. Each directly requires the use of a primary factor called labour in its production process, and each requires in its productive process inputs which are output of the other industry. Table 1 provides a simplified picture of such an economy. Agriculture and manufacturing are the first two entries, and each of their rows will show what happens to their total output. The third row is given to the primary factor, labour, of which the community has a total of 50 units thousands of man-years per year. These 50 units of labour are allocated as inputs to the two industries in the respective amounts 10 and  The first row total shows that the agricultural output totals units million of tons per year. Of this total, 50 units go directly to final consumption, i. What happens to the remaining units of agricultural output? Thus units of agricultural output is required as material inputs in order to make possible manufacturing production: The remainder of agricultural output, 25 units, is required in agriculture itself, e. In row 2, columns 1, 2 and 3 show allocations of 40, 20 and 60 units of manufactured goods per year to agriculture manufacturing and final consumption households and governments. All the items in Table 1 are flows, i. The first column describes the input or cost structure of the agricultural industry: Similarly, the second column details the observed input structure of the manufacturing industry. Labour is assumed not to be directly consumed. Suppose, however, that we had deliberately chosen the physical units in which each commodity is measured so that at some given base prices, one unit costs Re. Then each entry in Table 1 becomes a rupee value and the columns can be measured virtually literally as cost figures. Since the output is also measured in terms of rupee values, total output is the same as total revenue. Thus agricultural revenue at the base prices is Rs million, and cost of production is Rs 75 mn. In manufacturing, revenue is Rs mn, and cost Rs mn. Thus in agriculture there was a profit of Rs million, and in manufacturing there was a loss of Rs mn. The economy can be thought of as a machine that uses up labour and has 50 units of labour per year at its disposal and produces final consumption. With its 50 units of labour the economy is capable of producing an annual flow of 50 units of agricultural goods and 60 units of manufactures. In Table 2 the sum of the rows shows the total value that has been sold or allocated to consumption and all industrial uses. The sum of any column is the same as the sum of the corresponding row. The rationale for the term input-output is quite plain to see. In this light, it is clear that input-output analysis should be of great use in production planning, such as in planning for the economic development of a country or for a programme of national defence. Broadly interpreted, this does permit the case of two or more jointly produced commodities, provided they are produced in a fixed proportion to one another. In order to produce each unit of the j-th commodity, the input need for the i-th commodity must be a fixed amount, which we shall denote by a1j. Specifically, the production of each unit of the j-th commodity will require a1j amount of the first commodity, a2j of the second commodity,â€¦. The first subscript refers to the input, and the second to the output, so that a1j indicates how much of the i-th commodity is used for the production of each unit of the j-th commodity. The a1j symbol is referred to as an input coefficient. If no industry uses its own product as an input, then the elements in the principal diagonal of matrix A will be all zero. In view of the presence of the open sector, the sum of the elements in each column of the input-coefficient matrix A or input matrix A, for short must be less than 1. Symbolically, this fact may be stated thus: Carrying this line of thought a step further, it may also be stated that, since the value of output Re. Thus the value of the primary input needed in producing a unit of the j-th commodity should be If industry 1 is to produce an output just sufficient to meet the input requirements of the n industries as well as the final demand of the open