

## CHAPTER XIII

### EXCHANGE IN A CAPITALISTIC ECONOMY

1. *Quantity Theory of Money.* In the days before banks assumed their important position in the economy and great dilution of money by credit expansion was impossible, quantity of money in circulation and its velocity of circulation were essentially the sole determinants of prices. Volumes of production in general depended upon technology, weather, etc. In these economies the price of a good was the ratio of the quantity of the good which would be exchanged for a given quantity of gold (or silver, wampum etc. in some economies) to that quantity of gold. In such economies prices and prosperity were vitally dependent upon the quantity of money in circulation since the rate of spending, which was largely fixed by habit, did not greatly vary. The Chinese 500 years before Christ knew the quantity theory of money. In fact, the story of a Chinese ruler who proposed to bring about prosperity by changing the value of his money is well known.\*

Theories of money and purchasing power generally assume that the average quantity of money  $M$  in circulation during an interval of time  $t$  to  $t + T$  multiplied by its velocity of circulation  $V$  in this time (number of times this money changes hands or circulates in transactions involving goods) plus the average quantity of bank credit  $M_c$  multiplied by its velocity of circulation  $V_c$  (transactions involving goods) is proportional to an average price of goods

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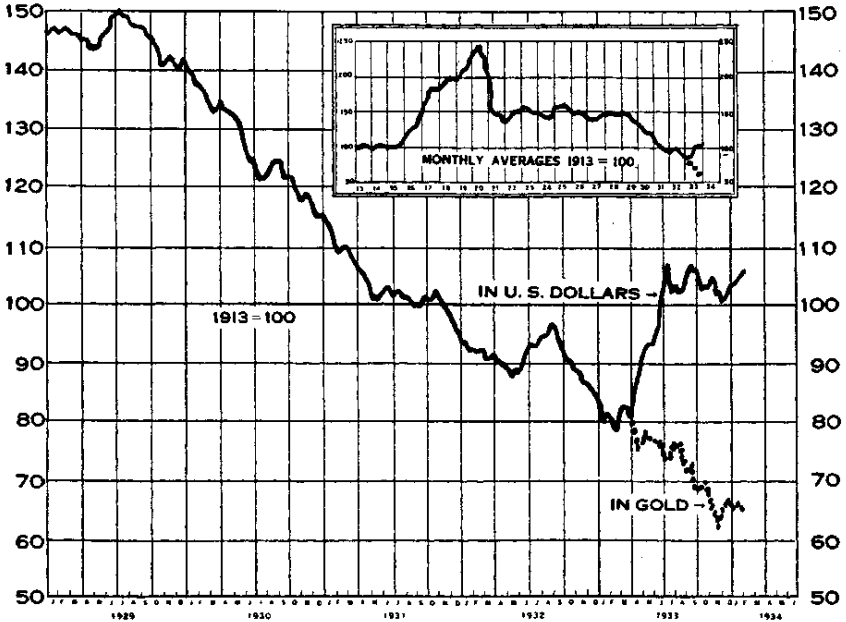
\*In the thirteenth century the scholar-statesman, Ma Tuan-lin, compiled a large encyclopedia of general information based upon original Chinese sources. The particular passage given below was written twenty-five hundred years ago during the Chou Dynasty; it was translated in the Gest Chinese Research Library at McGill University:

"In the year 524 B. C., Emperor Ching of the Chou Dynasty thought that the coins in circulation were much too light, and issued an order to mint heavier coins and banish the light ones entirely from circulation . . . . .

"Regarding this drastic change, Shan Mu-kung, a minister of the government, comments as follows: From time immemorial the monetary system of the country has always been so regulated as to relieve the people in time of distress (i.e., economic depression). When the inconvenience of the people is not great, more heavy coins are put into circulation for the reason that when the coins are light prices of commodities go up. In this case the heavy coins are standard value, while the light ones are auxiliaries — but they are both in circulation.

