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IV

ANALYSIS AND APPRAISAL OF PRICE AND OTHER DATA

THE foregoing survey of statistical information bearing upon price formation and price movements in the oil industry discloses numerous shortcomings and gaps. It does not indicate, however, (1) whether any useful purpose would be served by meeting the deficiencies, or, if so, (2) in what particular directions the need is most urgent for supplementing or improving the statistical record, or (3) the best method of making such improvements. Manifestly, these questions may be most appropriately considered in particular reference to specific types of information now inadequate or lacking.

Before proceeding to a detailed examination of the deficiencies in the current record, however, it may not be out of place to note the basic criteria used in appraising statistical 'adequacy'. What constitutes a shortcoming or a gap in the record, the degree, and the relative urgency of its removal alike depend upon the standards of judgment employed. Standards may, of course, be legion. For our present purpose it will suffice to distinguish two types: qualitative and functional. By the former is meant the degree of original authenticity (correspondence between source figures and facts), the measure of reliability of computation and transcription, the known extent of coverage, and similar criteria of the trustworthiness of statistical records. By the latter is meant the utility of the information, assuming its trustworthiness, for some definite purpose.

The qualitative standard used in general is of practical expediency, not one that might be termed technically ideal. For example, if a responsible enterprise in the industry voluntarily consents to report a given type of data respecting its operations we take for granted the authenticity of its report. For the purposes in hand, sworn statements, legally imposed sanctions to assure accuracy, even outside and disinterested

checking, are considered superfluous. Again, if the compiling agency for a particular series of price data happens to be a reputable trade journal it is assumed, in the absence of evidence of a biased interest, that there is no deliberate suppression of data from acknowledged sources and that reasonable care is taken to exclude errors of computation. In short, our general qualitative objective in making the criticisms and recommendations aims to provide a body of data upon price-making forces and price movements that will be reasonably dependable.

The functional standard employed comports with this qualitative standard. In this respect, the test of the adequacy of the statistical record, as a whole no less than for any particular class of information, is the measure in which it fulfills the requirements, primarily, of two groups of interests: (1) those directly engaged in the industry, including investors and employees and especially business executives; (2) a wider and more heterogeneous group, including consumers, professional economists, government officials, representing collectively what may be termed the public interest. It is recognized that the interests of these two primary groups may not in all respects be identical or even compatible, that there may well be divergences of interest on particular points within each group. Furthermore, the interests of the second group are probably more nebulous than those of the first. Hence the standard of the adequacy of the statistical record from this standpoint is not susceptible of clear and unexceptionable definition.

Notwithstanding all these recognized difficulties the Committee is convinced that at least up to a certain point it is possible to reconcile the standards of appropriate and useful price information for each of these basic groups of interests. There is, we believe, a certain area of common ground for all the different interests, and from this we have sought to survey the functional adequacy of the statistical record. In sum, our functional standard aims to provide a body of data upon price-making forces and price movements that will better meet the needs of business executives

in the discharge of their responsibilities and at the same time enable outside observers and students better to trace the causes and effects of the actual course of affairs within the industry and of its relations with the whole economy. The following analysis is predicated upon subscription to this standard. So vital do we consider this desideratum that we have felt obliged in recommending each particular improvement or supplementation of currently available data to suggest how and in what measure the project is designed to fulfill a definite, useful purpose from both standpoints.

PHYSICAL DATA

Information upon production, consumption, stocks, deliveries, and capacities is essential to both an understanding and intelligent treatment of price phenomena. This is true no less for the investor and business executive than for the student and investigator. Because petroleum is a mineral resource, because technically and commercially the industry is closely integrated in its various phases, and because its members have long been conscious of their vital interdependence and mutual obligations, physical data upon the facilities and operations of the industry are, upon the whole, singularly well and fully provided. Few branches of either extractive or manufacturing industry furnish or secure as prompt and complete returns upon the current course of their operations as the oil industry.

The Monthly Petroleum Statement of the federal Bureau of Mines, though issued from 35 to 45 (average 42) days after the end of the month reported, is probably as prompt as is consistent with its wide and diversified coverage. The production of crude petroleum is so widely scattered and in such numerous hands that some delay in the assembly of the data is necessarily entailed if the compilation is not to rely to an intolerable degree upon estimates. The number of small independent refineries often inadequately staffed for record keeping, let alone record reporting, is also a factor preventing greater promptness in the release of the monthly statements. It is a tribute to the efficiency of the

work of the Bureau of Mines in this field that the revisions of its current figures in subsequent (month later) releases and in the annual summaries published 7 to 10 months after the close of the year are insignificant.

While the crude production report in the Monthly Statement does not segregate different grades of oil, it does divide the output by states. A basis for an approximate estimate of the production of various grades is thereby furnished and there seems to be no appreciable demand for more detailed reporting in this sphere. The data upon refined products cover all the major varieties. They do not, however, differentiate grades of gasoline, gas and fuel oils, or lubricants in the same degree as is done in the reports of the Census of Manufactures, or to an extent comparable with the differentiation of grades in market price reporting. Grade differentiation to the latter extent is not practicable. It may be suggested, however, that, at least as an eventual prospect, it would be desirable to 'refine' the data in the Monthly Statement upon output of refined products to conform with the detail in the Census of Manufactures. In this way a biennial check-up would be facilitated and the current usefulness of the data on refinery output enhanced. This applies perhaps more especially to gas and fuel oils than to the other major refined product, gasoline, since the grade of the former ordinarily remains unchanged after leaving the refinery while blending operations upon motor fuel are customarily carried on to a not inconsiderable extent outside the refineries.

