Description of Microeconomics by System Dinamic

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Abstract

Some principle conceptions in microeconomics are simulated by System Dinamic (in brief S.D) in this article. The simulating of two fundamental theories in microeconomics concerned with balanced prices and marqin anatysis leads to some significant conclusions . Most of these conclusions are now in heated argument in microeconomic field. Our achievement is provided as a test of the proceeding ideas.

Brief introduction to microecoromics

Microeconomics and macroeconomics are two mainstays in the area of modern economics . They both lay emphasis on quantitative analysing the facial relationship between economic factors. They treat economical relations as quantitative connection between several variances . This quantitative connection is closely related to a tradional mathematical tool-differentiation. S.D deals with differentiation in microeconomics as difference method. Many conclusions can be deduced in this way.

It is known to all that microeconomics studies a single economical unit, and in a quantitative way, it investigates the various economical activities of a single manufacturer, a consumer and profession and the economical changes of an occupation or a market. Therefore it is also called individual analysis. Since all the researched objects in microeconomics are handled as a system , it contains a great variety of element and subordinate systems. S.D functions and feedbacks as a bridge between these element and subordinate systems .

According to microeconomical researchers, the relationship between supply , demand and prices are primarily studied in microeconomies and microecoromics starts from dealing with price problems and market thories .

In the market of goods and the labour market , a consumers family makes choices based on the different prices of goods . The principle with which a consumer makes his decision is to obtain the greatest satisfaction from the quantity and quality of goods he buys on his limited income . The way in which every family chooses to buy goods necessarily affects various prices of the goods in the market . Changes of prices in the market become signals for industrial firms or commercial enterprises to determine their production in the market of production means , the prices of diverse production means are varied.

Microeconomics describes how industrial firms or commercial enterprises most efficientty produce their products in the greatest quantity and gain the greatest intersts at the least cost of production. The determination of all these firms or enterprises inevitably affect the various prices of means of production and goods in the market . in turn it influences the quantitg of numerous products provided for individual families.

From this market , industrial firms and commercial enterprises buy means of production , and each family gets its income as a supplier for means of production . These families buy goods and service supplied by the above industrial firms and commercial enterprises from this market. thus the choices made by each family and the determinatons of industry and commerce are shown through the relation between supply and demand in the market. This relationship is in harmony with the changes of prices . The whole system works from the determinations of industry and commerce . These determinations exert effect on the prices of means of production and the prices in the market . They further affect the quantity of productive elements each family can increase. These , on the contrary , influences the determinations of the enterprises . The cause and result of relationship between these three elements by S.D is shown as follows.

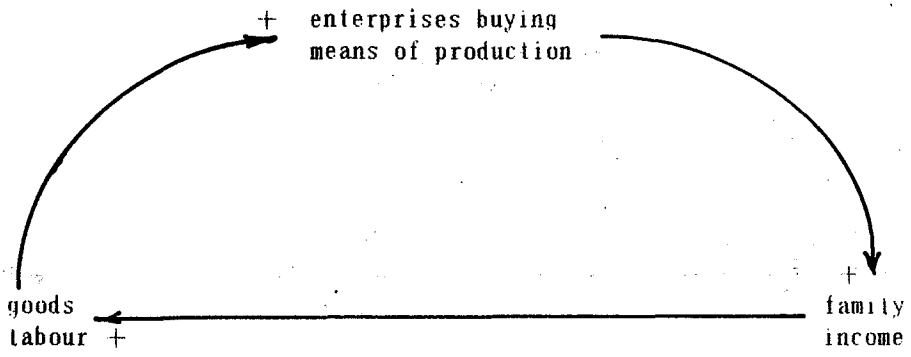


Figure 1.

It is worth mentioning that microeconomics is completely based on a fumdamental hypothesis, i, e, the principle for the behaviour of the consumer is to try to satisfy himself most , buying various goods within the limitation of his income, the principle for industrial enterprises and commercial firms is to seek the greatest quantity of products or realise the highest productivity so as to gain the greatest profits . Thus the influence of other factors over the consumer and industrial enterprises is removed . In reality, this influence is unavoidable . It is displayed in various forms in different social systems. For the convenience of our analysis , this quitting is a reasonable proximity to our real economical state .