THE ANNALIST WEEKLY INDEX OF WHOLESALE  
COMMODITY PRICES (1913 = 100)  
(Unadjusted for Seasonal Variation)

CHART XLIII



Changing the gold content of gold currencies does not immediately affect all prices. International commodities are first affected. Changes in prices of these commodities affect other prices. See also Charts XXXIII to XXXIX.

On the other hand, if the inconvenience of the people is great they cannot bear the burden of heavy money. The light money automatically becomes the standard value and the heavy auxiliary.

"Now, the Emperor has ordered the abolition of light coins completely. The immediate result of this change will be an enormous decrease in the income of the people and consequent hoarding will be inevitable. All this causes a bad effect on the national treasury and directly raises the rate of taxation. When the rate of taxation is raised, financial disaster and political discontent follow.

"Preparation should be made in advance to meet the coming of a financial crisis. If remedy is to be applied only after the crisis has arrived it may be impossible to meet the exact condition and consequently will cause great anxiety."

See Wên hsüan t'ung k'ao (Edition 1896, A. D.), Chapter 8, p. 4-15, by Ma Tuan-lin, 13th cent. A. D. Rendered by S. D. Quong.

times the quantity of goods consumed in the interval of time  $t$  to  $t + T$ , that is,

$$(1.1) \quad MV + M_c V_c = (\lambda/T)PQ$$

where if  $P$  is the average price of goods and  $Q$  is the quantity sold in the time  $t$  to  $t + T$  the proportionality factor  $\lambda = 1$ . If  $P$  is used to denote a price index and  $Q$  a quantity index, the proportionality factor is not equal to unity. Actually it is only in the latter way that the equation makes sense statistically.

Equation (1.1) can be used to demonstrate the quantity theory of money provided additional assumptions are made. Thus if bank credit  $M_c$  is proportional to currency,  $M_c = \gamma M$  and the velocity of circulation  $V_c$  is proportional to  $V$  that is,  $V_c = \mu V$ , the equation (1.1) becomes\*

$$(1 - \gamma\mu)MV = (\lambda/T)PQ$$

which readily yields the proportionalities demanded by the quantity theory of money.

As a first approximation to an equation representing the exchange of goods for money the classical formula (1.1) cannot be criticized, but it is certainly no more than a first approximation. In the first place the equation does not take into account the lag between the production of a good and its consumption unless, of course, the interval of time  $T$  is sufficiently long. In the latter case the use of an average effectively buries an important element. In the second place the formulation (1.1) fails to recognize that prices of capital goods depend upon *expected* income and hence are largely psychological and that fluctuations in prices of these goods materially affect  $M_c$ ,  $V_c$  and also  $V$  and  $M$ . This omission is essentially more important than the omission of the lag between production and consumption, but lag cannot be ignored.

2. *Lag between Wages and Consumption.* As already pointed out, Chart XLII, inventories play an important role in a capitalistic economy. There are goods purchased with raw materials and labor at prices prevailing in the past. For some goods the prices paid for labor may be those in effect six months or more before the goods pass out of inventory into final consumption. Soap is essentially in

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\*For refinements of this argument see J. M. Keynes, *Treatise on Money*, New York, 1930, p. 192.

this class. In other instances consumption is much more rapid. For example, according to economists of the meat packing industry the total time required to slaughter meat and dispose of it through the retail meat markets seldom exceeds two weeks.

Prices of raw materials seem to be determined largely by the supply of materials available and therefore sometimes bear little relationship to the wages required for producing them. For example, for years farmers have been complaining that they could not sell their cotton for the average cost of producing it. Whether or not the complaint is in general worthy of merit need not be answered here, but it is incontestable that prices of cotton have fluctuated widely and that the only way an assumption that the price of cotton reflects "wages" required to produce it can be justified is by a further assumption that farm wages fluctuate as violently as cotton prices. In reality, however, farm wages remain relatively stationary and farm income or profits fluctuate.\*

Let  $p_{mi}$  represent average price of the  $i$ th raw material and let  $q_{mi}$  represent the quantity sold in the time  $t$  to  $t + T$ . This quantity may be sold several times before it actually enters a processing operation. The price  $p_{mi}$  is a weighted average so that if  $F$  is the total number of raw materials used,

$$(2.1) \quad \sum_{i=1}^F p_{mi} q_{mi} ,$$

is the money value of all transactions involving raw materials in the time  $t$  to  $t + T$ .

