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CONCLUDING NOTES

1. The Burden of Seasonal Variations

The detailed discussion in the preceding chapters has served to show that seasonal variations affect the rate of activity in almost every branch of industry and trade; that the solution of the seasonal problem involves keeping stocks of one kind or another; and that the exact nature of the solution depends upon and varies with economic conditions in the industries and trades affected. Seasonal irregularities in the flow of related commodities may be either non-synchronous or of unequal amplitude or subject to both types of disparity, and the surpluses may be in the form of an excessive accumulation of finished commodities or of raw materials, of idle machinery, of an excessive supply of labor or of any other of the numerous factors essential to carrying through an economic process.

A definition is given below of what constitutes 'excessive' and what may be called 'surplus' stocks, as distinguished from the stock of commodities accumulated for the purpose of a prosecution of an economic process at a constant and continuous rate. For the moment we are concerned only with the manner in which commodities, equipment or labor become 'excessive'. A surplus may arise not only from the disparate influence of seasonal factors on related economic processes but also from the varying influence upon these processes of other types of change: secular, cyclical and random. It is rather difficult to segregate the portions of the surplus available in excess of the amount needed for the most efficient prosecution of economic activity at a constant rate due specifically to the disturbing influence of seasonal, cyclical, secular and random factors. It would be impossible to attempt to estimate the burden imposed specifically by seasonality unless exhaustive data on the seasonal rate of utilization of industrial equipment and labor, and measures of seasonal variations for stocks of all commodities at each of the stages from the production of raw materials to the finished products were at hand.

Such data are not available and the frequent gaps which have occurred in our detailed discussion have emphasized repeatedly the lack of quantitative records for the important links. However, a few partial indications of the burden of seasonal variations may be attempted. They are presented below in full recognition of their limited and highly tentative character.

a. *Surplus Stocks*

To measure the seasonal surplus of commodity stocks we may use the seasonal indexes that have been computed in the study. For each commodity, stocks are taken at the beginning of a month in which both the flow to the utilizing agents and the flow from them, that is, production and consumption, or shipments, are close to the average for the year. In every instance the seasonal flow from the utilizing agents during the chosen month is equal to or higher than the rate of supply to them during that month. The seasonal index of stocks at the beginning of the month then represents the minimum amount of stocks necessary for carrying through the activity in question at a rate free from seasonal disturbances. If for any other month the seasonal index of stocks is above the index for this month, this excess stock holding is due purely and exclusively to the seasonal disturbance in the flow and utilization of the commodity in question.

The seasonal surplus of stocks may then be measured in either of two ways. First, we may obtain the total sum of differences between the seasonal index for the month taken as the 'minimum' and the seasonal indexes for the other eleven months. This sum of differences measures the seasonal surplus of stocks through the entire year. Second, we may obtain the difference between the 'minimum' and the seasonal peak of stock-holding. This measures the maximum seasonal surplus of stocks for a single month.

The seasonal excess of stocks, measured in either way, may be expressed in units of the average monthly volume of activity that the stock serves. In the first, total differences, a figure of 1.0 would mean that the seasonal surplus of stocks throughout the year is equivalent to the holding for one month of a volume of commodities equal to one month's output, consumption or shipments. In the second, the difference between

the ' normal minimum ' and the seasonal peak, a figure of 1.0 would mean that at its peak in any single month the seasonal surplus of stocks is equivalent to the holding for one month of a volume of commodities equal to one month's activity.

Example:

In evaporated milk, case goods, the seasonal index for March is 100 for production and 100 for shipments. Hence, stocks in producers' hands at the end of February are sufficient to enable the producers to ship at an average rate for one year while production is also at the same rate. The seasonal index for stocks at the end of February is 67, which is the ' minimum '. Hence

(1) The total seasonal surplus of stocks for the year is $33 \times 12 = 396$. The ratio of stocks to shipments (or production) being 1.34, the seasonal surplus in terms of production or of shipments is $396 \times 1.34 = 531$. Average monthly production is expressed by an index of 100. Hence, in terms of monthly volume of production, the seasonal burden of stocks through the year is 5.31.

(2) The stocks at seasonal peak are measured by an index of 139. Hence, the maximum seasonal surplus for a single month is $72 = 139 - 67$. In terms of monthly output, it is 72×1.34 , divided by 100, or 0.96.

Table XLIX presents these estimates of the seasonal surplus of stocks for the commodities that were analyzed in the study.

The comparison could not be made for stocks of such agricultural raw materials as wheat and cotton because a month could not be found in which marketing by farmers (or receipts at primary markets), deliveries to mills and exports were all at a seasonally normal level, a clear indication that for a more analytical study of seasonal changes time units shorter than a month are essential. On the other hand, almost no records are available on stocks in the hands of the distributive trades. As a result the table covers only stocks in the hands of manufacturing producers, which, from the point of view of quantities involved and extent of seasonality, represent the less important stages of commodity accumulation.

Nevertheless, for many of the commodities listed the purely seasonal burden of stocks appears considerable. In at least one-third the total surplus has a measure of 4.0 or more. This means either that stocks equivalent to four times or more of monthly production are held for one month or that the output of a month is held for four months or longer. If the seasonal surplus of raw material stocks of each of the commodities involved and the seasonal excess of the same commodities held by the distributive trades and the consumers