The whole model of our microeconomy is mainly developed from prices. It is divided into subordinate systems of supply and demand, margin analysis, theories of elasticity etc . These subordinate systems are bridged by prices . Among these systems , the system of supply and demand is the most important .

Subordinate system of supply and demand

In microeconomics , the relation between supply and demand determines the prices of products and the quantity of goods sold and bought in the market . Balance occurs when supply is equal to demand. In this case , the supplier and the demander are satisfied with their own behavior . The supplier sells out every product . the demander gains everything he needs . From this , the adjustment of prices and the ever existing means of awarding and punishing in the economical system of free markets can be seen . From the demand viewpoint , the rising of prices hinds the consumption of products and the development of service . Resources are saved for this reason . On the other hand , the consumption is stimulated and the running out of resources is speeded up . From the supply viewpoint, the rising of prices exites production and service development . vice versa . Their cause and result relation in this system is seen as fotlows,

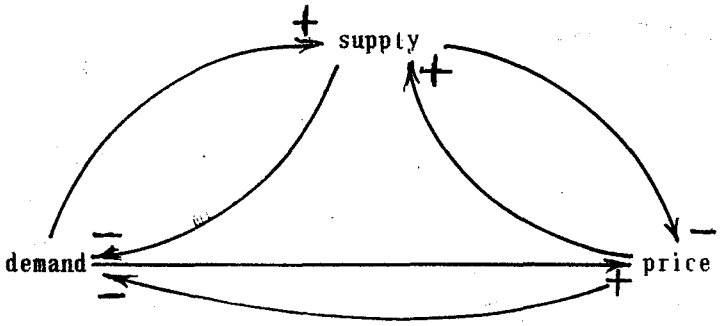


Figure 2.

Description of the laws for supply and demand in microeconomics

law for demand , provided other factors remain the same , the lower the price to buy this product is , the more people wish to buy this product ; the higher the price of this product is , the less people wish to buy it .

law for supply, provided other factors remain the same, the higher the price of one product is , the more this product is manufactured . and vice verse . Under the influence of suppy and demand, the prices in the market are adjusted spontaneously . This influence of the market functions as an "invisible hand" to reach a balanced price , i, s, the price mentioned above when supply equals demand . This subordinate model is described by S.D , which regards supply and demand as level varibles , supply function and demand function as auxiliary

variables as well . These three auxiliary varibles are fedback from the level variablos of supply and demand respectively . The brief flow diagram is drawn as follows :