To raw material are added transportation and sales services and then the product enters a production process and additional labor, power and management are added to produce either consumer or capital goods. A consumer good usually passes from the manufacturer to a jobber or wholesaler via additional transportation and then to the retailer who sells to the ultimate consumer (laborer, farmer, skilled mechanic, professional man, etc). Stock (inventory) shortages or stock surpluses may occur at any point in the process of manufacture and distribution. Consequently, *the price paid by the ultimate consumer for consumption goods need not be constantly proportional to the wages paid for manufacturing and*

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\*It is possible to beg the issue by defining farm income to be farm wages, but by the same method corporation profits could be defined to be wages to owners of capital.

*distributing the goods.* Let  $p_{gi}$  represent price of the  $i$ th consumption goods and let  $q_{gi}$  represent the quantity consumed (purchased) in the time  $t$  to  $t + T$ . In this definition all goods in process other than raw materials and all consumption goods in the usual sense are regarded as consumption goods. It might be better to make a division into producers' goods and consumers' goods, but this does not appear to be essential since additional variables would be added without increasing fundamental knowledge of flows of exchange. Then the money paid for consumption goods in the time  $t$  to  $t + T$  is

$$(2.2) \quad \sum_{i=1}^G p_{gi} q_{gi}$$

where  $G$  is the total number of consumption goods sold in the time  $t$  to  $t + T$ .

The price of capital goods or equities depends to a large extent upon *expected income* from the goods or equities. In Chapter XI it was pointed out that this price or value could be represented by an integral or infinite sum of expected income plus a fraction of cost of the capital goods. For the present, however, denote the price of the capital goods  $A$  by  $p_{ci}$  and the quantity sold in the time  $t$  to  $t + T$  by  $q_{ci}$ , so that the total money paid for capital goods is

$$(2.3) \quad \sum_{i=1}^C p_{ci} q_{ci} ,$$

where  $C$  is the total capital goods sold in the time  $t$  to  $t + T$ .

Let  $p_{ri}$  represent the average price of capital services (rent, dividends, etc.) and let  $q_{ri}$  represent the quantity of such services demanded in the time  $t$  to  $t + T$ . Then the money paid for capital services is given by

$$(2.4) \quad \sum_{i=1}^R p_{ri} q_{ri} ,$$

where  $R$  represents the number of services of capital used in the period.

If  $p_{si}$  represents the price of the  $i$ th service (wage or salary) and  $q_{si}$  the quantity of the service paid for in the time  $t$  to  $t + T$ , the total value of wages or salaries is equal to

$$(2.5) \quad \sum_{i=1}^S p_{si} q_{si} ,$$

where  $S$  is the number of services required in the period.

The following notation will be useful:

$M$  = average amount of currency (gold, silver, paper notes) in circulation in the interval of time  $t$  to  $t + T$ ;

$V$  = average number of times this currency changes hands or circulates in the time interval  $t$  to  $t + T$ ;

$M_c$  = average amount of bank credits subject to check in the interval of time  $t$  to  $t + T$ ;

$V_c$  = average velocity of circulation of  $M_c$ ; and

$y_c$  = the fraction of  $M_c V_c$  used for the purchase of consumer goods and all services.

Obviously,  $1 - y_c$  is the fraction of  $M_c V_c$  available for (part of it may be hoarded) purchase of stocks, bonds, mortgages and capital goods.\*

Let  $M_b$  represent brokers' loans, savings accounts and all money other than that already mentioned, and let  $V_b$  be its average velocity of circulation.

