

Information Circular 8860

# Operation of the International Tin Agreement

By Thomas J. Witzig



UNITED STATES DEPARTMENT OF THE INTERIOR  
James G. Watt, Secretary  
BUREAU OF MINES

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

This publication has been cataloged as follows:

Witzig, Thomas J.

Operation of the International Tin Agreement.

(Information circular / United States. Bureau of Mines ; 8860)

Bibliography: p.20

Supt. of Docs. no.: I 28.27:8860.

1. Tin industry. 2. Commercial treaties. I. Title. II. Series: Information circular (United States. Bureau of Mines) ; 8860.

TN295.U4 [HD9539.T5] 622s [338.2'7453] 81-607844 AACR2

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## INTRODUCTION

The International Tin Agreement (ITA) is the oldest of International Commodity Agreements (ICA).<sup>2</sup> Formed in 1956, the ITA was supported by a history of international cooperation in the tin market reaching back to 1921. Tin is the only nonagricultural commodity to be represented by an ICA (78)<sup>3</sup> and, as such, serves as an example for proposed ICA's dealing with other mineral commodities.

The United States became a member of the ITA for

the first time with the fifth 5-year ITA beginning in 1976. This action followed a period of formal and informal U.S. cooperation with the International Tin Council (ITC), the body that controls and operates the ITA. Membership marked a departure from the traditional U.S. minerals policy of noninterference in minerals markets (5). This paper presents the background of the ITA and U.S. involvement and focuses on the activities of and outlook for the agreement.

## PURPOSE OF INTERNATIONAL COMMODITY AGREEMENTS

The economic purpose of an ICA is essentially the stabilization of price at a level consistent with a reasonable return to producers and an assurance of supply to consumers at a fair price (24). Secondary goals deriving from this are preventing excessive export earnings fluctuations, increasing export earnings, especially for less-developed countries (LDC), increasing investment and exploration, and promoting long-term equilibrium between production and consumption (23). In the case of tin, the latest agreement (the Fifth ITA) also states several related goals. These include the

promotion of tin consumption, increasing processing in the producing countries, improving technical and economic efficiency, insuring the fair allocation of supplies in the event of a shortage, taking measures to alleviate difficulties such as unemployment in producing countries in case of an oversupply, and reviewing tin disposals from noncommercial stockpiles (10). As will be seen, this latter provision has a substantial bearing on the U.S. relationship with the ITC, in light of history and current policy.

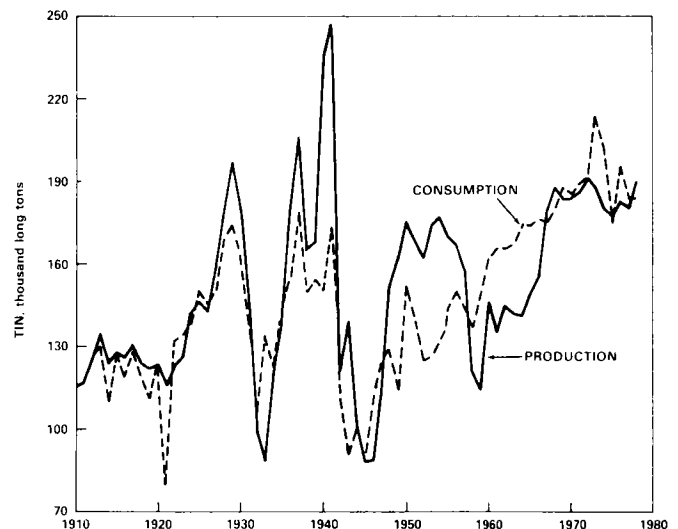
## HISTORY OF INTERNATIONAL COOPERATION IN THE TIN MARKET

A need for stabilization of the tin market, that is, an equalization of supply and demand at a stable price, is based on the historic volatility of the price of tin and of the gaps between production and consumption. As can be seen in figure 1, surpluses or deficits between production and consumption of tin have existed during most years since 1910. Excluding the Depression and World War II, the gaps have ranged from a surplus of 36,000 long tons, or 45 percent of consumption, in 1921, to a deficit of 34,200 long tons, or 23 percent of consumption, in 1959. The differences between production and consumption have been less than 5 percent during only one-third of the years from 1910 to 1978.