TABLE XLIX

SEASONAL SURPLUS OF COMMODITY STOCKS IN UNITS OF MONTHLY VOLUME OF PRODUCTION, SHIPMENTS OR APPARENT CONSUMPTION

Commodity ^a	Seasonal Surplus	
	For the Year	For the Peak Month
Wheat Flour, All Positions.....	0.2	0.10
Beef and Veal, Cold Storage.....	0.9	0.02
Mutton and Lamb, Cold Storage.....	0.1	0.05
Pork and Pork Products, Cold Storage.....	5.0	0.67
Butter, Cold Storage.....	6.1	1.17
Cheese, Cold Storage.....	6.5	1.17
Evaporated Milk, Case Goods.....	5.3	0.96
Condensed Milk, Case Goods.....	6.6	1.34
Condensed Milk, Bulk Goods.....	2.9	0.72
Cottonseed Oil, Refined.....	11.2	2.06
Raw Cotton at Textile Mills (unreliable).....	11.0	1.51
Finished Cotton Goods.....	0.1	0.05
Knit Underwear	2.1	0.42
Hosiery	1.5	0.26
Working Clothes	1.4	0.24
Dry Goods, Wholesalers' Stocks ^b		
Philadelphia F. R. D.....	2.6	0.40
Richmond F. R. D.....	3.4	0.50
Dallas F. R. D.....	4.8	0.78
Department Stores ^c	2.2	0.57
Crude Rubber, All Positions.....	2.7	0.57
Inner Tubes	3.0	0.65
Pneumatic Casings	1.5	0.41
Solid and Cushion Tires.....	1.8	0.34
Gasoline	1.5	0.62
Steel Sheets	0.6	0.09
Portland Cement	5.5	0.85
Petroleum Asphalt	1.2	0.18

TABLE XLIX (CONTINUED)

Commodity ^a	Seasonal Surplus	
	For the Year	For the Peak Month
Common Brick	4.3	0.98
Face Brick	3.2	0.71
Floor and Wall Tile.....	1.2	0.28
Southern Yellow Pine.....	0.3	0.08
Western Pine	4.1	0.68
Maple Flooring	2.8	0.50
Radiators	9.6	1.70
Square Boilers, Cast Iron.....	11.4	1.90
Round Boilers, Cast Iron.....	9.2	1.53
Baths	3.1	0.51
Lavatories	1.4	0.30
Sinks	2.0	0.49
Vitreous China	0.8	0.22
Dry Roofing Felt.....	0.2	0.04

^a Unless otherwise noted, stocks are given as held by producers.

^b Ratio of stocks to sales assumed as 2.0.

^c Ratio of stocks to sales assumed as 3.0.

(industrial or private) could be added, the total would be much more impressive. Our partial estimate may be concluded by emphasizing once again the paucity of data on the monthly changes in stocks of commodities at the various stages of production and distribution.

b. 'Excessive' Equipment

In measuring surplus equipment the difficulties created by lack of data are increased by the even more serious difficulties that arise in defining the concept. What is the capacity of an industry and when may it be said with assurance that over-capacity exists in a given branch of economic activity? Even if we resolve numerous difficulties by assuming that the volume of output affords a reliable measure of capacity, troublesome questions still remain. If, for example, the volume of output of a certain commodity is characterized by a seasonal swing that declines in one month to 60 and rises in another month to 150, may we say that for our purposes its capacity is measured by an index of 150 and that therefore any month in which production is below 150 is a month in which a part of capacity is idle? Or is normal capacity de-

scribed by an index of 100 and does any output above 100 indicate an extraordinary utilization of capacity? It is obvious that our measurement of the degree of over-capacity attributable to seasonal disturbances will vary with our answer to these questions.

The difficulty may be resolved by the assumption that the seasonal peak month measures the normal plus the latent capacity of the industry; that an output below the seasonal peak indicates an inadequate utilization of the maximum possible capacity of an industry; and that an output below a seasonal index of 100 indicates an inadequate utilization of the normal capacity of the industry. We can then set up two measures of the degree of over-capacity in industry attributable to seasonal disturbances: one gives the total difference in activity between each of the months and the month of peak output; the other the amount by which the months below 100 depart from 100. Dividing each of these by 12 we obtain two measures of the average monthly over-capacity attributable to seasonal disturbances.

These two measures may be computed for industrial production by utilizing the seasonal indexes for the component branches of manufacturing production and mineral output made available by the Federal Reserve Board. Since equipment may not be considered mobile as between industries, the measure was computed for each branch of production separately; then a weighted average was computed for manufacturing industry and for mineral output. The resulting figures are as follows:

For manufacturing industry—monthly average per cent by which output is	
below the seasonal peak	11.9
below the line of 100.....	3.3
For minerals—monthly average per cent by which output is	
below the seasonal peak.....	15.2
below the line of 100.....	4.9

The true measure of seasonal over-capacity in manufacturing and minerals probably lies between the two figures. It should be below the average deviation from the seasonal peak, for during a single month a higher output could probably be

achieved than would be possible under continuous utilization of capacity. On the other hand, the lack of utilization of capacity must be much higher than that indicated by deviations below 100. It seems likely that the true figure must be about 8 or 9 per cent in manufacturing industry and 10 to 12 per cent in minerals.

For manufacturing industry another interesting indication of the influence of seasonal disturbances on over-capacity may be obtained from the *Census of Manufactures* for 1921 and 1923. For these years "each manufacturing establishment was asked to estimate the percentage which its actual output during the census year constituted of its maximum possible output."¹ These percentages were computed by the Bureau of the Census for each industry, and an average, weighted by the value of products, was taken for all manufacturing establishments. The averages for all industries were 57.1 for 1921 and 72.2 for 1923.

Of the total number of industrial branches (335 in 1921 and 328 in 1923) 68 were chosen as subject to seasonal disturbances. For these we then compared the percentage of maximum capacity utilized with the average percentage for all industries during the same year. This comparison, when made for both 1921 and 1923, reveals whether the seasonal industries suffer from an over-capacity larger than that which prevails in the manufacturing industry of the country as a whole. Table L summarizes the results of this comparison.

It may be seen that in the overwhelming majority of instances the utilization of capacity by seasonal industries is below the average. In 1921 this is true of 45 out of 65 industries in the list; in 1923 of 57 out of 68. This difference in showing is due to the fact that in a year of business depression, such as 1921, the seasonal industries, which include many concerned with producing consumers' goods, did not suffer as deep a cyclical decline as the non-seasonal industries which include chiefly those turning out producers' goods. In 1923, on the contrary, a cyclical peak year, the seasonal industries tended to show a less steep cyclical rise than the non-seasonal industries.

When the deviations from the average for both 1921 and 1923 are added, only 16 of the 68 industries show a rate of

¹ *Census of Manufactures, 1923*, p. 1200.