Then total monetary transactions are given by

$$[MV + M_c V_c + M_b V_b]T \text{ or splitting up } M_c V_c ,$$

by

$$[MV + y_c M_c V_c + (1 - y_c) M_c V_c + M_b V_b]T$$

Total monetary transactions in the time  $T$  are also given by the sum of (2.1), (2.2), (2.3), (2.4) and (2.5). It follows therefore that

$$MV + y_c M_c V_c + (1 - y_c) M_c V_c + M_b V_b = 1/T \left[ \sum_{i=1}^F p_{mi} q_{mi} + \sum_{i=1}^G p_{gi} q_{gi} + \sum_{i=1}^C p_{ci} q_{ci} + \sum_{i=1}^R p_{ri} q_{ri} + \sum_{i=1}^S p_{si} q_{si} \right] .$$

This equation of exchange is, of course, an identity. Its chief value lies in the fact that it illustrates how various parts of an economy compete for purchasing power. A slightly more incisive analysis of the nature of some of the prices on the right indicates how depressions and booms may arise.

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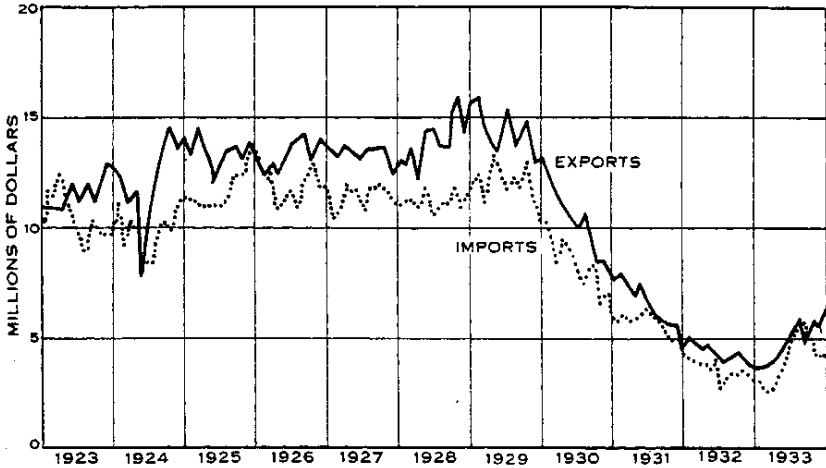
\*Although related to Keynes' efficiency factor  $y_c$  is not to be confused with it.

UNITED STATES FOREIGN TRADE

Average Daily Value Adjusted for Seasonal Variation

Source: The Annalist, September 29, 1933, and February 2, 1934.

CHART XLIV



The excess of visible plus invisible exports over visible plus invisible imports can be regarded as internal inflation of purchasing power. Lure of foreign investments caused United States savings to be loaned abroad thus providing purchasing power for nations trading with the United States. Manufactured goods were thus exchanged for foreign bonds which may be regarded as paper money.

3. *Prices of Capital Goods.* As already pointed out, prices of capital goods depend upon expected future income and only slightly upon wages and material expended upon them. Thus, the prices,  $p_{ci}$ , are of the form: sum over some interval of time (sometimes regarded as such a long time that it can be an infinite interval of time) of  $(pq - Q)$  where  $p$  represents price,  $q$  represents quantity of a good or service produced by the capital goods, and  $Q$  represents the cost of production of  $q$ , multiplied by a discount factor plus a fraction of the cost of production of the capital goods, that is,

$$p_{ci} = \sum_{j=1}^N \int_t^{t+t_1} [\gamma_{ij} p_{qj} q_{qj} - C(q_{qj})] e^{-\delta_i t} dt + \mu_i L_i ,$$

where  $L_i$  is the construction cost of the capital goods;  $N$  is the number of products or services to be produced by the capital goods;

$C(q_{sj})$  is the cost of producing the  $j$ th good or service (if a subscript  $s$  is used to denote a service);  $\delta_i$  is a discount factor (force of interest);  $\gamma_{ij}$  is a factor used in estimating future income, and  $\mu_i$  is a mortgage or bond ratio, for example, fifty or sixty per cent for real property. The quantities  $\gamma_{ij}$  and  $\mu_i$  are largely psychological and of course, the former is more subject to fluctuation than the latter. This formulation of price applies particularly to plants. Some unassembled capital goods of course have their prices determined much like the prices of consumer goods. See Section 4.

