

Case Study From



The Small Refiner Bias in the U.S.¹

The Small Refiner Bias (SRB) was one of the most important special programs enacted under the Emergency Petroleum Allocation Act (EPA) of 1973. Under the program, refineries with processing capacity less than 175,000 b/d were granted extra entitlements, which allowed them to enjoy lower marginal costs than larger refineries. Refineries with processing capacity less than 30,000 b/d realized the largest benefits. In the first two years of the program, 11 out of 14 new refineries built had a capacity below 30,000 b/d. This was a significant change from the five-year period prior to the implementation of the SRB

program when the majority of new refineries had significantly larger processing capacity. But the program failed and was eliminated in the early 1980s.

- *Why did the program fail?*
- *What could the government do differently?*

Background

In 1959, the Mandatory Oil Program (MOIP) was instituted. It established quotas and required importers of crude oil and refined products to obtain import quota tickets. These tickets were allocated among "established importers, larger refiners that had not previously imported large amounts of crude oil and small refiners. A sliding scale awarded proportionately more import quotas to small refiners than to large ones."

Many believed that there were two main reasons for this sliding scale allocation scheme. One was the Antitrust Division's desire to use the oil import programs to offset competitive advantages that integrated firms were believed to have over independent refiners. The other reason was to provide for equitable allocations to two classes of large companies, the traditional importers and those who had begun significant international operations in the 1950s. Many companies in the latter group had low historical minimums and without the sliding scale their allocations based on refinery inputs would have almost equaled those of established importers of similar size.

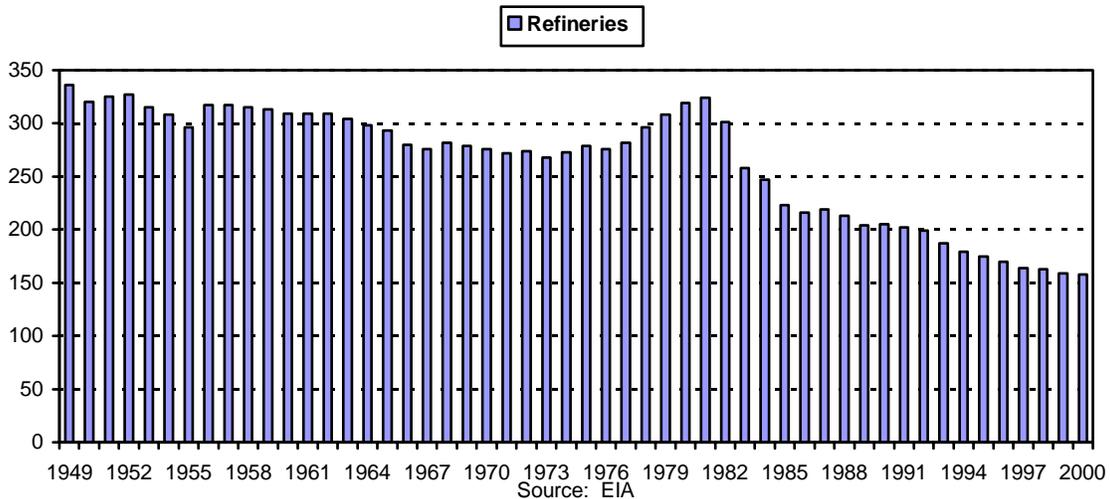
During the oil crisis of the 1970s, the government controlled the price of crude oil through a set of regulations (EPA). These regulations established two levels of price-controlled oil (lower tier "old oil" and upper tier "new oil") in addition to free market priced oil. Because small oil refiners experienced disproportionately high operating costs during the oil crisis, the government made additional entitlements available to small refiners. Those entitlements, referred to as "small refiner bias" (SRB) entitlements, were issued on the basis of the amount of oil the small refiner refined each month.