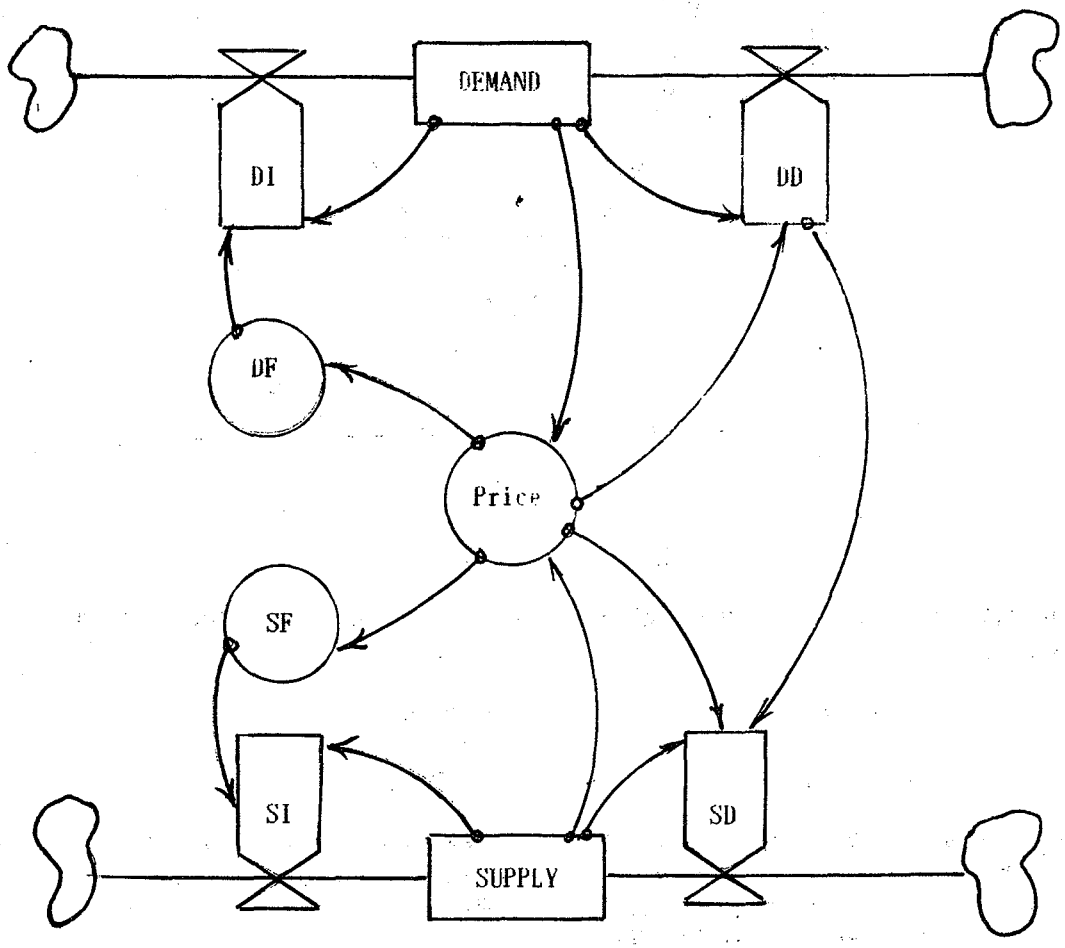


Figure 3: The flow diagram of supply and demand

In this flow diagram , DI and PI represent the increase rate of supply and demand in a given period , DEMAND means level varince of demand and SUPPLY is level variance of supply . DD symbolises demand satisfaction rate in a given period and rate of demand realization . The price is a auxitiary variance.

The randon supply function curve SF=F1(PR) is based on the hypothesis of micro economic theories . Its slope is necessarily possitive . The random demand function curue is DF=F2(PR). Its slope is naturally negative. PR is the variable for price . Their cross point tells the quantity between supply and demand when the price is balanced . As figure 4.