Supply and demand for tin are said to be relatively price inelastic in the short term and have been estimated to have coefficients of elasticity of 0.42 and between  $-0.1$  and  $-0.5$ , respectively (4). In other words, the percentage changes of supply and demand will be less, in the short run, than the percentage changes in price. The converse of this is that price changes to a greater extent in response to changes in supply or demand. That is, small changes in the supply of or demand for tin result in relatively larger changes in its price. Figures 2 and 3 show that as well as having a marked imbalance between production and consumption, the tin market has seen periods of substantial short-term price volatility. These gyrations in price can

jeopardize stable operations for marginal and high-cost producers, such as the lode mining operations of Bolivia.

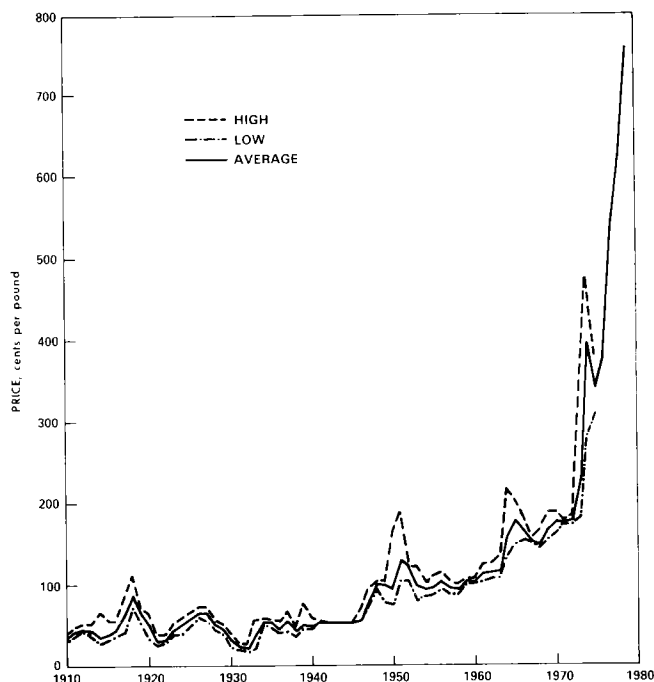
Contributing to price instability is the structure of the tin-producing industry. Tin producers are usually either small, individual operators or large, capital in-



**FIGURE 1.—World production and consumption of tin, 1910–78. Excludes China, the U.S.S.R., the German Democratic Republic, North Korea, and the Republic of Korea. Starting 1950, tin metal; previously tin-in-concentrates. Data for this figure are in table A-1.**

<sup>2</sup> A commodity agreement is a market agreement among producing and consuming nations. This is as opposed to a cartel, which is an agreement among producers only, "to divide markets among themselves, fix prices, exclude would-be competitors, or otherwise try to increase joint monopoly prices." (3)

<sup>3</sup> Italic numbers in parentheses refer to items in the list of references preceding the appendix.



**FIGURE 2.—High, low, and average prices of Straits tin, prompt delivery, New York, 1910-79. After 1975, American Metal Market composite New York tin price. Data for this figure are in table A-2.**

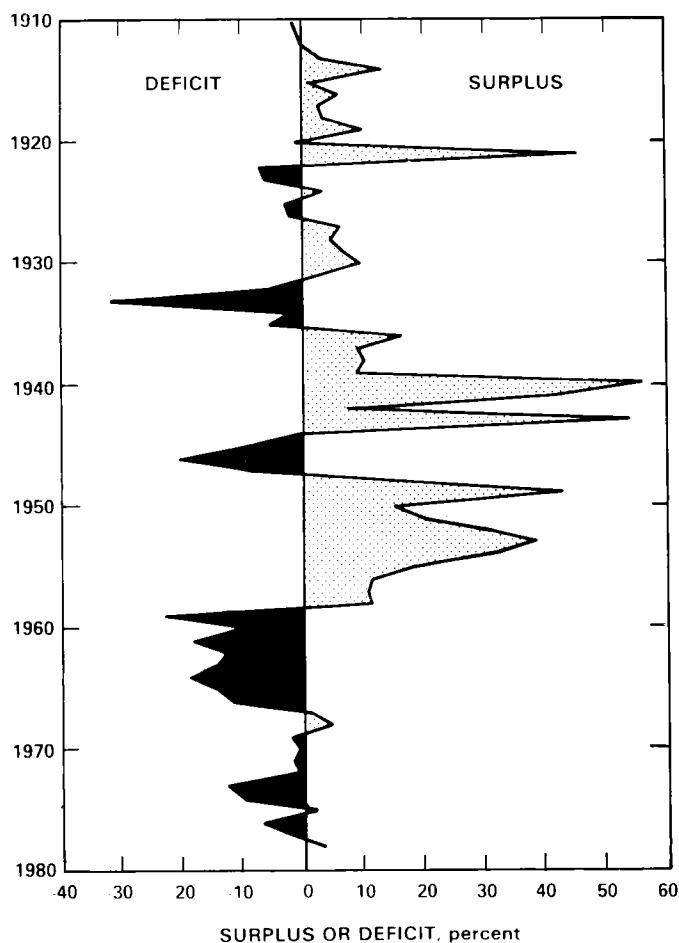
tensive and often government-owned producers. The Senate Foreign Relations Committee reviewed the relationship of pricing and production (25).