TABLE L

PER CENT ACTUAL OUTPUT OF MAXIMUM POSSIBLE OUTPUT
 MANUFACTURING INDUSTRIES CHARACTERIZED BY SEASONAL VARIATIONS
 DEVIATIONS FROM AVERAGE FOR ALL INDUSTRIES

Industry	1921	1923
Agricultural Implements	- 21.7	- 11.1
Artificial and Preserved Flowers and Plants.....	+ 6.5	- 2.6
Artificial Stone Products, Excluding Paving and Roofing..	- 8.3	- 11.9
Asbestos Products Other Than Textiles, Steam Packing or Pipe and Boiler Covering ^a	- 17.7	- 4.5
Awnings, Tents and Sails.....	- 3.2	- 14.4
Beverages	- 12.4	- 38.3
Boots and Shoes Other Than Rubber.....	+ 5.6	- 0.4
Butter, Cheese, Condensed and Evaporated Milk.....	+ 13.9	- 2.4
Canning and Preserving, Fish, Crabs, Shrimps, Oysters and Clams	- 8.6	- 27.9
Canning and Preserving, Fruits and Vegetables; Manufac- ture of Pickles, Jellies, Preserves and Sauces.....	- 5.0	- 7.0
Cement	+ 21.5	+ 14.0
Clay Products (Other Than Pottery) and Non-clay Re- fractories	- 3.3	+ 5.4
Clothing, Men's	+ 9.1	+ 0.7
Clothing, Women's	+ 7.7	- 3.1
Confectionery ^b	+ 2.9	- 9.8
Dairymen's Supplies, Creamery, Cheese-factory and Butter- factory Equipment; Poultrymen's and Apiarists' Sup- plies	- 2.8	- 17.9
Fertilizers	- 6.7	- 16.6
Flavoring Extracts	- 22.1	- 17.1
Flavoring Sirups and Bitters.....	- 15.1	- 24.8
Flax and Hemp, Dressed.....	- 10.9	- 34.3
Flour-mill and Grain-mill Products.....	- 2.8	- 16.0
Food Preparations, Not Classified Elsewhere.....	- 6.2	- 14.9
Fuel, Manufactured	- 17.4	- 23.4
Fur Goods	+ 7.1	- 4.3
Furnishing Goods, Men's.....	+ 7.4	- 8.8
Furs, Dressed	- 0.1	- 5.5
Glass	- 2.3	+ 2.4
Gloves and Mittens, Leather.....	- 12.7	- 4.7
Gloves and Mittens, Cloth, Not Made in Textile Mills....	- 9.1	+ 5.8
Hat and Cap Materials.....	+ 0.4	- 10.4
Hats and Caps Other Than Fur-felt, Wool-felt and Straw..	- 5.0	- 2.6
Hats, Fur-felt	°	- 5.1
Hats, Straw	+ 5.6	+ 0.4
Hats, Wool-felt	°	- 18.0
Ice Cream	°	- 16.3

TABLE L (CONTINUED)

Industry	1921	1923
Ice, Manufactured	+ 1.1	- 18.8
Jewelry	- 1.4	- 3.8
Knit Goods	+ 9.6	+ 2.1
Lime	- 1.8	- 3.7
Linen Goods	- 11.4	- 12.1
Marble, Slate and Stone Work.....	+ 1.7	- 2.9
Millinery and Lace Goods.....	+ 8.2	- 4.3
Minerals and Earths, Ground or Otherwise Treated.....	- 13.5	- 4.6
Motor-vehicle Bodies and Parts.....	- 14.3	- 1.2
Motor Vehicles, Excluding Motorcycles.....	- 14.0	+ 2.7
Motorcycles, Bicycles and Parts.....	- 22.7	- 6.5
Oil, Cake and Meal, Cottonseed.....	- 5.0	- 24.4
Oleomargarine and Other Butter Substitutes Not Made in Slaughtering and Meat Packing Establishments.....	- 15.0	- 3.3
Paints and Varnishes.....	+ 3.9	- 1.3
Paving Materials Other Than Brick.....	+ 1.3	- 2.9
Peanuts, Grading, Roasting, Cleaning and Shelling.....	- 12.4	- 25.6
Poultry Killing and Dressing.....	- 2.8	- 1.9
Rice Cleaning and Polishing.....	- 11.1	- 16.0
Roofing Materials, Excluding Wood, Slate, Burnt Tile, Asbestos, and Metal Other Than Metal Shingles and Ceilings	- 0.7	- 7.8
Rubber Tires and Inner Tubes.....	- 5.0	- 5.7
Saddlery and Harness.....	- 13.2	- 17.1
Sand-lime Brick	- 6.9	- 1.8
Ship and Boat Building, Steel and Wooden, Including Re- pair Work	- 11.4	- 36.4
Soda-water Apparatus	- 6.4	- 6.1
Steam and Other Packing, Pipe and Boiler Covering, and Gaskets, Not Made in Textile Mills.....	- 2.9	+ 0.3
Steam Fittings and Steam and Hot-water Heating Appa- ratus	- 3.6	+ 8.7
Stoves and Appliances, Gas and Oil.....	- 2.3	- 3.2
Stoves, Other Than Gas, Oil, or Electric, Hot-air Furnaces and Fireless Cookers.....	- 9.8	- 3.0
Structural and Ornamental Iron-work, Not Made in Rolling Mills	- 15.6	+ 3.5
Sugar, Beet	+ 24.9	- 8.4
Sugar, Cane, Excluding Refinery Products.....	+ 8.4	- 21.9
Sugar Refining, Cane.....	+ 8.0	- 0.8
Toys, Games and Playground Equipment.....	- 1.7	- 2.1

^a Includes asbestos textiles in 1921.

^b Includes ice cream in 1921.

^c No data.

utilization of capacity above the average and in several of these 16 the excess utilization is very slight. Thus, if we count only the 38 industries for which the total deviations for 1921 and 1923 are either +10.0 or -10.0 and over, we find 34 industries below the average and only 4 above. This is a clear indication that seasonality in an industry contributed to the accumulation of excess capacity.