The small refinery bias increased the profitability of operating small, inefficient refineries, and construction of these facilities boomed. Most of the new capacity was in the form of unsophisticated hydro-skimming plants with less than 30,000 barrels per day of crude

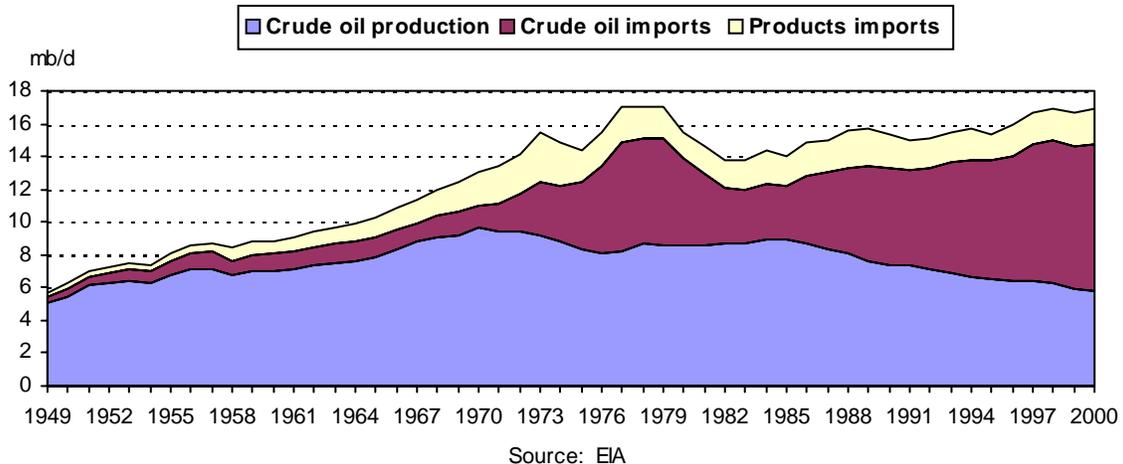
¹ This case study was prepared using publicly available information.

distillation capacity. Between 1973 and 1981, the number of operable refineries in the U.S. rose from 281 to a record high of 324.

In the first two years of the entitlements program, fourteen small refining firms entered the industry and three firms became large refiners. Of the fourteen new small refiners, eleven were in the 0-30,000 b/d range. By comparison, over the five years preceding the entitlements program, the number of firms declined by six. The 30-175,000 b/d class showed an increase of three firms.



By the mid-1970s, the U.S. had become a major importer of crude oil and products. In 1973, domestic production was about 8.8 million barrels a day (mb/d) and the U.S. imported 3.2 mb/d of crude oil and more than 3 mb/d of products. In 1977, the production of domestic crude oil was down to 7.9 mb/d while the imports rose to 6.6 mb/d. Products imports were also down to 2.2 mb/d.



The Small Refiner Bias

The Small Refiner Bias (SRB) has its basis in the MOIP. At the time the program was initiated, the Federal Energy Administration (FEA) believed that a “bias” was necessary to

compensate for higher operating costs and proportionately greater capital expenditures. FEA also believed that the small refiners were forced to price their products below those of major branded refiners. But, a U.S. Department of Energy study in 1978 concluded that the SRB entitlements program had not been completely successful in equalizing the delivered cost of equivalent crudes.

Cost of the SRB Program

Extra entitlements are based on a sliding scale that grants a decreasing number of entitlements per barrel of crude oil throughput as throughput increases up to 175,000 b/d. As of 1977, the SRB applied to approximately 18% of US refining capacity and to 126 of the 148 domestic refining firms. To a first approximation, allocations of entitlements to these affected firms under the SRB represent pure transfers from larger companies and, ultimately, their customers. While the general entitlements program subsidizes these refiners' incremental crude oil use, the SRB assigns each level of crude input extra entitlements that may be sold at the full entitlements price (that is, the difference, less \$0.21, between the prices of imported and lower-tier crude oil). In 1977-78, the maximum per barrel subsidy was approximately \$2 per barrel. In 1977, total amount of subsidy was calculated at \$659 million.

The table below shows the total subsidy made to various size refiners under the SRB in 1978 on an individual refiner basis. As of 1978, the subsidy increased from 0 to 30,000 b/d crude oil throughput. It peaked at a throughput of 30,000 b/d and an annual value of approximately \$9.4 million.