The official reporting service of the Bureau of Mines is supplemented by the weekly reports of the American Petroleum Institute upon crude production, crude run to stills, and gasoline and fuel oil production. While the coverage of this service does not approach the completeness of that represented by the Monthly Petroleum Statement, its timing allows it to serve the function for which it is primarily designed, despite its incompleteness. It enables the business executive to follow trends and detect changes in the rate of operation of the industry more promptly than he would

otherwise be in position to do. It indicates, as it were, the pulse beat of current productive operations, and for this purpose the tolerable margin of error is somewhat wider than in the case of a reporting service designed primarily to measure what might be described as the season-to-season ebb and flow of industrial activity.

Data upon stocks have recently been greatly improved, though there is still room for further improvement in some directions as will be noted. The Department of the Interior issues monthly and weekly reports upon crude oil stocks. The former, included in the Monthly Petroleum Statement, have a more exhaustive coverage and divide the total according to both geographical location and states of origin. They show as well the amounts in the field, in pipelines and tank farms, and at refineries. There seems to be no good reason to seek greater detail or wider coverage in these crude oil stock reports.

Stocks of refined products held at refineries and, in the case of gasoline, those held also at large marine and pipeline terminals are reported in the Monthly Petroleum Statement. For products other than fuel oils these statistics are doubtless adequate. The industry should be better able to adjust inventories to the levels economically required, however, if stocks of fuel oils held at terminals were reported as well as those held at refineries. Although the American Petroleum Institute supplements the Bureau of Mines service by a weekly report of somewhat more limited industrial coverage upon gasoline and fuel oil stocks, it also omits terminal stocks of fuel oil.

Perhaps the most marked deficiencies in the currently available physical data on the industry's operations are in traffic movements (other than those of crude oil). For crude oil the Petroleum Administrative Board, in cooperation with the Planning and Coordination Committee, sponsored in 1934 a monthly reporting service of receipts by refineries. This information now compiled by the Bureau of Mines and issued by the Department of the Interior as Report Number A-943, shows deliveries to refineries (wher-

ever located) from every producing state and receipts by refineries (classified by state of origin, or foreign, and by method of transportation). This report on crude movements not only supplements, in practical effect it supersedes, the annual report of the Interstate Commerce Commission on pipeline traffic, that of the United States Engineers Corps on water-borne traffic, and the quarterly reports of the Interstate Commerce Commission on rail traffic. It is far more timely; it encompasses truck transportation; it reveals source and destination of movements. The third feature preeminently, by showing interdistrict circulation of crude petroleum supplies, enables both producers and refiners to adjust more economically their output, storage, and market policies.

It is precisely this same feature which, by its absence, distinguishes current statistical information upon the movements of refined products. It is true that, supplementing the belated data from the Interstate Commerce Commission and the United States Engineers, the Bureau of Mines reports monthly the volume of gasoline delivered into gasoline pipelines and shipments of refined products (as well as crude, of course) by tankers from California and Gulf Coast ports to East Coast destinations. These data are of prime significance; the compilation of similar data, covering other interdistrict movements, is desirable. Essentially, such information is no less indispensable than that on crude oil movements to the formation of sound marketing policies by the business interests concerned or to the determination by research students of such issues as the responsiveness of the industry to variations in price stimuli among various marketing regions.

At the minimum, it is suggested, such a reporting service should embrace the movements of both gasoline and fuel oils. As an initial step, this coverage might well be sufficient. The Committee recognizes that transactions in gasoline and fuel oils are much more numerous and individual shipments smaller than those of crude petroleum. This has doubtless been a major deterrent to the collection of such

information hitherto. It makes the original assembly of the data by the reporting companies, if the same procedure were followed as in the compilation of the data for Report Number A-943, correspondingly more expensive. The Committee is also aware that if the effort were made to obtain the data from the various transport agencies through public supervisory bodies the practical obstacles to an expeditious assembly and issuance of the data would be formidable, to say the least, and in the case of truck transportation perhaps insuperable.

In these circumstances, notwithstanding the recognized burden, the Committee feels justified in recommending that the industry co-operate in furnishing the necessary data to the Bureau of Mines for a report parallel to Report Number A-943. Such a report would show monthly the aggregate outward shipments of gasoline and fuel oils from the refineries of each state classified by states of destination and by mode of transportation.[1] No individual reporter would be called upon to disclose the amount of any individual shipment or delivery. Each reporting company would simply furnish information to the compiler (the Bureau of Mines) concerning the aggregate of its deliveries of gasoline and of fuel oils during the month into each defined territory (state or district). The Director of the Bureau of Mines has indicated to us his approval of a project along these lines and the readiness of the Bureau to co-operate in providing the service if the requisite additional funds, estimated at $12,000 per year, can be found. We believe that the benefits to be gained on all sides by such an extension of the reporting service of the Bureau of Mines warrant general co-operation in making it a reality.

[1] It is recognized, of course, that reports derived from refining companies could not in the nature of things, so far as the deliveries reported consisted of shipments to purchasers, assure complete accuracy with respect to the eventual destination of the products shipped. Resales of the products either in transit or after they reached original destination might mean their final delivery into other districts. It is believed, however, that the margin of error such re-transfers would involve would not, in this industry, be substantial.