But manufacturing production and mining, while highly important branches of activity, especially from the viewpoint of the amount of equipment utilized, are not as subject to such large seasonal disturbances as are agriculture, construction, most branches of wholesale and retail trade, and even transportation. For agriculture there is no single measure that would indicate the seasonal rate of utilization of equipment, but of course the seasonal surplus of capacity must be enormous.

For the other branches of activity we have single indexes that may be taken as representative of total activity. These single indexes are likely to over-estimate the rate of utilization of capacity, for they measure the course of activity in several branches at once and reduce the total seasonal variation by the process of algebraic addition of peaks in one branch with a lower level in others. For most equipment such an algebraic cancellation is indefensible, since at the time of peak activity in the transportation of coal the demand for coal cars is not relieved by the fact that during the same month the seasonal demand for ordinary box cars is low. On the other hand these estimates are slightly exaggerated since the indexes are not adjusted for the number of working days in the month. In spite of a probable under-estimate, the measures of seasonal over-capacity yielded by these indexes are rather high. Thus, for construction (index of volume) the measures of over-capacity are: average below the seasonal peak, 26.8, below 100, 10.0. Similar measures for railroad freight transportation (freight cars loaded) are 15.2 and 3.0; for wholesale trade (9 lines), 18.4 and 4.9; for retail trade (Copeland's index), 37.2 and 5.2.

c. *Surplus Labor*

The relation between seasonal disturbances in industry and seasonal unemployment and the importance of such disturb-

ances in creating a surplus labor supply may be estimated, using concepts and data similar to those used in the estimates of surplus equipment. If the seasonal peak in employment indicates the number of workers attached to a given industry, then the average monthly departure from that peak measures the average seasonal unemployment and hence the surplus labor that is in the industry because of seasonal swings. If, however, we consider only the annual average as the proper estimate of labor attached to the industry, then only departures below 100 should be considered as measuring seasonal unemployment and excess labor supply.

The problem of seasonal employment is complicated by another factor. It may safely be assumed that plant and equipment cannot move from industry to industry, especially since the periods involved in seasonal variations are so short. But labor may be assumed to move with some degree of freedom from enterprise to enterprise, from industry to industry, and from one branch of activity such as manufacturing, mining, trade and agriculture to another. For manufacturing, therefore, we present two estimates, one based upon the assumption of mobility among various branches, the other upon the assumption of lack of mobility.

For the industrial groups covered in Table LI the exact measure of excess labor supply attributable to seasonal factors lies within the limits indicated. If we assume that this rate is roughly 3 per cent for manufacturing industry, 15 per cent for construction, and 5 per cent for total trade, the absolute amounts involved can be computed by using Dr. W. I. King's estimates of the number of wage-earners attached to each of these groups in 1927 ²—9.1 million in manufacturing, 1.4 in construction and 3.9 in mercantile pursuits. Persistent seasonal unemployment thus affects 273,000 workers in manufacturing, 210,000 in construction and 195,000 in trade. Although there is some mobility among these groups, the estimates are, on the whole, low, for they assume perfect mobility among the individual enterprises, and in construction and trade, perfect mobility among the various branches. Adding these estimates we obtain a rough figure of about 700,000 as that of the seasonally unemployed in all three together.

² See *National Income and Its Purchasing Power* (National Bureau of Economic Research 1930) Table IV, p. 56.

The estimates do not cover agriculture, with about 2,300,000 wage-earners, mining, with about 1,200,000, and transportation, with about 2,500,000, a total of about 6,000,000 as compared with the 14,400,000 covered in the three groups above. In view of the extreme seasonality of employment in agriculture and the marked seasonality in mining, it appears more than safe to

TABLE LI
MEASURES OF SEASONAL EXCESS LABOR SUPPLY

Employment in	Average Monthly Departure Below	
	Seasonal Peak	100
Manufacturing Industry ^a		
(Mobility among branches)	3.5	0.6
Manufacturing Industry ^a		
(No mobility among branches).....	3.7	2.2
Construction ^b		
Ohio (1914-24)	22.2	9.1
Pennsylvania (1921-27)	20.0	6.9
Retail Trade ^b		
Pennsylvania (1921-27)	17.0	2.1
United States (1929).....	20.6	2.9
Wholesale Trade ^b		
United States (1929).....	4.9	0.9

^a Based upon the seasonal indexes for manufacturing employment for 1930, computed by the Research Division of the Federal Reserve Board.

^b From various sources, assembled in P. H. Douglas and A. Director, *The Problem of Unemployment* (New York 1931) Chapter VI, pp. 73-85.

add a similar proportion of these 6,000,000 to make possible a complete, though exceedingly rough estimate of the seasonal surplus of labor. This would vary from month to month, but about one million would be the average volume of seasonal unemployment persisting from year to year. One million unemployed out of a total of 27.3 million wage-earners appears very substantial, but it is, if anything, an under-estimate of the labor surplus attributable to seasonal variations in industry.

The great burden imposed upon the economic system by diverse seasonal influences is thus apparent. Surplus commodity stocks, surplus equipment ranging from 5 to 30 per cent of the total, and an excess labor supply of one million unemployed—these indicate that the problem is far from slight.

2. Seasonal Variations and Cyclical Fluctuations

This study has been devoted mainly to tracing the responses of various branches of productive activity to the influence of seasonal factors. The nature of the factors that make for cyclical fluctuations is far less definitely determined. In analyzing cyclical fluctuations, indeed, attention is centered upon the establishment of differences in cyclical behavior of various aspects of economic activity as representing differences in response to one and the same set of events. It might even be seriously argued that differences in response are in themselves sufficient to account for the presence of cyclical oscillations, for if there is any material variation in the responses of related economic processes to the same stimulus it seems very probable that this variation in response will tend to cumulate into a cyclical swing.