Benefits under Small Refiner Bias

Refiner throughput (1,000 b/d)	Marginal crude cost (\$ per barrel)	Average crude cost (\$ per barrel)	Total daily value of bias (thousands of dollars)	Total annual value of bias (millions of dollars)
0 → 10	11.08	10.61	0 → 18.9	0 → 6.9
10+ → 30	12.61	11.42	18.9 → 25.8	6.9 → 9.4
30+ → 50	13.39	12.01	25.8 → 17.2	9.4 → 6.3
50+ → 100	13.10	12.38	17.2 → 10.4	6.3 → 3.8
100+ → 175	13.10	12.48	10.4 → 0	3.8 → 0

Source: Calculated from data in US Department of Energy, Monthly Energy Review, using 1978 data, with an entitlements price of \$8.265 and a marginal crude oil cost for large refiners of \$12.96.

As shown in the table, the SRB has kept marginal crude oil costs of refiners with less than 30,000 b/d crude oil throughput below the average costs of all larger refiners. Above 30,000 b/d, however, small refiners have faced slightly higher marginal costs for acquiring crude oil than those faced by large (that is, 175,000+ b/d) refiners since incremental inputs of crude oil have carried the penalty of a reduction in the small refiner subsidy. Consequently, there has been an incentive, other things being equal, to move the scale of operations toward 30,000 b/d.

Refining Technology

Small refineries typically are most efficient at producing limited slates and specialty products. In general, the SRB encourages capacity expansion in units that are smaller than optimal, that is, that fail to take full advantage of the economies of scale available in refining. Nevertheless, at the time the SRB was implemented, there have been studies indicating that the minimum size refinery necessary to take full advantage of production economies of scale of the time was one designed to process 200,000 b/d. Managerial and

organizational economies of scale reinforce this tendency toward large-scale operations and are apparently not exhausted by the single-plant firm.

Moreover, encouragement of expansion through operations by small firms that employ relatively unsophisticated and inflexible technologies and produce relatively large yields of heavy refined products (such as residual fuel) runs counter to the expansion implied by a continuing secular trend in the composition of demand favoring light products (such as gasoline). Thus the product mix, as well as the mix of firm and plant sizes, is distorted by the special entitlements subsidy to small refiners. Significantly, no new large grass-roots refinery (that is, a completely new plant as opposed to an expansion of an existing operation) has been started under the entitlements program.

Objectives and accomplishments

Among the objectives expressed as official justification for the SRB have been “economic efficiency: and the “minimization of economic distortion, inflexibility, and unnecessary interference with market mechanisms.” The foregoing discussion suggests that the SRB does not satisfy these goals. According to the FEA, other objectives included “preservation of an economically sound and competitive petroleum industry; including the [preservation of] the competitive viability of...small refiners: and an “equitable distribution of crude oil...among all...sectors of the petroleum industry” At least some of these objectives appear to be served by the SRB. In light of the state of technology in refining entitlements subsidy may indeed preserve the “competitive viability” of some small refiners who might otherwise be unable to cover their total costs.

This preservation is accomplished through a distribution of crude oil among refiners that might be judged equitable under some standards of fairness (for example, a standard that attached value to smallness per se). Indeed, the SRB can be viewed as a mechanism for enriching smallness through special assignments of property rights to controlled crude oil. The extra allocations of entitlements allow small refiners to capture the rent associated with access to the controlled crude represented by such entitlements. For many small refiners, this rent amounts to millions of dollars per year.

Market Distortions

After the U.S. imposed the price control on domestic crude, not only did the domestic producers hurt and domestic production start to decline (see chart above) but also the product prices were distorted. Since the government could not control the price of imported crude oil (about 30% of total consumption at the time), refiners that could not receive domestic crude had to buy imported crude, the higher price of which ended up setting the products prices higher as well. This created windfall profits for those companies that had better access to domestic crude. As the entitlements programs such as the SRB were designed to address these kinds of inefficiencies, the mix of these regulations created more market distortion. For example, sometimes, large refiners promoted small refiners because they could use the cheaper products from the smaller refiners (such as fuel oil and vacuum gas oil) as feedstock for their cat crackers and cokers. Most small refiners that came online under the SRB program were shut down once the price control on domestic crude oil was removed.

Sources:

Kalt, Joseph P. *The Economics and Politics of Oil Price Regulation*, The MIT Press, 1981.

Small Refiner Bias Analysis, Final Report, January 1978, prepared for the U.S. DOE Economic Regulatory Administration, Office of Regulations.