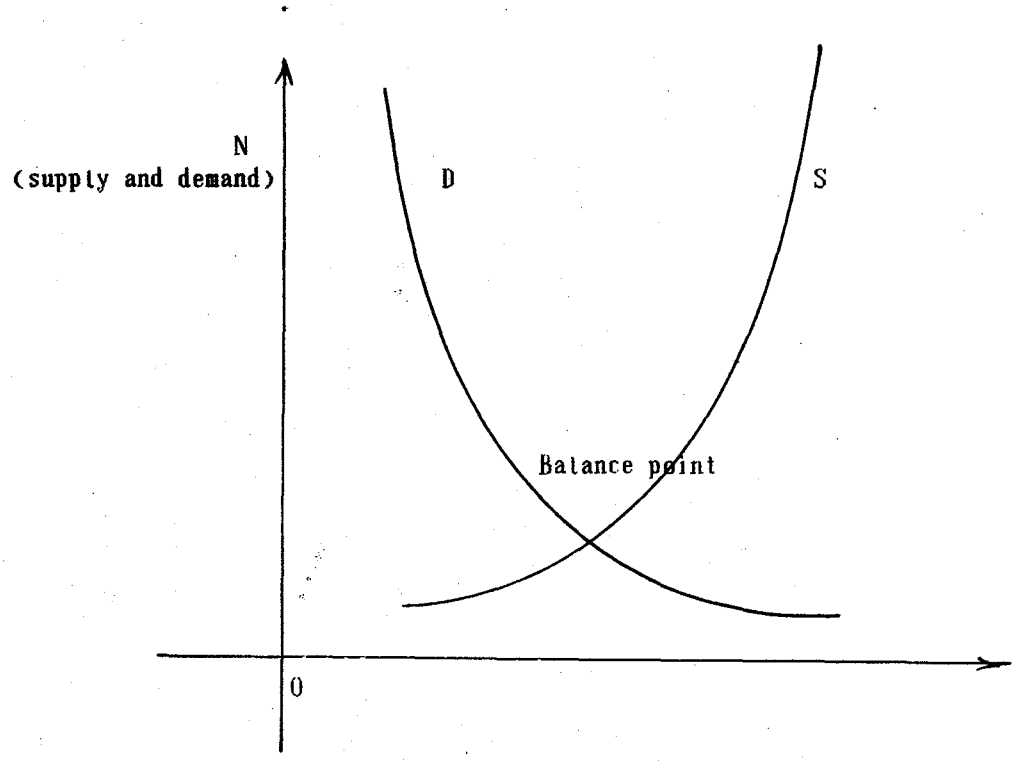


Figure 4:

In this model, P=F1(PR) and D=F2(PR) are described by a reference variance t time.

S=S(t1) D=D(t2)

PR=PR(t1) PR=PR(t2)

According to the traditional relation between supply and demand, price=f(d,p,t) satisfactorily describes the relation between cause and result showm in figure 1 and a balanced price can be deduced if the original numerals are given. It is modeled as follows.

1,when the supply curve and demand curve are given different original prices, the modeling is diverve in time to get balanced prices.

2, when the stoping rate of the supply curve and the demand curve go in opposite directions, the modeling diffuses.

3, Different balanced prices are reached when the modeling is done according to various supply curves and demand curves, and their adjusting time is completey different.

4, The amount of feedback greatly affects balanced prices and adjiusting time.

5, This modol is an ideal microeconomic model which has removed the influence of many human factors existing in the subordinate systems. such as salaries, price control, distributed supply, supplementary production, preferential tariff etc. these factors may come to be considered in the constant perfection of the model, The following can be concluded from the model.

1, The supply curve and the demand curve play an important part in the formation of balanced prices . So statisticians are tasked to try their best their to reach the supply and demand curve of one product .

2, The increase of production and demand has a direct effect on the formation of balanced prices. So steady increase of production and demand is required on a small scale. stability of balanced prices is harmed if a great change occures in either of these two factors.

3, It is necessary to reach balanced prices when production and demand is fedback . This has provided a theoretical foundation for our economic system characterised by its complete planning to complicated market economic system .

4, To reach and maintain balanced prices is determined by the relationship between suppliers and demanders . For this reason to keep balanced prices is realized by harming this relationship resulted from governmental behaviour such as subsidy tax etc .

5, The final formation of balanced prices needs certain adjusting time . The longer the adjustment of the modeling is , the less stability it reflects, and vice versa .

Subordinate system of margin analysis

In economic activity , the increment produced by one economic quantity is called margin . The margin number is generally regarded as derivative . The course of the solution and calculation of this margin number is called margin analysis The result of the margin analysis is described by the relationship between cost and income .

Two different cause and result relationships can be deduced from the cause and result relationship , i, 'e, cost and income.

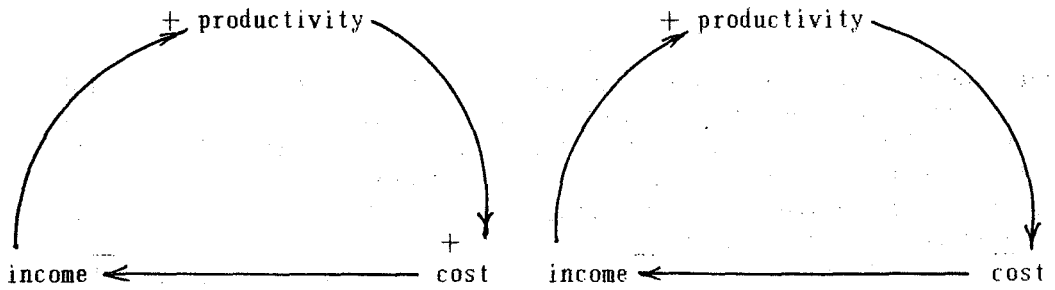


Figure 5,

Thus the two cause and result relationships can be seen from the cost and income relationship . The flow diagram of this system is drawn as follows ,