Of the numerous factors determining the different responses of various economic processes to the same stimulus two are particularly relevant to our attempt to describe the influence of seasonal variability upon cyclical fluctuations: (1) the continuity of activity in each economic process; (2) stock accumulation. The short-term variations that we have studied as seasonal imply discontinuity in the economic process affected. The wider the seasonal swing the more marked the discontinuity. But this presence of seasonal variability means a qualification in the possibility of response to the stimulus of factors other than seasonal. Thus, if an impetus to greater activity is given during a certain month, an industry not subject to seasonal swings may be able to feel such an impetus fully and react to it accordingly. But if such a stimulus acts upon a highly seasonal industry, such as road construction, during the time of the year when operations are almost impossible, for example, in December, it cannot exercise any effect until weather conditions make an expansion of activity feasible.

It may be said that in highly seasonal industries such a stimulus is not even felt by the economic agents who guide the industry's activity, although under conditions of more continuous operation such a stimulus would have exercised its full influence. Thus, retailers in many branches of trade are unable to judge properly the state of demand by consumers until the peak month or months of the seasonal swing

have passed. In certain types of construction, builders and producers of building materials are not able to judge whether or not conditions are favorable until the season begins. Consider how different such a situation is from that in an industry in which the monthly rate of operations is relatively constant and changes in business conditions can be apprehended and responded to in whatever season they occur.

The influence of such discontinuity in activity upon cyclical fluctuations in the affected branch of industry cannot be determined easily. It is not inevitable that such intermittent economic processes should show cycles of smaller amplitude than continuous economic processes. It seems probable, however, that such discontinuity will affect the timing of the cyclical swings.

J. Akerman³ suggests an interesting connection between seasonal swings and the timing of turning points in cyclical fluctuations, to which, however, one could subscribe only upon further evidence.

It is scarcely surprising that it should in general be difficult to keep the different periods of economic life apart. One asks oneself whether times are improving or growing worse, but seldom takes into consideration in what degree this depends upon the season, upon the cycle, or upon the average rate of progress.

An examination of the history of economic cycles will show us to what a surprising extent the seasonal variations have influenced the cyclic movement. Further evidence of this state of affairs was supplied during the depression of 1930-31, in that no one expected an upward cyclic movement at any other time of the year than the autumn or possibly the spring. It is the seasonal advance which is needed to release the expansive forces, not less in the sphere of consumption than in those of production and credit.

The increased credit requirements of agriculture, industry, and trade in the autumn thus supply the impulse for the inception of the upward cyclic movement, and also for the breakdown of the boom. The increased amount of purchasing power which is placed during the autumn at the disposal of industry for purely seasonal needs acts during a depression as a push in the upward direction, assuming the existence of other conditions for better times. On the other hand, the seasonal credit requirements of industry act during the boom as an extra burden on the money market already drained by enterprise, and force on the crisis.

Since the season has this effect, largely psychological, upon cyclic development, it is natural that the cyclic waves should, as a rule, have a length corresponding with an even (?) number of years. The year, the seasonal wave, is thus an indivisible unit like a piece in a game of dominoes.

³ *Economic Progress and Economic Crises* (London 1932) pp. 99-101.

The short cyclic waves are, therefore, as a rule exactly three (or exceptionally exactly two or four) years in length. So the season affects not the cycle only, in that it regularly releases the forces which encourage enterprise; it is also a standard in the system of economic periods.

Seasonal variability and cyclical fluctuations are, however, intimately interconnected through stocks of commodities, idle equipment and a seasonal labor surplus. Indeed the influence of these surpluses on cyclical oscillations cannot be over-estimated. It may be observed in two ways: (1) the large ratio of equipment to current output helps to account for the change in cyclical amplitude as we pass from one stage of production to the next; (2) excessive stocks of commodities and a surplus of labor help to explain how the economic system can respond to these disturbances without any material change in its processes until the cumulation in one direction serves to initiate a movement in either that direction or the opposite.

Students familiar with various theories of the business cycle will recollect how equipment of a value larger than current output serves to pass any changes in output in an exaggerated fashion back to the production of equipment. Thus, cyclical fluctuations in industries making producers' goods are so much more violent than the oscillations in industries producing consumers' goods because the existing equipment is in large ratio to current output, and any changes initiated in current output find an exaggerated reflection in the changes necessitated in equipment.* Similarly, if we conceive of stocks in the hands of retailers and wholesalers as the necessary equipment for 'production' of sales, these stocks serve to pass, in an exaggerated form, any change in final sales back to the preceding links in the chain from the finished product to the final consumer.

In so far as seasonal variations make for a larger volume of idle equipment they serve to magnify disparities in cyclical amplitude between the processes themselves and the subsidiary processes connected with these producers' goods. If, for example, in the automobile industry equipment is in the ratio of 5 to 1 to average monthly output, while it might be 3 to 1 were there no seasonal variations in monthly production, the effect of this ratio on the cyclical fluctuations in the equipment

*See J. M. Clark, Business Acceleration and the Law of Demand, *Journal of Political Economy*, March 1917, pp. 217-35; also the controversy between J. M. Clark and Ragnar Frisch, *Journal of Political Economy*, October and December 1931 and April and October 1932.

essential to the production of automobiles has been materially increased by seasonal variations. If branches of retail trade could sell rather evenly through the year, and could therefore keep smaller stocks, the magnification of any changes in retail sales, when passed on to sales by wholesalers, would be smaller.

Passing now to the second way in which surpluses affect cyclical fluctuations we find that the accumulation of commodities and of a labor surplus is a means by which related economic processes are enabled to proceed at diverse rates. The surpluses serve as a buffer to absorb small disturbances, preventing an immediate effect upon the complex interrelated economic system. And in this buffer-rôle surpluses make possible a cumulation of small disturbances which may eventually provide an impetus towards a cyclical swing.

Indeed, let us imagine an economic system so adjusted as not to need any stocks of commodities and to provide full employment for the labor group. Any disturbance originating at any link would tend to be passed on directly and immediately all through the system. Any sequence of small changes would then result in a similar sequence reflected all through the various branches of production, distribution and consumption.