If general optimism prevails,  $\mu_i$  is large and equities have high values. If pessimism prevails so that  $\gamma_{ij}$  becomes so small that the first term is nearly zero, brokers' loans  $M$  and even bank credit  $M_c$  will be reduced. Thus, when there are no prospects of profit, prices of bonds and money based upon these bonds are upset. Although the number of capital goods sold and their dollar value may be small, important price changes of these goods may bring serious repercussions throughout the economic system since  $M_c$  and  $M_b$  are largely based on these prices.\* Thus, loss of confidence which brings about low equity values will force a downward spiral in the amount of bank credit, brokers loans and other credit money outstanding. In other words, on the left-hand side of the equation of exchange there are equity values not represented on the right-hand side which are directly affected by the prices of those which do appear on the right-hand side. Of course, disturbances also occur on the other side of the equation.

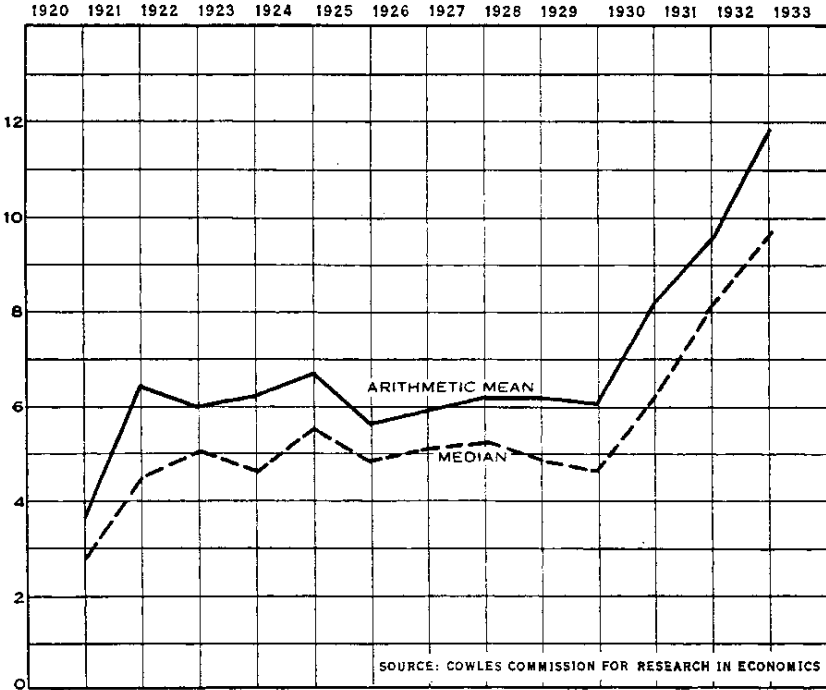
4. *Prices of Raw Materials and Consumers' Goods.* Consumption of raw materials going into consumers' goods is a relatively fixed quantity, i.e., over fairly long intervals of time (a year or more) consumer goods demand is relatively fixed. Excess production of raw materials goes into inventories of producers of raw materials, or speculators, or into inventories of manufacturers of consumers' goods. Manufacturers' and speculators' inventories are built up only if present price is sufficiently low and expected to advance (a short crop, production difficulties, etc.). Hence prices of raw materials depend to a large extent upon the quantity available, that is, upon the supply on hand and in sight within a year.

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\*Banks and investment houses do not revalue their securities daily so that short time fluctuations are relatively unimportant. A long downward or long upward sweep is the thing to be feared. See C. F. Roos, *Stabilization of Employment*, Chap. XIV.