The economic incentive among small owners who do not see themselves as influencing price is to assume price as a given. They maximize revenue by maximizing output. Assuming little or no fixed costs among these operations, they will continue to produce until price falls to a level that will not cover wages or other daily operating expenses.

In the large capital intensive mining operations, economic incentives will cause the firms to maximize production in order to lower per unit production costs. This incentive to maximize production will continue even if the operation is losing money, as long as the fixed cost of operation plus some percentage of daily operating costs are covered (sic). [More properly “. . . as long as the daily operating costs plus some percentage of fixed costs of operation are covered”—Author.]

In cases of government ownership, mining operations might well continue in the face of heavy losses for reasons of domestic politics or balance of payment needs. In such cases the government subsidizes tin output.

In both the case of the small entrepreneur and the large capital intensive mine, the economic incentives to the firm cause overproduction in the stag-



**FIGURE 3.—Surplus or deficit of production, as a percentage of consumption, 1910-78. Data for this figure are in table A-1.**

nant market, driving prices down to or below cost levels and eventually closing mines and reducing output. Cyclical surges in demand, therefore, cannot be met causing prices to inflate rapidly. The market mechanism in tin does not regulate production very effectively.

Developing countries thus have an interest in keeping price at a level high enough to keep marginal producers in operation, for purposes of maintaining both employment and the export earnings needed for further development. Consuming nations benefit, it is argued, by the increasing, and thus assured supplies forthcoming from such operations (2).

Several aspects of the tin market suggest the feasibility of a commodity agreement. First of these is the relatively small number of major tin producers in the world. In 1977, eight countries accounted for almost 90 percent of world production (9). The bulk of this production is geographically centered in Southeast Asia. These producers generally do not consume tin to any great extent, while the major consuming nations do not produce tin to any great extent. Consequently, both producers and consumers are seen as having a mutual interest in some sort of cooperation. Additional factors are the short-term price inelasticity of supply

and demand, making stabilization desirable, and the fact that most of the producing nations are LDC's and are dependent on tin exports for much of their economic well-being. This latter factor, coupled with the substitutability of other materials for tin in some of its uses, makes the possibility of a cartel-like producers' arrangement less likely.

### Early Agreements, 1921-46

Formal agreements among tin producing countries began with the Bandoeng Pool in 1921. This agreement was between the tin producing Federal Malay States (now Malaysia) and the Netherlands East Indies (now Indonesia). Following the postwar price collapse of 1920, the two governments held sizable stocks that they had bought in unsuccessful attempts to support prices. The pool was an arrangement to hold the stocks of the two governments and the smelter at Singapore off the market until prices had risen to an acceptable level. The quantity held for most of the period was approximately 17,000 long tons, about 15 percent of world production in 1921. Although prices did not rise until well after the stocks were on hand, Fox credits the pool, as well as rising consumption, with a significant increase in prices (7). Sales from the pool, beginning in 1923, are similarly credited with restraining increases in price and reducing fluctuations between the highest and lowest prices. The pool was depleted by 1925 and "in the eyes of its proponents, the pool had proved conclusively that a degree of control over stocks meant a degree of control over price" (7). The sale of the stocks marked the end of the Bandoeng Pool.

The 1920's saw a sustained boom in tin production, consumption, and price. Consumption and production were roughly matched until 1927, when substantial excesses in production began to become apparent, along with an initially gradual decline in prices. This decline continued until 1929, when the drop became precipitous with the Great Crash and the collapse of consumption, particularly in the United States. Earlier in June 1929, a group of companies representing some 20 percent of world production, formed the Tin Producers Association. The purpose of the association was to stockpile the excess supplies of tin arriving at the companies' smelters in order to maintain prices within a certain range. However, membership in the association was not large enough to counteract the surplus of tin on the market. A high degree of dependence on the recovery of U.S. consumption and the continued high production of nonmembers caused the association, even with the addition of the Netherlands East Indies and the major Bolivian producers, to be largely ineffectual. Voluntary restrictions on production also proved to be useless.