The real situation is different. Since stocks exist, any minor change in supply and demand, either for commodities or for labor, need not be reflected immediately in production, distribution or consumption. Stocks make possible a slightly larger supply or a slightly smaller demand, the stocks themselves absorbing the change. This lessens the closeness with which economic elements are interrelated, but it also makes possible a cumulation of small disturbances, which by chance may be in the same direction. This cumulation of changes is a very important factor in accounting for cyclical oscillations, for it helps to explain the initial push necessary to set in motion that entire set of disparities, stresses and strains which are the essence of the cyclical phenomenon.⁵

⁵ See the author's article, *Random Events and Cyclical Oscillations*, *Journal of American Statistical Association*, September 1929, pp. 258-75. On the connection between seasonal variations and the amplitude of the business cycle we may again quote an interesting suggestion by Åkerman:

"In a country in which the variations of temperature are great, for example, in the United States, there are naturally also strongly marked seasonal variations in industrial life. All wage-earning labor in such

In some industries the surplus of labor, which, if not created by the seasonal swing in production, is at least maintained and perpetuated by it, has far-reaching consequences on the type of organization in the industry and hence also on the cycles characteristic of the industry. For example, in the cloak, suit and skirt industry of New York City, which is subject to marked seasonal variations in activity

. . . . this excess of labor seems to have characterized the industry during most of its history. For many years during the period of great immigration from 1880 down to 1910 potential workers were always at hand among the immigrant population in excess of the actual present needs of the industry. On the other hand, the seasonal character of the industry has required just such a labor supply in excess of normal needs to meet the seasonally recurrent peaks of production. It has been necessary at some time during each spring and fall season to be able to call extra workers into the shops for a short period to lift production to the level of the seasonal demand. At such times the labor supply is frequently not in excess of the momentary need and there may even be difficulty in se-

a country is subject to considerable vicissitudes even in so brief a period as a year. The formation of new means of production, which is the foundation of economic progress, tends in such a country to be stimulated by external circumstances. In another country, Italy for example, the contrast between summer and winter is less violent and the impulse to enterprise with a view to the future is less powerful.

Without anticipating the consideration of the cyclic periods, we may therefore draw the conclusion that in a country having great variations of temperature, and therefore great seasonal variations in industry, the cyclic fluctuations have a tendency to be particularly pronounced. . . .

But the association between seasonal and cyclic variations is not of so simple a nature that one can lay down any generally applicable law. It is not only that different countries are industrialized in different degrees and therefore not directly comparable, but also that the accumulated capital required for the formation of new means of production may be drawn from any quarter. The international nature of the money market thus interferes with local conditions. . . .

So long as we confine ourselves to the seasonal and cyclic variations of production and employment within a single country, the association is, however, plain enough. Those branches of industry which have marked seasonal variations—such as the building and iron industries—prove to be also very susceptible to cyclic fluctuations, whereas other branches of industry—for instance, clothing and many of the provision industries—show neither seasonal nor marked cyclic variations." (*Economic Progress and Economic Crises*, pp. 39-41.)

Obviously, Åkerman under-estimates the complexity of the relationship between seasonal variations and business cycles even within a single country. It is not true that large seasonal variations and marked cyclical amplitude are closely associated, as witness the evidence of retail trade and the clothing industry which is cited by Åkerman to the contrary above. The amplitude of cycles in various industries is often determined by factors not associated definitely with seasonal forces.

curing all the workers required. This excess of work at the peak of the season has no doubt tended to maintain in the industry the surplus workers who might otherwise have been driven into other employments. The prospect of a chance to obtain work at the height of the season is very likely to hold out to the worker an illusory hope of regular employment which co-operates with his natural inclination to stick to his old trade and thus interferes with the natural economic tendency to equalize the supply of labor as of everything else with the demand for it.

The existence of a surplus labor supply serves in turn to enhance the seasonal character of the industry. Given the possibility of calling at short notice a large number of additional workers into the shops, there is an inducement to the manufacturer to time production to the vagaries of demand and to do nothing toward producing in advance of demand or toward seeking to stabilize demand. A restricted labor supply is bound to be a stimulus to continuous production, and even if the conditions of demand are such as to make continuous production impossible, serves to some degree to stabilize employment. A surplus labor supply on the other hand works in the opposite direction and is an actual force making for discontinuous and seasonal operation.

The cumulative and reciprocal force of an excess of labor co-operating with a demand which is naturally seasonal has no doubt helped to bring about several of the specific developments in the New York cloak and suit industry in recent years. For one thing it has tended to stimulate the increase of submanufacturing shops. Many of the more ambitious and energetic workers have no doubt sought to free themselves from a life of irregular employment by setting up shops themselves in the hope that by their own energy they might succeed in finding more work than their previous employers could find. The increase in the number of separate shops, however, has not been accompanied by a corresponding increase in the total amount of work available, and, resulting as it has in increased competition for the available work, has tended to increase the irregularity of production and the resulting seasonal unemployment.

Seasonal unemployment under the particular conditions of the industry is thus a thing which breeds upon itself and tends continually to increase within the limits of the existing labor supply. As it becomes more pronounced, and production concentrates more narrowly to a peak, there may come to be an actual shortage of labor at the height of the season, and this tends in turn to bring even more workers into the industry who swell the number of unemployed during the period of slack work. Meanwhile the pressure of the demand for labor at the height of the season is an effectual check on the natural economic tendency of supply to conform to demand."⁶

Thus, seasonal disparities in related processes, by calling forth surpluses in equipment, commodities and labor, create a certain looseness in the relations of the economic elements

⁶ Report of an *Investigation of the Cloak, Suit and Skirt Industry of New York City*, by John Dickinson and Morris Kolchin, to the Governor's Advisory Commission (New York 1925) pp. 144-5.

and sometimes magnify appreciably the ratio which productive means bear to the final product. The effect of both of these influences of seasonal disturbances is to facilitate the appearance of cyclical oscillations and to magnify the unequal movement of various groups of processes in the cyclical swing. As a result of surplus commodities and labor random events may cumulate sufficiently to initiate a cyclical rise or decline. Surplus equipment serves to magnify the difference between the amplitudes of cyclical swings in consumers' and producers' goods, and surplus labor sets up a condition of instability in the industry which leads to a type of industrial organization of possibly decisive bearing upon the character of cyclical fluctuations in the industry.