## RATIO OF CURRENT ASSETS TO CURRENT LIABILITIES FIFTY-SEVEN LARGE INDUSTRIAL CORPORATIONS

### CHART XLV



Since 1929 the ratio of current assets to current liabilities for large companies has been steadily rising. This may mean 1) current liabilities have been reduced more rapidly than current assets or 2) current assets have increased more rapidly than current liabilities. At any rate a "normal" rate of circulation of current assets and current liabilities has not been maintained. Today small concerns are not considered good credit risks whereas large concerns in general do not need credit. This makes credit expansion as a means of inflation very difficult.

Salt, which is very plentiful, has a low market value. Recently the supply of petroleum became so plentiful that its price declined to ten cents per barrel.

In a surplus economy like that of the United States a slight decline in consumption of consumers' goods can bring about a drastic decline in prices of raw materials.

Decline in prices of raw materials may bring about substitute uses for the raw materials, for example, cheap cotton can be used

to make bags that might otherwise be made of paper. Again high cotton prices will undoubtedly bring the rayon industry to maturity much more quickly than low cotton prices and will lead to less demand for cotton at an earlier date than would otherwise be the case. See Chart XXVIII. A decline in prices of raw materials will ultimately be reflected in reduction of prices to the consumer, but during the decline some producers are almost sure to suffer severe losses due to decline in value of their inventories.

The price  $p_{gk}^{(1)}$  of a semi-finished consumer good, i.e., a good in the first stage of processing, may be expressed by a relation

$$p_{gk}^{(1)} = \gamma_1 \left[ \sum_{i=1}^{M_1} p_{mi} + \sum_{j=1}^{W_1} W_j^{(1)} \right],$$

where  $W_j^{(1)}$  stands for services of capital (interest) and services of labor, including direct labor to produce power. For the second stage of manufacturing

$$p_{gk}^{(2)} = \gamma_2 \left[ \sum_{k=1}^{M_2} p_{gk}^{(1)} + \sum_{j=1}^{W_2} W_j^{(2)} \right]$$

and so forth for other stages of processing. Transportation and selling expense can also be included by proper modification of the definitions of  $W$  and  $p$ .

If the time of manufacture extends from  $t - t_i$  to  $t$  the price of the consumer good may for simplicity be taken to be

$$p_{gi} = \int_{t-t_i}^t \left[ \sum_{k=1} \lambda_{ik}(x, t) W_k(x) + \sum_{j=1} \lambda_{2j}(x, t) p_{mj}(x) \right] dx$$

where  $\lambda_{ik}(x, t)$  is a psychological factor depending upon business conditions at each time  $x$  in the interval  $t - t_i \leq x \leq t$  as well as upon business conditions at the time  $t$ . This formulation indicates how a change in the price of a raw material may be reflected through different stages of processing and distribution.

*5. Interest, Rent and Dividends.* The rate of interest is invariably fixed by contract. Short-term interest rates are in general (except in boom times) less than long term rates on account of the fact that the danger of losing the principal increases as the length of time of a loan increases. Short term interest rates are fairly

flexible. In the United States they are considerably influenced by the discount policies of the Federal Reserve Board and by borrowings of the United States Treasury.

On the other hand, in the United States a six per cent per annum rate of interest for real estate mortgages has been in vogue for years. The rate of interest on corporation bonds has varied from four per cent per annum to seven or eight per cent per annum, the variation depending chiefly upon the expected rate of risk. Long term interest rates adjust very slowly. They become fixed by habit and are very difficult to change.

It might be expected that the force of interest  $\delta_i$  in Section 3 is the long term interest rate, but it is in reality more nearly the short term rate. That is, in boom time the capitalist is tempted to use his money in financial dealings promising a high interest yield rather than to invest them in long term securities. In a depression, on the other hand,  $\delta_i$  is very small to the investor. Thus  $\delta_i$  and  $\gamma_i$  move in the same directions. In reality it may be questioned whether it is necessary to use two factors  $\delta_i$  and  $\gamma_i$ . In view of the fact that  $\delta_i$  is an interest rate and  $\gamma_i$  is a psychological quantity, it appears best, however, to separate them.