Data upon the volume of consumption, so far as current or month-to-month figures are concerned, are in every case of a derivative nature. In other words, the item misleadingly termed 'demand' in the Monthly Petroleum Statement is deduced from data upon production and changes in stocks. Doubtless there is no feasible alternative to this procedure for other petroleum products, but in the case of the major product, gasoline, consumption data can be obtained directly from motor fuel tax figures, which are available both nationally and for the several states upon a monthly basis.[2]

Besides the basic types of physical data concerning current operations of the industry discussed above, certain other types of physical data relating to its structural features, particularly capacity, deserve brief attention. There is no regular and dependable reporting service covering the number of wells currently drilling, producing or abandoned, or the potentials of wells producing. All these data are of vital significance to the business executive in planning capital commitments and in framing market policy in the light of potential supply, as well as to students concerned with the responsiveness of capital inflow and outflow to price considerations. It is true that well-drillings and completions for major fields are reported weekly by the *Oil and Gas Journal* and the American Petroleum Institute and, from these sources, summarized monthly by the Bureau of Mines. But this record is neither authentic nor complete, and contains no data whatever upon well shut-ins (temporary) or abandonments (permanent). Upon a matter so important from every aspect it would seem desirable that the primary source of information should have a greater measure of responsibility, and should cover the

2 The motor fuel tax figures do not cover the entire consumption. Some gasoline is used, along with naphthas, as a cleaning agent; and some is used also, along with kerosene, as tractor fuel on farms. In certain states gasoline used for one or the other of or both these purposes is tax-exempt. Slight qualifications on this account would be required in estimating total consumption solely from the tax data.

whole field exhaustively. It is clearly a task appropriate to the Bureau of Mines.

Upon the capacity of producing wells, or so-called well potentials, adequate current data are likewise lacking. The state regulatory bodies in Texas, Oklahoma, Kansas, Louisiana, and New Mexico, and the California Bureau of Mines do from time to time make 'samples' by testing the potential of selected wells in important fields. Because these tests are made by various methods and under different conditions and because there are numerous producing fields outside the jurisdictions mentioned above (in which, in the main, potentials are gauged by the producers themselves) it is questionable whether current data upon the potential capacity of producing wells are not more misleading than informing. The Committee strongly urges the early inauguration of a movement, looking to the eventual standardization of conditions, methods, and periods for the authentic testing of well potentials in every field. It recognizes the thorny obstacles in the way of an early achievement of this goal, particularly those arising from the circumstance that diverse stipulations in statutes, administrative orders, and judicial decisions hedge about the testing procedure in states in which proration is operative. Nevertheless, the Committee believes that a forthright attack upon the problem and earnest solicitation of the co-operation of oil producing states would not prove futile. Whatever advance was made would be a definite contribution toward a wiser and more orderly exploitation of the oil resources of the country.

Since storage capacity may at times have special significance for pricing problems, it is worthy of remark that the latest comprehensive survey of storage facilities was made by the Bureau of Mines in 1931, though a special study of gasoline storage capacity was made by the Planning and Coordination Committee in 1934. It is suggested that surveys of this character covering all classes and locations of storage would be most serviceable if made at regular, say three-year, intervals.

Refining capacity by size, class of equipment, and location is reported annually by the Bureau of Mines. These data presumably are complete and authentic. Figures upon transportation capacity are not so satisfactory. For pipelines the Interstate Commerce Commission reports only length, classified upon the basis of crude and gasoline facilities. Tank cars available for rail transport of crude petroleum and petroleum products are not separately classified. The capacity of trucking facilities is unknown. The Bureau of Navigation reports annually the number of registered tankers and barges. While regular reporting of these capacities does not seem urgent, studies at infrequent intervals, such as those suggested above with respect to storage, would probably find useful application.

Perhaps in no other division of the industry, not even in crude production, is the deficiency of data bearing upon capacity so marked as in marketing. Until the Petroleum Administrative Board made its special survey for the Congressional (Cole) Committee undertaking the Petroleum Investigation, even the number of bulk stations and retail outlets in the United States was unknown.[3] This report, covering the period January 1930 to July 1934, shows bulk-station capacity, classified by states, and estimates the number of service stations and other retail outlets. Less comprehensive data of this character are also reported by the Bureau of the Census in the *Census of Business*. The Committee recommends that hereafter in the *Census of Business* provision be made not only for the separate reporting of all 'filling station' operations, with some classification by type and gallonage, but also for the segregation of the gasoline and oil business reported by garages, repair shops, hotels, and all other classes of retail establishments. The exceptional diffusion of, peculiar diversity in, and frequency of ingress to and egress from, the retail trade in gasoline and

[3] This report was separately published in March, 1935, its completion being too late for inclusion in the 5-volume Report of the Petroleum Investigation by the special sub-committee of the (H. of R.) Committee of Interstate and Foreign Commerce pursuant to H. R. 441 (Washington, 1934).

oil make its statistical survey almost a unique problem. It does seem desirable, however, in view of the importance of facilities and operations in this field, alike to the consuming public and to business managers in the industry, to have at least biennial information sufficiently comprehensive and detailed to reveal the general outlines of its development.

PRICE DATA

The indispensable elements for a fruitful study of price formation and price movements in any industry are costs and sales revenue, outlays and receipts. Whether these are expressed in unit-product terms or gross sums expended and realized is often a significant matter for the analyst. In whichever form expressed, moreover, the completeness or the representative character of the data for the operations covered, whether those are of a company, of a single phase or division of a given industry, or of the industry in its entirety is always a vital desideratum. But some information in one form or another, of one quality or another, upon both financial outgo and income is essential, if price analysis is to avoid sterility. This is true whether the analysis is that of the business manager primarily concerned with the adequacy of prices and the opportunities they afford or withhold for new commitments and expanded operations, or that of the economist primarily concerned with the functional interrelationships of prices and their efficacy as guides to economic behavior, particularly in directing the distribution of productive resources. And it is true in both cases for the same reason. Neither financial outgo nor income, neither costs nor prices, has any meaning or significance economically, save in relation to the other. As the 'weight' of an object is conditioned by, and in turn conditions, the density of the surrounding medium so the 'adequacy' or the 'efficacy' of prices is conditioned by, and in turn conditions, the costs they envelop.