This realization, and the drastically reduced revenues from the tin trade, led the governments of the major tin producing nations to form the International Tin Control Scheme, sometimes referred to as the first international tin agreement, in 1931. Essentially an outgrowth of the Tin Producers Association, the objective of the agreement was to achieve an equilibrium between production and consumption through govern-

ment-enforced export quotas. The participants formed the International Tin Committee to oversee the agreement. The first agreement did not provide for any buffer stock but could only affect the market during times of overproduction through the export quotas. The second and subsequent agreements extended controls to include producers' stocks. The second agreement, in 1934, also provided for "the absorption of surplus stocks" by a small buffer stock (7). The buffer stock replaced a privately held "international tin pool," which operated from 1931 to 1934. This pool held and released approximately 21,000 tons of tin and, according to Fox, had a real effect on stabilizing prices (7). However, the buffer stock was much smaller than the pool, and by the end of 1935 it had been exhausted with little effect on the market (24).

During the third agreement (1937-41), representatives of the two major tin-consuming nations (the United States and United Kingdom) served as nonvoting advisors to the committee. Through these representatives, the United States expressed its dissatisfaction with the price levels the committee had set and indicated that high prices could push consumers into reducing the use of tin or increasing the use of substitutes (7). The U.S. view was that a firm estimate of production costs was necessary to insure the establishment of reasonable price ranges. During the life of the agreements no such studies were made with this end in mind.

In 1938, a new buffer stock was created in response to declining prices. The stock bought and sold tin until the beginning of World War II, at which time it was quickly liquidated. During the war, the agreement's control measures ceased to have effect, and although the agreement remained in existence, the Allies Combined War Materials Board handled the allocation of tin, primarily to the end of building up U.S. supplies. The Board, after the war, set up the Combined Tin Committee, which performed the same function, albeit on a much more widespread scale, until its dissolution in 1949.

### The International Tin Council

The present-day International Tin Council (ITC) has its roots in the International Tin Study Group of 1948-56. Independent of previous tin control agreements, the study group was set up along the lines of the international Havana Conference of 1947, encouraging a widespread membership. The Havana Charter, drafted at the conference but never ratified by the major nations,<sup>4</sup> laid down principles of international trade that have been viewed by the world community as authoritative (24). Chapter VI of the charter, dealing with intergovernmental commodity agreements, set the guidelines for and enunciated the objectives, principles, and circumstances of commodity agreements. The chapter states the conditions that must exist before a commodity agreement can be entered into. These conditions are development of a surplus of a primary commodity that would cause serious hardship to producers or development of widespread unemployment or underemployment in connection with a primary commod-

<sup>4</sup> Chapter VI of the charter was adopted by the Economic and Social Council of the United Nations in 1965.

ity arising from difficulties relating to the commodity that, in the absence of specific governmental action, would not be corrected by normal market forces in time to prevent undue hardship to producers or workers (24). Additional principles governing commodity control agreements include designing the agreements so as to assure the availability of supplies adequate at all times for world demand at reasonably stable prices, allowing votes for consuming nations equal to those for producing nations, making provisions to afford the satisfying of demand from the most economic sources, and the adoption of programs by the participating countries to make internal economic adjustments for

the purpose of correcting the commodity problem involved (24).

The Tin Study Group produced four drafts of a tin agreement, each an evolution of the previous. The final one was to be adopted as the document that would become the First International Tin Agreement. The agreement was approved by the United Nations Tin Conference in Geneva at the end of 1953, was ratified by the participating governments, and took effect on July 1, 1956. While conferences and discussions had been held under the auspices of the United Nations, the final agreement was, and is, independent of it.

## PRINCIPLES AND OBJECTIVES OF THE TIN AGREEMENTS

The First International Tin Agreement ran from July 1, 1956, to June 30, 1961. It reaffirmed the basics of Chapter VI of the Havana Charter, stating that "a burdensome surplus of tin is expected to develop and is likely to be aggravated by a sharp reduction in purchases of tin for noncommercial stocks" (13). This statement was included after the United States announced that it would be halting the purchase of tin for its strategic stockpile (7). The stated objectives of the agreement were to prevent or alleviate the problems of widespread unemployment and excessive price fluctuations, to provide for adequate supply of tin at reasonable prices, and to promote the more economic production of tin at reasonable prices, as stated earlier. The agreement also put in place the control machinery, under the auspices of the International Tin Council. The Council is responsible for the buffer stock and export quotas, and arranges for the quarterly meetings of the representatives of the member nations. Operations of the Council are discussed in a later section.