3. Some Practical Implications of the Survey

The problem created by seasonal surpluses of commodity stocks, equipment and labor may be considered from two angles: (1) the viewpoint of society as a whole—the waste involved in the inactivity of a part of the limited resources of our economy in the form of unproductive stocks; (2) the viewpoint of the different social groups—observation of which classes of the population bear this burden of idleness. Any remedial program directed towards ironing out seasonal disturbances and reducing their burdens should distinguish clearly between these two approaches to the problem.

In the former it may be noted that conspicuous seasonal disturbances arise only at the points where man is not in complete control of the economic process. The disturbances persist only because of this lack of control. Thus seasonality characterizes all those productive processes in which climatic and organic forces are as yet beyond complete control by producers—agriculture, construction, inland water transportation—and also consumers' purchases, over which the sellers do not exercise complete control.

One way of reducing seasonal disturbances would, therefore, consist in extending the control of those who are interested in stabilizing economic processes. In production this would mean a technical development in agriculture and other industries affected by climate to a point where either the productive process itself was made more continuous or at

least some perishable products were rendered sufficiently durable to be stocked. Considerable progress may be made in this direction, especially in rendering some perishable products durable (note the development of quick freezing of foods, refrigeration and cold storage of eggs, poultry, meats and the dairy products). Were sufficient stimulus provided, it is quite possible that technical research might yield substantial results. In spite of the commonly prevalent notion of the alacrity with which the economic system supposedly grasps every technical advance, economic activity is, in fact, considerably affected by traditional procedures which may have once corresponded to the prevalent level of the industrial arts but which do not fully utilize present technical possibilities. It may also be noted that the investment in existing equipment sometimes acts as a deterrent to the adoption of more modern technical methods (note, for example, the problems of winter construction); an added incentive towards more continuous activity may help to overcome such obstacles.

The course of technical progress cannot be foretold with any assurance. Still it is clear that short of a technical revolution which would enable man to produce the basic food products by inorganic rather than organic processes, or at low cost to counteract completely the effects of climate on outdoor activity, seasonal factors in agriculture and construction are likely to continue, exercising fully their disturbing influence on the rate of productive activity. On the other hand, greater technical advance may be made (and has been made) in the stages intermediate between the raw materials and the final products (manufacturing, transportation and trade). It is in manufacturing and transportation that the degree of control made possible by the development of technical arts has grown most strikingly, and with it has come emancipation from those forces which still disturb agriculture and construction. The development of steam has freed transportation from interruptions in activity occasioned by the freezing of inland waterways. The decline in the price of artificial light has freed manufacturing from limitations imposed by reliance upon natural light, just as artificial hot and cold air have made manageable some of the manufacturing operations which had been well nigh impossible during extremes of temperature. But all these developments have re-

duced and sometimes completely eliminated only the disturbing influences exercised directly upon these types of activity by climatic factors. They have contributed nothing towards the reduction of the original disparity between the seasonal influences on the supply of the raw materials and on the demand for the finished products by final consumers.

Just as at present there appears scant hope for complete technical control over the climatic and organic forces which affect agriculture, construction or inland water transportation, so not much hope appears for an extension of control over consumers' purchases, short, of course, of a complete recasting of our social order. So long as consumers' freedom to buy is limited only by the amount of purchasing power at their disposal, and purchasing power is distributed under the system of free exchange, there is little hope that the sellers, so long as they wish to remain in business, will gain control over the rate of purchase by consumers. Consumers' reluctance to buy may be partly overcome by a definite price policy, but the effective limits of any such policy are necessarily narrow since price differentials are felt more acutely by the sellers than by final consumers, and losses to sellers from off-season discounts should not exceed the cost of keeping stocks of either the commodity or productive equipment.⁷ Moreover, in recent years any tendency towards making consumers' purchasing steadier through a price policy appears to have been more than counterbalanced by the attempt of industries which sell durable goods to render them more perishable by a greater insistence on the elements of style and fashion, thus accentuating the seasonally intermittent character of consumers' demand. Only in those exceptional fields where a virtual monopoly of supply exists can the sellers force the buyers to make their purchases at a more even rate.

But besides an extension of control over the climatic and conventional forces there is another method of ameliorating the seasonal problem: the dovetailing of activities characterized by varying seasonal swings so that productive resources which formerly served only one purpose and were therefore partly unemployed may be made to serve additional purposes and in this way be rendered capable of more continuous service. Such dovetailing is theoretically possible at any stage of

⁷ See discussion, Chapter I, Section 4.

the employment of productive resources in carrying through an economic process. In manufacturing, mining, transportation, agriculture and trade it is possible technically to arrange the utilization of common resources in such a way as to avoid in part the under-employment attributable to seasonal disturbances.

The limits of such a policy are strictly set by two counter-acting tendencies. The first limitation is purely technical. Increase in efficiency is easier to achieve when a tool or method of utilization of resources is designed for a specific purpose rather than to serve many purposes. The second limitation is social. The incentive for devising multi-purpose tools is not appreciable because each independent enterprise has its own specific function and its profit-motive prevents it from considering definitely the effects of technical progress from the point of view of society as a whole. Were a premium put upon technical progress that assured a greater continuity of operation and a greater percentage of exploitation of the total resources of the economy, it is quite possible that progress in the direction of multi-purpose equipment would be greater.

Moreover, the lack of conscious cooperation among the enterprises and agents in our economic system means that no definite facilities are set up for dovetailing productive resources, except within the limits of single enterprises or within the ken of individual agents. In some instances such cooperation results voluntarily or under pressure or encouragement by public authority. Thus the organization of some agricultural enterprises into cooperative institutions has sometimes resulted in pooling the resources and apportioning them in such a way as to bring about more continuous utilization. The activity of the trade unions and of public employment exchanges in encouraging migration of labor to the points of seasonal demand is another instance, and, of course, the most conspicuous example is the mobility and dovetailing of credit, achieved by an elastic banking system guided by a central bank.