To restate the matter, no business man is greatly concerned with prices as such. His interest is in prices in relation

to costs and to other prices. Nor does the level, or movement, of a particular price, by itself, invite much inquiry by the economist; only its level, or movement, in relation to the levels, or movements, of its components and of other coordinate elements in the price system. Thus stated, in their elementary nakedness, there would seem to be little ground for exception' to these propositions. It is when one brings them down from the sphere of abstraction to the domain of concrete application that doubts, reservations and objections arise. These spring in substantial part, we believe, from the inherent impossibility under modern industrial conditions of attaining that complete and accurate knowledge of the pecuniary terms upon which industrial processes proceed which would constitute the ideal, both for the business man and the research worker.

There are innumerable technical obstacles to the attainment of that ideal, but of fundamental importance in our judgment are the problems of apportioning costs and sampling prices. The commitment of productive resources in durable forms for use over long periods entails the apportionment of costs in time. The multiplicity of products made by refining petroleum likewise presents the problem of the apportionment of (their joint) costs among the various products. Apportionment of costs upon both bases and the selection of what are deemed representative transactions for the measurement of product-price yields are bound under these conditions to be in some degree arbitrary. In these circumstances, which are certainly not less characteristic of the oil industry than of most other branches of modern industry, there is an understandable reluctance to divulge information compounded of such large elements of discretion and judgment. For in the absence of clearly defined and generally accepted standards for the apportionment of costs and the sampling of price transactions, the information reported can disclose little more than the business judgment of the individual reporter with respect to internal management and external policy. These being the essential factors upon which business success hinges in a competitive private

enterprise system (in which full knowledge of the market is precluded), there is the more reason for jealously guarding the limited knowledge each enterpriser has of his own operations.

Nevertheless no business in the modern economy can be sufficient unto itself. However extensive the scope of its integration, at certain points it must come into trading relations with the market, both as buyer and as seller. In these transactions prices emerge, some of which, for better or worse, well or ill selected, are bound to be recorded. Part of the costs represented by capital investment, labor employed, materials purchased and part of the prices realized upon sales will become matters of general information available to all engaged in the industry and to the public. Whether these cost-price data are representative or misleading will depend in no small part upon the readiness or hesitancy of the business units in co-operating in the erection of definite standards and furnishing direct and continuously comparable information within the standardized categories. Favorable to the assumption of a responsible attitude toward this essentially co-operative function is the circumstance that in its absence the conduct of business is rendered needlessly speculative, hazardous, and erratic. Lending collateral support to the assumption of this responsibility is the further circumstance that thereby the circulation of misleading information and the attendant growth of suspicion and illwill among the public with which the industry must perforce deal may be in a measure mitigated, if not abated.

Moreover, there is what this Committee considers a still more positive reason for the collection and wide dissemination of comprehensive, accurate price information, namely, its salutary effect upon the extent and character of competition among the units of an industry. If a competitive economy is a sound economy, then any procedure that increases the intensity and, thereby, the usefulness of competition also increases the tempo of economic progress. Frequent, accurate, and comprehensive price reports imple-

ment such procedure. On the one hand, they make more difficult the exploitation of any class of buyers, especially those otherwise ill informed price-wise, and, on the other hand, continuously provide backward suppliers with a spur to initiate cost reducing improvements in their own businesses in order to remain in the competitive ranks.

The oil industry has not been oblivious to these considerations, as will be shown by the analysis of available cost and price data. Nevertheless, here as elsewhere, prodigious opportunity remains for the improvement of statistical records. The price item most completely and reliably reported is unquestionably raw material. In the oil industry the prices paid by leading purchasers have for many decades been publicly posted. Almost invariably purchases are made at such posted prices. However, in periods of rapidly rising demand premiums are sometimes given and in periods of overproduction discounts likewise are irregularly made. These posted prices are quoted daily and weekly in the trade press, and averages of representative samples have been included in the wholesale price reporting service of the Bureau of Labor Statistics since its inception.

Nevertheless two features of current operations in the industry detract from the adequacy of these data upon crude petroleum prices. The first is that there is a wide range of grades of crude oil marketed; the second, that posted prices apply to purchased portions of crude only. As to the first factor, variations at any one time in the purchase price depend principally upon the presence or absence of certain foreign elements, partly upon other characteristics affecting the results of its processing,[4] and partly upon location.

It is presumed that the schedules of posted prices integrate the influences of all these various factors but the prices reported in trade journals are usually not accompanied by information concerning any properties, except specific

[4] The ordinary water and sediment deduction is generally standardized, but variations in the chemical composition of oil from different levels even of the same area and from adjacent pools are often reflected in the net prices paid.

gravity, of the different crudes purchased. In numerous cases, not even specific gravity is specified. This is, of course, not in any way a reflection on the reporting service of the trade journals but merely an indication of the limitations of the price data for research purposes. Furthermore as a gauge of the weighted average prices actually being paid for all crude petroleum, a price record drawn from the postings for a single grade is not dependable, however representative that grade may be as an indicator of price changes. But as a measure of price fluctuations over fairly long periods, which is doubtless the primary function of the Bureau of Labor Statistics index, no more than this sampling method is reasonably required. What is required is only that the samples chosen be representative in respect of both grades and fields covered. Seeking fulfillment of this need, the Committee has made suggestions to the Bureau, looking to an extension of the field-coverage of its crude petroleum price series designed to make it nationally more representative.