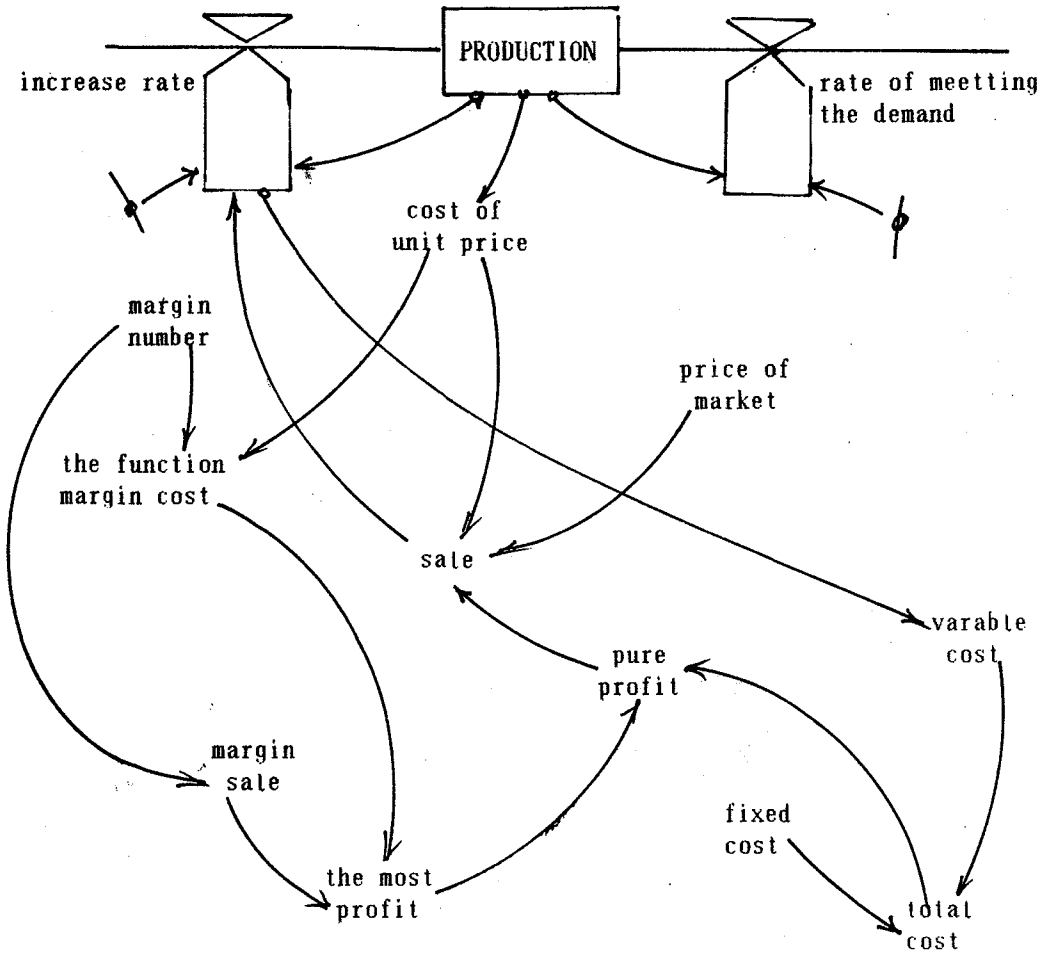


Figure 6:

By the simulation of the relationship between compared average cost, average income and margin cost and margin income , the influence on the model is seen when market prices are constant or varied . The significance of the model lies on its direct description of the following two aspects .

1:why is it the condition for an enterprise to gain the highest interest when its margin income is equal to its margin cost ?

2: It provides the relibility for the determination of an enterprise when prices change or remain the same .

subordinate system of elasticity analysis

Previously elasticity was mentioned briefly . its habitual bihavior in the model S.D is analysed in detail from a microeconomic point . Elasticity means aspects of reaction when the ratio of one variance to another is changed . it is mathematically defined as follows :

$$\text{Elaticity} = \frac{\triangle \text{ Variance1 \%}}{\triangle \text{ Variance2 \%}}$$

For the convenience to describe the scale of elasticity it is divided into five groups .