sector, its output level x1 must satisfy the following equation: The equation may also be written as: The matrix I-A is called the technology matrix. If the exogenous sector of the open input-output model is absorbed into the system as just another industry, the model will become a closed one. In such a model, final demand and primary input do not appear; in their place will be the input requirements and the output of the newly conceived industry. At first glance, the conversion of the open sector into an additional industry would not seem to create any significant change in the analysis. Actually, however, since the new industry is assumed to have a fixed input requirement it must now bear a fixed proportion to the labour service they supply. This constitutes a significant change in the analytical framework of the model. Mathematically, the disappearance of the final demands means that we will now have a homogeneous equation system. Being homogeneous, this equation system can have a non-trivial solution if and only if the 4 x 4 technology matrix I â€" A has a vanishing determinant. The latter condition is indeed always fulfilled: This guarantees that the system does possess non-trivial solutions; in fact, it has an infinite number of them. We can determine the output levels x1â€¦â€¦â€¦â€¦â€¦â€¦.. The simple input-output model can well be presented in terms of a few mathematical equations and symbols and on the basis of certain technological assumptions. If we call agriculture industry 1, manufacturing industry 2 and give labour the subscript 0, then the previous table can be presented as: In addition, we can always add across the rows, so we know that Leontief assumes: There exist constant returns to scale. There exists fixed coefficients of production, i. This special Leontief production function can be written in the usual form 1. Then The available output certainly cannot be less than the sum of its alternative uses, but it could, physically, be greater. We can account for the output X1 as follows; a11X1 will be used up in industry 1 itself, and a12X2 in industry 2. What is left will be used up for final consumption C1, viz. Labour is not produced but is available in amounts up to X0; the use of labour is a01X1 in industry 1 and a02X2 in industry 2. L1and L2 intersect at L. If L1 and L2 were parallel, i. Any gross-output levels in this region will enable society to consume C1 and C2 of the two commodities. In fact, if L2 had a bigger slope than L1 there would also be no point L. What is the condition that L should exist or that some bill of goods should be producible? It is that the slope of L2 must be less than the slope of L1 i. Otherwise, there would be negative net outputs 1 â€" a11 and 1 â€" a Multiply the first equation in 4 above by 1 â€" a22, the second by a22 and add to get Now A01 is the direct labour input not into a unit of C1 but into the gross direct and indirect X1 and X2 needed to support a unit of C1. In other words, A01 represents the total direct and indirect labour embodied in a unit of final consumption of commodity and A02 is the same for a unit of final consumption of commodity 2. The schedule in 9 simply says that only those bill of final demand are producible and efficient which require X0 units of labour to support them. A consumption possibility schedule 9 , drawn in Fig. If it is desired to give up some C1in favour of C2, such substitutions are possible along the transformation curve. Because the frontier is a straight line, substitution of C2 for C1 takes place at constant costs. The MRS is constant, viz. To get 1 more unit of C2 requires A02 units of labour. The straight line constant cost nature of the transformation curve reflects not only the linearity of the technology, but also the presence of only one primary factor and the absence of joint production. Prices in the Leontief Model: This must determine the relative price of the two commodities: We have interpreted A0i as the total labour content of 1 unit of final output of commodity 1. If we designate the wage rate by W, this tells us that since labour is the only cost-generating element in the system. The absolute level of prices remains completely indeterminate.