In addition to ambiguity in respect of quality differences, we have noted that the posted prices apply only to the purchased portion of raw material supply. The exact proportion of crude petroleum purchases to total crude run to stills is not definitely known; it has been estimated at approximately one-half. When such a large proportion of the raw material processed consists of crude that has not 'gone to market', serious question arises concerning the reliability of the posted prices as an indicator of what the price would be if all crude had to go to market.

Wholesale transactions in the principal refined products of petroleum comprise three separate categories of business. We may consider briefly, first, those sales, chiefly of gasoline, by one refiner to another, or to a large marketing company. Such sales are ordinarily in large volume and at prices negotiated privately with each customer. In the second place, there are sales, usually in tanker, tank car or transport-truck lots, by both integrated and non-integrated refiners to brokers and jobbers. In the Middle West many of these sales are on an f.o.b. mid-continent refinery basis, or a modi-

fication thereof, but probably in most instances today delivered prices prevail. Finally, there are sales by both classes of refiners, as well as by jobbers, to retail dealers. Individual transactions in this category ordinarily involve less than tank car lots; indeed they customarily involve simply day-to-day replenishment of supplies in service station tanks from the suppliers' delivery trucks. The term 'wholesale prices' as used in the oil trade refers solely to prices in transactions of the first two types distinguished. Prices in wholesale transactions of the third type are usually denoted as 'dealer prices' or 'dealer tank-wagon prices.'

The price record for sales within these three distinct categories of transactions is not of uniform quality or dependability. Prices in transactions between refiners are not currently reported and never have been regularly disclosed to outsiders. As these transactions probably do not bulk proportionately large, the Committee does not consider that such statistical value as they might have would be commensurate with the difficulties that would be encountered in trying to secure their separate reporting.

What are usually denominated 'tank car prices' (involving principally transactions of the second category above distinguished) for the various refined products are now reported daily or weekly, as the case may be, in the trade press; e.g., in the *National Petroleum News, Oil and Gas Journal,* and the *Chicago Journal of Commerce.* Weighted monthly averages of certain of these items are compiled by the Bureau of Labor Statistics and published monthly in mimeographed form and semi-annually in its *Wholesale Price Bulletin.* These tank car prices are derived in the main from systematic inquiries by field representatives of the trade journals in the important market centers.

Substantially all prices are reported on an f.o.b. refinery basis. Historically, these f.o.b. refinery prices had a very real significance because delivered prices to jobbers, up to a relatively few years ago, were typically the f.o.b. refinery prices as described above plus the tank car rail freight to the jobber's destination. Today, however, this has ceased to be

the real basis for the delivered prices to jobbers in many, if not most, parts of the country because of the great changes in transportation, in refinery locations, and in marketing practices. Relatively little of the gasoline reaching jobbers today has come all the way from the old refinery centers by tank car: most of it has had the benefit of some lower cost method of transportation such as pipeline, water transportation, or transport trucks. Furthermore, as new refinery centers have appeared in many parts of the country, there is no longer one predominating refining center that supplies the jobbers in a given area; e.g., in the Middle West, jobbers are supplied by refineries in Oklahoma and Kansas, in the St. Louis area, in the Chicago area, and at other points. This development, together with the diversity in methods of delivery to the jobber, has tended to modify the earlier tendency of determining jobber prices on the basis of some predominating refinery center and adding rail freight from that center to the jobber's location. The result is that the f.o.b. refinery prices referred to above do not now constitute a very satisfactory means of determining what delivered prices to jobbers actually may be at any given point.

Moreover, most jobbers or distributors handling recognized brands buy from their supplier under a contract which in many if not in most cases provides that the price to the jobber will be a certain amount per gallon below the price to dealers in that area and, up to a few years ago, prior to the initiation of the Iowa Plan, such jobber price was not infrequently determined as a certain amount per gallon below the retail price in the same area. In these circumstances, the prices paid by jobbers in a particular locality at any given time depend far more upon the dealer and retail prices current in that area than upon the f.o.b. refinery prices in some distant refining center plus the rail freight to the destination in question. This is particularly true, of course, with respect to the larger marketing centers where usually competition is especially keen and where there is access to the market by several methods of transportation from several sources of supply.

Presumably it remains true, of course, that delivered prices to jobbers in areas contiguous to and supplied mainly from a basic refining center such as the Oklahoma 'Group 3' region would usually conform to the f.o.b. refinery tank car prices in such refining center plus the transportation cost to destination. This is axiomatic so far as the actual course of business in these areas conforms to the pattern indicated, as it still does in considerable measure. The significant point is that the areas around such refining centers within which these conditions apply with any great degree of rigor or consistency tend to become smaller and smaller, and if the refiner desires to sell to jobbers at points beyond such areas he must do so on the basis of whatever delivered price levels may have resulted at such points from the interplay of competitive forces represented by various alternative sources of supply and methods of transportation available to such markets. It is also true that changes in the general level of delivered prices to jobbers throughout the country continue to follow closely fluctuations in f.o.b. prices in the basic refinery markets. In other words, while there may be many independent variations in prices in response to local market conditions in different areas, and while the spread between the average delivered prices to jobbers throughout the country and the concurrent basic refinery prices doubtless tends to diminish on account of the savings accomplished in transportation, nevertheless all these prices are sufficiently interrelated to fluctuate pretty much together. So far as measuring changes in jobber or tank car price levels is concerned, therefore, the f.o.b. refinery basis, which prevails for tank car price reporting in the trade journal sources referred to above, probably continues to be reasonably satisfactory, although the difficulties of getting satisfactory price data for such sales obviously increase as the f.o.b. refinery basis for making tank car sales to jobbers becomes less prevalent and the relative number of transactions on that basis declines.