Clearly the possibilities of a solution of the technical aspect of the seasonal problem are limited not only by factors which our knowledge has not learned to control; not only by the tendency of progress to produce uni-purpose rather than multi-purpose tools; but also by the social conditions which

put a premium upon changes of one kind and not of another. It is these social conditions which confine economic planning within the narrow boundaries of individual enterprises, within the limited possibilities of voluntary cooperation. Moreover, tardy formation of public opinion or authority as an active force limits the possibilities of even the technical solution of the seasonal problem.

Thus examination of the seasonal problem from the standpoint of the interests of society as a whole suggests that considerable alleviation may be achieved if technical and organizational ingenuity is stimulated towards a stabilization of activity; that more hope lies in the direction of dovetailing uses of productive resources which are subject to divergent seasonal swings than in an attempt to master directly the climatic or conventional forces which make for disturbances; that in our present social organization considerable limitation upon any such solution of the problem is imposed by the independence of individual business enterprises; and that from the point of view of social policy directed towards elimination of seasonal disturbances it seems advisable to bring pressure to bear upon those economic agents who are in a position to exercise their power and ingenuity to achieve a more efficient and continuous utilization of resources which society has placed at their disposal.

Before we examine the seasonal problem from the viewpoint of different social groups, it is important to note that at the stages intermediate between the supply of raw materials and the flow of finished products to final consumers there is sometimes an appearance of a reduction of the seasonal burden. This reduction of the burden is real enough as far as the stage at which it occurs is concerned, but it is accompanied by an increase of the seasonal burden at some other stage. In other words, what is taking place from the point of view of society as a whole is not a reduction of the seasonal burden but a shifting of it from one economic group to another. The most notable instance was the hand-to-mouth buying policy that characterized many distributive trades after 1921 and whose effects appear so clearly in the analysis in Chapter XI. The diminution of seasonal variation in the distributive trades was accompanied by a growth of seasonal instability in manufacturers' activity and in employment. For the eco-

conomic system as a whole the waste involved has perhaps increased rather than diminished as a result of the partial escape which the distributive trades have made from sharing in the burdens involved.

Passing now to the consideration of how the burden of the seasonal problem is borne by the various social groups, we may observe that at present the main factor which determines what share any economic agent will assume seems to be his economic strength in relation to that of any other agent. In a buyers' market a buyer can force upon the seller the burden of seasonal variations, but in a sellers' market it is the buyer who has to accept the burden.

In a perfectly competitive and static economy it would not much matter which agent bore the seasonal burden, for he would be adequately compensated for any waste of resources involved. But our society is not static, nor is it subject to conditions of perfect competition. On the contrary, there are many non-competitive areas and in some of these a burden of seasonal irregularity imposed upon one of the productive factors cannot be passed on by a process of equalizing mobility. It was seen above how in the New York garment industry the seasonal burden on labor was not compensated for by a shift of workers to other industries. Such a condition is typical, rather than exceptional, of seasonal industries.

It becomes a problem of social policy, then, on whom the burden of seasonal variations should fall. From the viewpoint of society as a whole the desirable method of disposing of the seasonal problem seemed to be to put the burden upon those who are capable, if thus stimulated, of changing technological and organizational conditions in such a way as to lighten it. But to this purely technical viewpoint may be added the consideration of some definite criteria of social policy.

Such criteria must be formulated by the social body of opinion. Suggestions are being made that labor should bear as little as possible of any of the ill effects of seasonal variations; that entrepreneurs be forced to forego the opportunity of sharing with the workers the burdens of the seasonal swing in their activity. This appears natural because of the obvious differences between the capacity of capital and of employed

workers to bear burdens and carry through adjustments. The social advantages of such a change are emphasized by pointing out that some of the incomes derived from economic activity are free from any seasonal disturbances which may affect it. For example, enterprises pay the interest on their bonds quite regularly in spite of the fact that the buildings and machinery that are bought with the money thus advanced are not used to the same extent through every month of the year. The suggestion is made that labor also should be paid throughout the year rather than have its income subject to seasonal variations in activity and that the task of dovetailing diverse seasonal swings so as to avoid excessive waste should be put upon the shoulders of the entrepreneurs rather than upon those of the employees, whose circumstances make them less capable of meeting the situation. On the other hand, the advantages of such a policy are counterbalanced in qualified measure by any changes it might make in the desirable mobility of labor. And, of course, the entrepreneurs may pass on a large part, if not all, of the additional seasonal burden to the consumer in the form of higher prices for the product. In this event, the redistribution of the seasonal burden is not between labor and the entrepreneurs, but between labor and the consumers of its products.

Another shift of seasonal burdens suggested as advantageous from the point of view of a reasonable social policy is that imposed upon agricultural producers by the seasonal character of the inflow of their finished product. Seasonal variations in prices paid to farmers are considerable, as may be seen in the products for which quotations are available for this particular exchange link (rather than for transactions on produce exchanges or on primary markets). Since agricultural producers sell most of their products during the months when prices are seasonally low, they obviously sustain a considerable loss and since few are financially able to carry stocks, this is done for them, at a charge, by all the intermediate agencies between the raw material and the industrial consumers, and by the industrial consumers themselves. It is suggested that the seasonal burden of these price variations could be taken over by public rather than private agencies and that the cost of this function to the farmers might be lessened thereby. This, of course, would imply a substitution

of public credit funds for private funds in maintaining stocks of agricultural commodities as well as the prospect that the public agency would undertake all the complicated exchanges and financial transactions now carried on by private agencies on the produce exchanges. Regardless of the practical difficulties in such a redistribution of the seasonal burdens, it is easy to recognize the social advantages.

Practical problems of ways and means of reducing seasonal swings are really beyond the scope of this study. Yet, they are most important among the numerous questions which, it is hoped, this investigation has raised. Why in certain industries are the payrolls so much more seasonally stable than output while in other industries the difference is much less appreciable? Were more data available, we could ask why certain prices reflect much more definitely the seasonality in the inflow of the commodity than do others. There is a wide field for a detailed investigation which could lay the basis for a practical policy of stabilization. This study presents merely the broad outlines of the seasonal problems and can arrive only at some general inferences as to the types of stabilization policy that might be undertaken.