Dividend rates are more or less fixed by custom. A corporation paying six per cent per annum dividends usually builds up a surplus in times of prosperity and continues to pay the same rate of dividends for some time after earnings fail to justify it. Such unearned dividends are, of course, paid out of surplus built up in times of prosperity.

Variation in house rent in St. Louis is shown in the chart used in the chapter on factors influencing residential building. Rent, like interest, is fixed by both short—and—long term contracts. History indicates, however, that rent is somewhat more flexible than interest.

6. *Competition for Purchasing Power.* As pointed out, prices of raw materials are quite flexible whereas quantities of raw materials consumed are relatively fixed. It follows that purchasing power going to producers of raw materials is therefore quite flexible.

Purchasing power going to producers of consumers' goods is on the other hand fairly constant. It is customary to keep prices of consumers' goods fairly constant and allow profits to fluctuate with prices of raw materials. In times of rising prices inventories offer

the best avenues of profit for producers of consumers' goods and similarly in times of falling prices inventories bring about losses.

Purchasing power going into capital goods is highly flexible and depends upon psychological factors. Capital goods therefore represent a highly volatile element in an economic system. Prices of capital goods depend upon confidence in the future.

Rents, interest and dividends are very stable elements in the equation of exchange. Thus, as purchasing power (left-hand side of the equation) shrinks, an increasing proportion goes to pay rent and interest and for a short time dividends also.

Wage rates or prices of labor change, but not rapidly, that is, they do not keep pace with prices. Quantity of labor employed constantly changes, however, so that purchasing power going to labor changes considerably. On the surface this fact would seem to indicate that purchases of consumers' goods would vary considerably, but it must be remembered that savings which can be drawn upon by the unemployed, gifts, charity, etc., all act to keep up purchases of consumers' goods. After prolonged unemployment of masses, i.e., when their savings are exhausted, consumption of consumers' goods necessarily falls. Here profits crumble, equities fall and repercussions occur throughout the whole system.

Examination of building statistics shows that residential building began to sag in 1926 and underwent only a slight revival in 1928, probably due to stock market profits going into building regardless of income incentive which was steadily dropping (see Chapter VI). From 1928 on, the decline in residential building has been almost precipitous. In 1929 and 1930 public works took up some of the unemployed, but abandonment of such work took the last prop out. The collapse of the stock market in the fall, due chiefly to psychological factors,\* might have led to only a temporary panic had it not been for the fact that building was on a precipitous downgrade with no important growing industry to take up the slack. See Chapters VI and VII. The two effects occurring simultaneously were sufficient to produce important changes in national income and thus set up the deflationary forces already described.

Following the second stock market crash business generally set about to reduce costs. All the adjustments described in Chapter X were attempted.

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\*It is not meant that the stock market had not led to an inflation of brokers' loans and bank credit which brought about profits generally, and gave the appearance of a new era.

When adjustments in cost take place rather generally the very process of decreasing production to increase profits will bring about changes in income that require smaller and smaller values of the production rate maximizing income. Thus, a shrinkage in national income can bring about an appearance of general overproduction. It must be remembered also that in this economic downtrend *expected* price decreases and the accompanying aggravating situation described briefly in inequality (7.1) of Chapter IX further reduces employment, especially in capital goods industries.

At some stage the downtrend in the psychological factor  $\gamma_j$  is arrested, and *expected* price increases so that production and distribution are speeded up. In this process of reversal, employment in consumer goods industries is increased. The accompanying increases in national income usually bring out new bank loans (newly created credit), which are essentially additions to national "income," and savings which have been idle or have been going into governmental loans are put into use for the construction of capital goods. As production increases further, prices of raw materials increase and inventories are increased in value. Increased values of inventories make new bank loans possible and these in turn provide more national "income", which brings about greater production and so on until a position of instability is again reached.