There would seem, on the whole, to be two main shortcomings in the tank car price data now available. In the first

place, if the f.o.b. refinery 'spot' price is of diminishing importance as a basis for actual jobber sales, the question arises whether it furnishes a satisfactory index of the average 'net back' (i.e., the net realization to the refinery) obtained on all sales of the product in question made by refiners in the given area to jobbers, including those made under contracts and for delivery at destinations where no single refinery-center-price-plus-rail-freight basis obtains. It seems probable that the practice of extending so-called 'local protection' (i.e., granting lower prices) to jobbers or distributors in cut-price areas, together with the general tendency of most refiners to make at least a part of their sales in more or less distant markets, has the effect of 'grading down' the average over-all realizations to a level somewhat below that represented by the f.o.b. refinery prices in 'spot market' sales, as quoted in the trade journals. This is not a criticism of the accuracy or dependability, as such, of the prices reported but merely introduces a question with respect to how large an area of the whole jobber market they represent.

The other limitation is the absence of a published record of the delivered prices at which jobbers are being supplied in the principal consuming areas. Nor is it possible, under the conditions above described, to deduce or compute such delivered prices, with any assurance of accuracy, by adding to the f.o.b. refinery tank car price quotations for a particular refinery market the rail freight rate to given destinations. So long, of course, as there are two radically different bases of pricing (i.e., f.o.b. refinery and delivered) being followed in the same area with respect to different transactions in this same wholesale class, an adequate price reporting service must include quotations upon both bases. There is no alternative. The two pricing methods are not interconvertible. The prices resulting from, or determined in, each way of transacting business influence the prices negotiated upon the other basis, of course. But in view of what has already been said it should be clear that a representative index of prevailing prices in many of the larger marketing

districts cannot be predicated solely on the assumption of a simple 'regular course of trade'.

The chief deficiency in the present reporting service is that it does not attempt to supply information on delivered prices to jobbers in important distribution centers. For example, if in a given state most jobbers buy upon a delivered or destination price basis, it should be of advantage to the trade to have a record showing at least approximately what these prices are for deliveries from a representative cross section of suppliers selling to jobbers in that territory. And for the purpose of determining the course of wholesale prices (changes from time to time) such a price record would afford a needed supplement to f.o.b. refinery prices. Yet at present not even in the large consuming area along the eastern seaboard, in which jobbers certainly buy mainly upon a destination basis, is there available a continuous record of what jobbers pay for their gasoline.

It is the opinion of this Committee that such a record of delivered prices is desirable and it hopes that one of the trade journals, which we believe are in the best position to assemble this type of information, will undertake the task. We suggest the collection of data representing the actual delivered prices charged to jobbers in various representative markets; such data should include sales on both spot and contract bases. Actually, there may not be as much difference as might be assumed between 'spot' and contract prices, since it is understood that where competitive conditions indicate prices below those that could be charged under such contracts, the suppliers quite frequently grant lower prices in order to protect the interests of their customers and thereby their own interests as suppliers. In the collection of such data there should, of course, be an attempt to establish such grade and other classification as would seem necessary in order to make the data representative.

It need hardly be added that we are not suggesting that this service should displace the practice of reporting tank car prices on an f.o.b. refinery basis for the leading refinery markets. Rather, the new information on delivered prices

would supplement the old information. It seems hardly probable that all sales will ever be on a strictly delivered basis; in fact, there is today a counter-trend in a few cases where jobbers, having their own transport trucks, are going to the supplier's refinery or terminal and getting their supplies directly. Usually, however, in such cases we believe the sale is on the basis of an independent delivered price at the jobber's destination, with a separate allowance for the transportation service performed by the buyer. Under these conditions, the physical delivery arrangement should not seriously interfere with the collection of delivered price data or impair their significance.

COMMERCIAL CONSUMER CONTRACT PRICES

In certain petroleum products, chiefly gasoline, fuel oils, lubricating oils and greases, a special class of business is in one sense wholesale and in another sense retail. In the industry this is known as commercial consumer contract business, and its price record is notably meager. The designation does not accurately indicate the class of business encompassed in this category, because among these transactions are sales to governmental agencies and co-operative associations. In the main, however, commercial consumer contract business consists of deliveries under contract to industrial and commercial consumers for use in their own operations, often at several scattered points. This class of business is retail in the sense that the products are sold directly to the ultimate consumer and not for resale. It is wholesale in the sense that these contracts ordinarily call for bulk deliveries, sometimes, as in the case of certain government contracts, in a volume exceeding that involved in any single wholesale, i.e., dealer, transaction.

For many years prices in the commercial consumer contract category were reported only sporadically even with respect to usual terms. Latterly, there have been issued in the price quotation columns of certain trade journals, notably the *National Petroleum News,* the posted prices of certain refiners for gasoline for delivery to commercial

accounts by tank car and, in some instances, by tank wagon. The news columns of the trade press occasionally carry information on governmental contracts recently let. Public fiscal documents also may contain information of this sort. Even so, there is a paucity of price information on this class of business. The geographical coverage is small even when all classes of postings are considered collectively, and there is no continuity of coverage with respect to any specific item.