## Chapter 2 : (Solved) - Discuss the importance of the Hawkins-Simon conditions in - (1 Answer) | Transtutor

*The Hawkins-Simon condition refers to a result in mathematical economics, attributed to David Hawkins and Herbert A. Simon, that guarantees the existence of a non-negative output vector that solves the equilibrium relation in the input-output model where demand equals supply.*

Z Imports A more satisfactory way to proceed would be to tie regions together at the industry level. That is, we could identify both intra-region inter-industry transactions and inter-region inter-industry transactions. The problem here is that the table grows quickly. Inputâ€"output is conceptually simple. Its extension to a model of equilibrium in the national economy has been done successfully using high-quality data. One who wishes to do work with inputâ€"output systems must deal skillfully with industry classification, data estimation, and inverting very large, ill-conditioned matrices. Moreover, changes in relative prices are not readily handled by this modeling approach alone. Of course, inputâ€"output accounts are part and parcel to a more flexible form of modeling, Computable general equilibrium models. Two additional difficulties are of interest in transportation work. There is the question of substituting one input for another, and there is the question about the stability of coefficients as production increases or decreases. These are intertwined questions. They have to do with the nature of regional production functions. Usefulness[ edit ] Because the inputâ€"output model is fundamentally linear in nature, it lends itself to rapid computation as well as flexibility in computing the effects of changes in demand. Inputâ€"output models for different regions can also be linked together to investigate the effects of inter-regional trade, and additional columns can be added to the table to perform environmentally extended input-output analysis EEIOA. For example, information on fossil fuel inputs to each sector can be used to investigate flows of embodied carbon within and between different economies. The structure of the inputâ€"output model has been incorporated into national accounting in many developed countries, and as such can be used to calculate important measures such as national GDP. Inputâ€"output economics has been used to study regional economies within a nation, and as a tool for national and regional economic planning. It is also used to identify economically related industry clusters and also so-called "key" or "target" industries industries that are most likely to enhance the internal coherence of a specified economy. By linking industrial output to satellite accounts articulating energy use, effluent production, space needs, and so on, inputâ€"output analysts have extended the approaches application to a wide variety of uses. Input-output and socialist planning[ edit ] The input-output model is one of the major conceptual models for a socialist planned economy. This model involves the direct determination of physical quantities to be produced in each industry, which is used to formulate a consistent economic plan of resource allocation. This method of planning is contrasted with price-directed Lange-model socialism and Soviet-style material balance planning. Input-output planning was never adopted because the material balance system had become entrenched in the Soviet economy, and input-output planning was shunned for ideological reasons. As a result, the benefits of consistent and detailed planning through input-output analysis was never realized in the Soviet-type economies. Because the data collection and preparation process for the inputâ€"output accounts is necessarily labor and computer intensive, inputâ€"output tables are often published long after the year in which the data were collectedâ€"typically as much as 5â€"7 years after. However, many developed countries estimate inputâ€"output accounts annually and with much greater recency. This is because while most uses of the inputâ€"output analysis focus on the matrix set of inter-industry exchanges, the actual focus of the analysis from the perspective of most national statistical agencies is the benchmarking of gross domestic product. Inputâ€"output tables therefore are an instrumental part of national accounts. As suggested above, the core inputâ€"output table reports only intermediate goods and services that are exchanged among industries. But an array of row vectors , typically aligned at the bottom of this matrix, record non-industrial inputs by industry like payments for labor; indirect business taxes; dividends, interest, and rents; capital consumption allowances depreciation ; other property-type income like profits ; and purchases from foreign suppliers imports. At a national level, although excluding the imports, when summed this is called "gross product originating" or "gross domestic product by industry. See also Gross domestic product. Inputâ€"output analysis versus consistency analysis[ edit ] Despite the clear ability of the input-output model to depict and analyze the dependence of one industry or sector on another, Leontief and others never managed to introduce the full spectrum of dependency relations in a market economy. Consistency analysis explores the consistency of plans of buyers and sellers by decomposing the inputâ€"output table into four matrices, each for a different kind of means of payment. It integrates micro and macroeconomics into one model and deals with money in a value-free manner. It deals with the flow of funds via the movement of goods.

## Chapter 3 : hawkins simon condition

*Basically, the Hawkins-Simon condition states that there can be no negative entries in the table of direct and indirect requirements." In essence it would mean that each time the industry with a negative entry expanded its sales to final demand, its direct and indirect input requirements would decline.*

## Chapter 4 : Inputâ€“output model - Wikipedia

*ques- Discuss the importance of the Hawkins-Simon conditions in input-output analysis. Basically, the Hawkins-Simon condition states that there can be no negative entries in the table of direct and indirect requirements.".*

## Chapter 5 : Solvability of the Economic Input-Output Equation by Time Irreversibility

*Input-output analysis is one of a set of related methods which show how the parts of a system are affected by a change in one part of that system. Input-output analysis specifically shows how industries are linked together through supplying inputs for the output of an economy.*

## Chapter 6 : Hawkins | Revolvy

*Input-Output Flow Tables: Leontief imagines an economy in which goods like iron, coal, alcohol, etc. are produced in their respective industries by means of a primary factor, viz., labour, and by means of other inputs such as iron, coal, alcohol, etc.*

## Chapter 7 : Input-Output Analysis in Economics | Economics

*Input-output planning was never adopted because the material balance system had become entrenched in the Soviet economy, and input-output planning was shunned for ideological reasons. As a result, the benefits of consistent and detailed planning through input-output analysis was never realized in the Soviet-type economies.*

## Chapter 8 : Input-Output Analysis and Related Methods

*Leontief Input-Output Model We suppose the economy to be divided into nsectors (about for Leontief's model). The demand vector d~2Rn is the vector whose ith component is the value (in dollars, say) of production of sector idemanded.*

## Chapter 9 : Hawkinsâ€“Simon condition - Wikipedia

*A NOTE ON THE HA WKINS~SIMON CONDITIONS*) M. KATO, G. MATSUMOTO, and T. SAKAI The object of the* *present note is to provide an alternative proof of the theorem that the Hawkins-Simon conditions are necessary and sufficient for.*