1; when E>>1, it is named infinite elasticity.
2; when E>1, it is described elastic.
3; when E=1, its datum of elasticity equals 1 (critical elasticity)
4; when E<1, it is stated lack of elasticity.
5; when E<<1, it is not elastic at all.

It is exceptional when E<0. This case is normally not allowed to take place. The ratio of two concrete variances-supply and price is called supply elasticity , demand and price demand elasticity . Besides there is supply and demand elasticity , demand and income elasticity etc . supply elasticity and demand elasticity are analysed in this model in reference to Figure 2.

Supply elasticity tells the relative ratio between supply and price . it is mainly used to show the reaction of quantitative supply of one product when the prices of labour or investment are changed .

Q1 represent original supply , Q2 is final supply . P1 tell original price degree1, P2 is final price degree2. E(supply) is so called desired supply elasticity . Their cause and result relationship , i, e, E(supply) and quantitative supply is shown in the following

$$E(\text{supply}) = \frac{\dfrac{Q2 - Q1}{Q1}}{\dfrac{P2 - P1}{P1}}$$

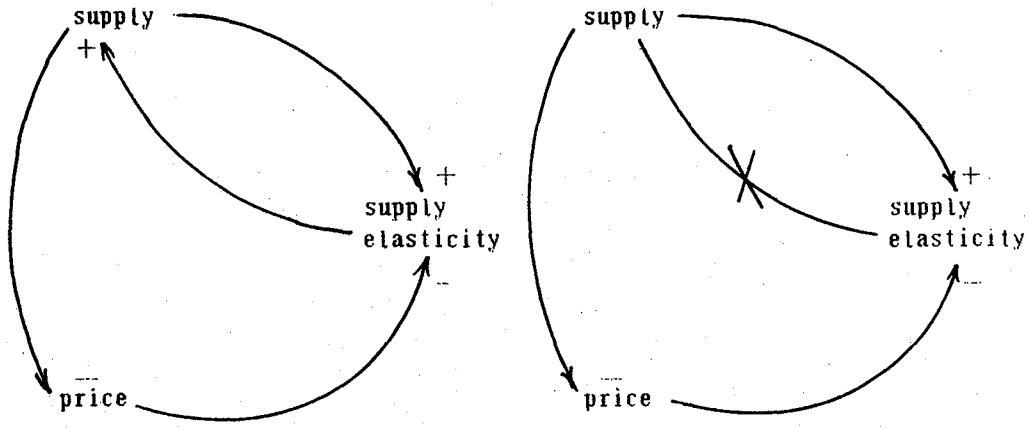
In S.D, the variables Supply.k are present data. Smooth(Supply.K, DT) are the initial data after variance Supply is smoothened . Generally DT means one unit length .

E(supply) in S.D is descripted as follows ;

$$Es = \frac{\dfrac{Supply.K - Soomth(Supply.K, DT)}{Supply.K}}{\dfrac{Price.K - Soomth(Price.K, DT)}{Price.K}}$$

DT is simulated unit time step length.

Q1 represents orignal supply , Q2 is final supply . P1 tells original price degree1 , P2 is final price degree2 . E(supply) is so called desired supply elasticity.Their cause and result relationship, i,e, E(supply) and quantitative supply is shown in the following Figure ,