The difficulties of securing an accurate record of transactions in the 'commercial consumer contract' category are numerous and in some instances seem insurmountable. Even under the administration of the Robinson-Patman Act there may be many bona fide classifications of accounts. The consideration accorded one class of accounts may differ in one or more particulars from that shown accounts in other classes. For example, certain accounts require as little as 100 gallons per month; others, upwards of 10,000 gallons per month. If an average were computed by weighting the volumes of deliveries at various prices, the result would probably convey little information of the actual price structure of the reporting company with respect to different classes of business. Nor would such an average yield a very reliable index of price changes unless it were supplemented with exhaustive information of a similar character for every grade of the product in question marketed.

However, there is nothing very extraordinary about the existence of such conditions in the petroleum industry. They have existed in many other industries in which manufacturers deal directly with large industrial consumers. Under these circumstances, the Committee is disposed to favor, for the present, only an attempt to extend the reporting service now available for commercial consumer rates rather than to develop an elaborate record of prices throughout the industry for this class of business. Obviously, a truly comprehensive system of reporting commercial consumer contract business would be expensive to operate and would yield results incomprehensible to the layman, confusing to

the price expert, and of questionable value to any and all concerned.

Accordingly, the Committee recommends that the members of the industry, particularly in the refining and jobbing branches, co-operate with an established trade journal, which has had broad and extensive price reporting experience, in furnishing currently, perhaps weekly, information upon average, current or 'going' rates at which new or renewal business of this type is being contracted. Such reports might, probably should be, in the nature of schedules which relate price to other essential terms of the offerings and with such classifications of customers as exist.

Under these circumstances, while it would be impossible for a student of price to ascertain actual realizations for deliveries made to commercial consumer contract trade as a whole, it would be possible and practicable to study the differences between the terms accorded the various classes of trade with special emphasis on their economic appropriateness. If these current price schedules were reported to the price collecting agency by several sellers in each important marketing area, and if the agency dexterously classified and compiled the data, it would also be possible for interested persons to gain information respecting the minimum and the maximum prices for specific categories, the arithmetic averages, and this without disclosing the specific terms of any particular company, which, no doubt, should be left to discovery in the ordinary channels of trade negotiation.

At the same time, the compiled average of current prices in each 'volume' bracket, together with their respective minimal and maximal limits, would furnish for the benefit alike of buyers and sellers what is now lacking, namely, a reasonably reliable gauge of the general situation in the market whereby to form a judgment upon the merits of any specific bid or offer. Moreover, this procedure would retain the advantage of a geographical differentiation of prices such as is now shown in the reporting services of certain trade journals. From a statistical and economic standpoint the recommended procedure would provide a record of

price variations and price changes having more than a questionable pretense of representing the actual course of the market. For all these reasons, therefore, the Committee urges an earnest effort forthwith to secure the furnishing, assembly, and publication of the data suggested.

RETAIL PRICES

No official record of retail prices of petroleum products, or even of gasoline alone, exists. The most commonly cited index of retail gasoline prices in the country as a whole has been the 50-city average, long published by the *Oil and Gas Journal*. Since the widespread adoption of the so-called 'Iowa Plan', whereby service stations formerly 'owned and operated' by major-company suppliers are leased to individual operators, the publication of the 50-city average has been discontinued. This index was derived from the postings for regular grade motor fuel in service stations owned or operated by 11 companies, collectively covering the national market. Prices reported for 50 representative cities were combined in a simple average to give a country-wide picture of the retail gasoline market. The actual quotations from which these indices were made up are no longer published but apparently somewhat comparable data are now being collected by the trade magazine, *Super Service Station*.[5]

The shortcomings of this retail price reporting service, even when it was more than the skeleton that now remains, may be briefly summarized: (1) It was unofficial and therefore unauthentic, though the index seems to have been com-

[5] Formerly the *National Petroleum News* published a complete record of the changes in service station posted prices in some 150 to 175 towns, including all the principal cities in the country, in its annual *Oil Price Handbook*. This Handbook now gives only the dealer tank wagon prices in these towns and cities. However, occasionally during the last two or three years this journal has published a 50 Cities Retail Price Index, apparently compiled on the same basis as the index formerly published regularly. It is understood that the *National Petroleum News* is now preparing to publish monthly an average of the posted retail prices in 50 cities. While this new index may not be on exactly the same basis as the old, it presumably will be on a basis roughly comparable.

piled with reasonable care and exactitude upon the basis of the original data available. (2) The basic data represented solely the service station prices of a group of companies, each operating in more or less distinct market territories. They may perhaps constitute, each in its respective sphere, the market leaders, but none is the marketer at retail, nor was it even prior to the adoption of the Iowa Plan, of more than a minor fraction of the gasoline actually distributed through service stations in any section of the country. Furthermore, the very position in the industry of these 11 companies that constituted the source of the retail price data used in the index tended to bias their service station postings somewhat toward stability. In our judgment it would not misrepresent the facts to state that the prices included in the 50-city average index have always reflected, in the main, 'top' prices in the retail market.

It would be clearly advantageous from every standpoint to have an index of retail prices of this major product that reflected more accurately the actual prices charged and was based upon information from wider sources. In particular, an adequate index would have to encompass transactions in several types of retail distribution, including so-called 'cut price' outlets. The most appropriate medium for the development of such a service would be, in our judgment, the Retail Price Division of the Bureau of Labor Statistics. This Division has developed a trustworthy technique and has established useful contacts in the 51 representative cities included in its retail food price index. It has for some time contemplated an extension of its service in this particular direction in view of the mounting significance of gasoline prices in the cost of living, changes in which it is one of its special functions to measure. With respect to the Bureau's plan the Commissioner of Labor Statistics has made the following statement: "The reporting service will depend upon the cooperation of a selected list of service-station operators in each city (the 51 cities included in the retail food price index), who will return to the Bureau, by mail, schedules showing prices as of a specified date. If the coop-

eration of a number of the large refiners who operate or control service stations on a sectional or national scale can be secured, this work will be simplified by having master schedules filled out at the home office for as many of the cities as are included in each company's sales territory. These master schedules will be supplemented in each city, however, by reports from several independent service stations."

The Committee endorses this general outline of the plan and especially recommends, in view of the considerations already advanced affecting the value of what remains of the 50-city average index, that the major integrated suppliers co-operate in developing and maintaining this essential service. The resultant index, published monthly, while it would not disclose every isolated instance of price unsettlement, would furnish a much more complete and authentic record of retail price movements for gasoline than we now have. The Commissioner of Labor Statistics estimates that the annual cost of such a reporting service would be about $11,000. As the lack of funds to this extent is the only present known obstacle to the institution of the service, and as the Bureau is authorized to accept funds from private sources for the support of such a service, this Committee recommends to the representative trade organizations of the industry earnest consideration of the advantages that might accrue from their support of the project, pending Congressional appropriations for the purpose.

Retail prices of fuel oil are now reported weekly in the *National Petroleum News* for about 40 cities in the middle and eastern parts of the country. This service suffers from the limitations pointed out in connection with consideration of the retail gasoline price index. It is now being supplemented by the Retail Price Division of the Bureau of Labor Statistics which has recently included in its survey of retail fuel prices in 51 cities a schedule showing delivered retail prices of range oil and four grades of fuel oil. This should furnish an adequate record of retail prices for the second major product of the industry. Because of the additional

expense occasioned by this and other revisions in the retail fuel price reporting service, in conjunction with the limited appropriations for the Bureau's work, it has shifted the reports from a monthly to a quarterly basis.

Of refined products of petroleum other than gasoline and the various fuel oils, in general, the economic importance is relatively so slight and the channels of distribution so varied that the Committee does not consider an attempt to develop a current retail price reporting service practicable, with a possible exception. Lubricating oils are sold very largely through service stations and garages. Eventually it might well be found that the additional burden entailed by simultaneous reporting of lubricant prices with the service station prices of gasoline, under the plan recommended, would be so slight as to warrant such an extension of that service. For the present, however, and until an adequate system of reporting gasoline retail prices has been introduced and proven dependable, it seems inadvisable to embark upon this auxiliary project.

In the foregoing analysis and appraisal of the available statistical data bearing upon price formation and price movements in this industry, we have endeavored to restrict ourselves, as indicated at the outset, to practicable standards and reasonably attainable objectives. While we recognize, for example, the advantages to be obtained from continuous and authentic price records of many cost elements such as investment, payrolls, and taxes, we have not deemed it expedient to extend our recommendations beyond the modest range of filling the more obvious gaps and improving the procedure in price reporting as now practiced. Moreover, we have addressed ourselves only incidentally and collaterally [6] to the technical problem of refin-

[6] Within the last twelve years the octane rating of regular grade gasoline, for example, has been increased some 16 points, or 30 per cent, and there are other improvements in quality not reflected in octane numbers. Moreover, no inconsiderable portion of the price of gasoline at retail, omitting the tax element, consists of a charge for services rendered the average patron. No serious effort has been made to compute in quantitative terms, so far as we are aware, the extent to which this service element in the price

ing price data to assure validity of time comparisons of prices, or accuracy in measurement of price movements. Changes in commodity composition or product standards present a special difficulty in this connection. Our recommendations relative to increasing the precision and extending the scope of refined product classification in price reporting do, in our judgment, lay the indispensable groundwork for an eventual attack upon this vital problem. For the rest, we may conclude this part of our study with the observation that, particularly in a co-operative enterprise such as the development of adequate trade statistics unquestionably requires, to attempt relatively little initially does not foreclose the prospects of a fuller measure of ultimate accomplishment.

V

OBJECTIVES OF A PROGRAM OF PRICE-COST RESEARCH IN THE PETROLEUM INDUSTRY

RELATION OF PRICE, COST, AND EARNINGS MOVEMENTS TO SUPPLY AND TO THE COURSE OF INVESTMENT IN THE INDUSTRY

A PROGRAM of price research in the industry might appropriately be directed toward three broad objectives. Determination of (1) the forces upon which price and price movements depend; (2) price relationships among the several products of the industry; (3) the functions prices perform and their effectiveness.

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of gasoline has varied with the passage of time. But it should be clear that this has an important bearing upon the comparability of retail gasoline prices, at least over extended periods and possibly over wide areas.

Because, however, of the relatively high degree of standardization of the products and raw materials of this industry at any given time, and particularly of its major product, motor fuel, it affords a promising field for analysis of the significance of product changes in the measurement of price movements. Moreover, on account of the complex relationship of various petroleum products, in some part as joint products, in some part as alternative products, and in some part as complementary products, and of the effects that quality changes may have upon these relationships, and *vice versa,* research in this direction should prove exceptionally fruitful. It will call for both economic perspicuity and statistical acumen and should have both theoretical and practical implications.