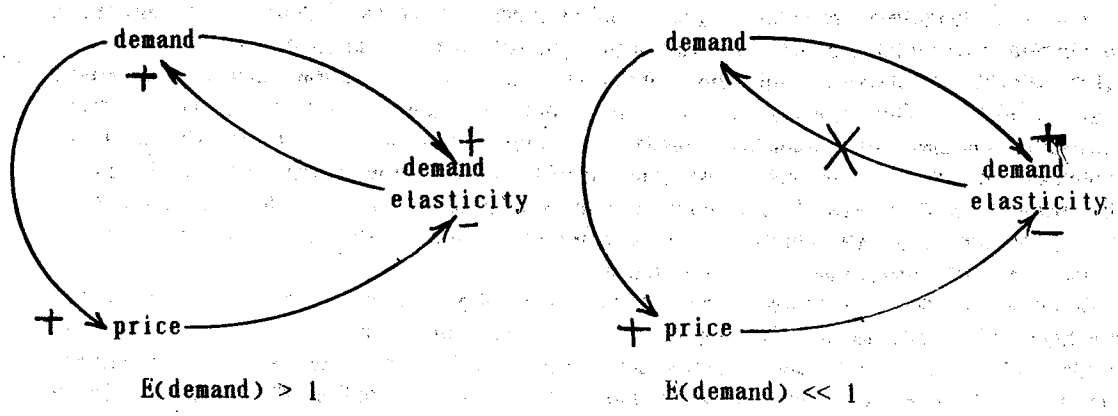
E(supply) > 1

Figure 7,

Demand elasticity exposes the relatively quantitative ratio between demand and price . it measures the quantitative demand of one product and adaptation of labour and income elementary factors elemantary factors when its price is changed .

$$E(\text{demand}) = \frac{\frac{Q2 - Q1}{Q1}}{\frac{P2 - P1}{P1}}$$

Q1 expresses the original quantitative demand , Q2 the final quantitative demand. P1 states the original price level , P2 is the final price level. Ed tells demand elasticity . The cause and result relationship between Ed and demand is shown in the following figure 8,



The demand elastricity has nothing to do with demand in abouve figure

Figure 8:

When supply elasticity and demand elasticity are added as variables to the flow diagram below of the subordinate system to expose .

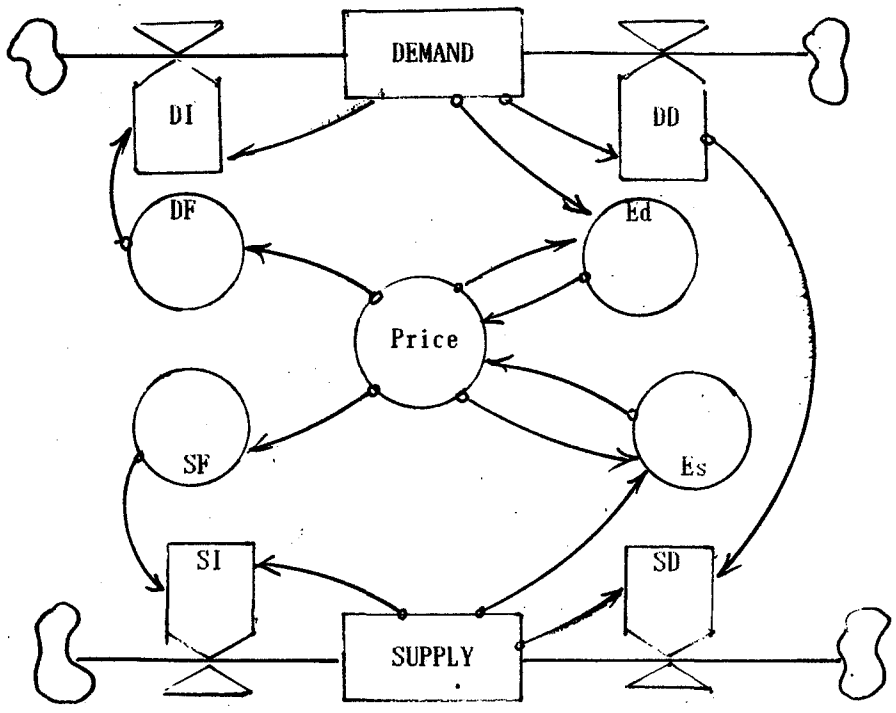


Figure 9:

the relationship between supply and demand, it tells different stimulation on demand and supply caused by the feedback of elastic adjustment .

The model simulates habitual behavior of this system under different elasticities . The greater elasticity can be read . if the system is very unstable and smaller elastic system changes slowly , it means the lack of economic motivity . But it is very difficult to measure practical elasticity . The coefficient of elasticity can be reached from a large number of statistic data . These data are reguired to be wide and exact . This is just the direct result of the simulation of this model.

Because of the urgency , the simulation of macroeconomics by S.D is left uncompleted . As far as the simulating of microeconomics , it is far from its perfection . We hope more personnel may go in for the study of economic theories. We are going to study macroeconomics by S.D and perfect the study of microeconomics.