The second agreement (July 1961 to June 1966) changed its thrust with respect to noncommercial stockpiles (that is, the U.S. stockpile) by expressing concern for the possible harmful effects of a liquidation of such stockpiles. A desire for consultation and advance notice in the event of a liquidation was stated.<sup>5</sup> The objectives of the agreement included a more detailed definition of "reasonable prices," substituting for

that term the phrase "prices which are fair to consumers and provide a reasonable return to producers" (14).

The third agreement (July 1966 to June 1971) specifically cited commodity agreements as being helpful to secure short-term stabilization of prices, long-term development of primary commodity markets, and assisting economic growth, particularly in developing producing countries. Also, "the importance to tin producing countries of maintaining and expanding their import purchasing power" was stated as a matter of policy for the first time (15).

The fourth agreement (July 1971 to June 1976) added as a principle the "desirability of achieving the expansion of tin consumption in both developing and industrialized countries" (11). Significantly, the wording of the fifth agreement was changed to the "desirability of improving efficiency in the use of tin . . . , as an aid to the conservation of world tin resources" (10). This occurred during the period when the tin market changed from a position of oversupply to one of under-supply. Both the fourth and fifth agreements specifically stated the purpose of conforming to the principles of the United Nations and its Conference on Trade and Development.

<sup>5</sup> It should be noted that although the United States was not a member of the agreement and thus not bound by it, it in fact paid heed to the effects of disposals on the world tin economy, as will be seen later in this report.

## MECHANICS OF THE TIN AGREEMENT

The major features of the tin agreement are the membership and voting, the buffer stock and its financing, and export quotas. Details of these are discussed in the following.

### Membership and Voting

Nations are members of the ITC as either producers or consumers of tin. Votes are apportioned to consumers on the basis of their average consumption during the three latest years, with the exception of the U.S.S.R. which votes on the basis of its imports of tin.<sup>6</sup> After five votes are given each country, each country's percentage of total consumption is used to allocate votes for a total among consumers of 1,000 votes. The votes of the producers are allocated roughly according to production, also for a total of 1,000. Each producer also begins with five votes. Both consumer and producer votes are adjusted regularly to take into account changes in production or consumption. Member countries and their votes are shown in table 1. As can be seen, the United States has the largest block of votes besides Malaysia. Among the producers, only Australia is a significant consumer of tin, and its votes are apportioned according to its exports. For the other producers, exports roughly equal production (7). As mentioned previously, the U.S.S.R., a major producer, has its votes assigned by its imports of tin, and is thus a consumer member.

Bolivia almost did not join the Fifth ITA. Unique among the major producers, Bolivia's tin deposits are located in high-altitude, hard-rock formations with declining ore grades. This makes Bolivia the highest cost producer in the ITC, hence its demands for higher floor prices in the agreement as well as regular revisions of floor prices to conform to production costs. Bolivia has other problems with its tin industry that contribute to its higher costs. Tin production dropped after nationalization of the three major tin-producing companies in 1952 and has only been slowly rebuilt, with the producers operating with antiquated machinery. There is great labor unrest due to the harsh working conditions at the mines that, combined with the political power of the mine unions and the fact that Bolivia counts on tin for almost half of its total export earnings (20, pp 149-159), makes tin extremely important to Bolivia's economy and a highly volatile political issue. After almost a year of hesitation Bolivia did sign the agreement and is an important factor in ITC policymaking.

### The Buffer Stock

The buffer stock is a method of affecting the basic supply-demand relationship of the tin market. By increasing supply when prices are high and demand when prices are low, the buffer stock manager (BSM) tries to maintain tin prices between the floor and ceil-

<sup>6</sup> The U.S.S.R. does not release consumption figures, thus its request to use imports as estimated by the ITC. This considerably reduces its voting power.

**TABLE 1.—Membership, percentages, and votes in the Fifth International Tin Agreement**

Country	Percentage	Votes
PRODUCERS <sup>1</sup>		
Australia .....	6.67	69
Bolivia .....	19.04	189
Indonesia .....	15.95	159
Malaysia .....	37.06	363
Nigeria .....	2.30	27
Thailand .....	16.76	167
Zaire .....	2.22	26
Total .....	100.00	1,000
CONSUMERS <sup>2</sup>		
Austria .....	0.28	7
Belgium-Luxembourg .....	1.83	21
Bulgaria .....	.52	10
Canada .....	2.87	30
Czechoslovakia .....	1.90	22
Denmark .....	.23	7
France .....	6.04	58
Germany, Federal Republic of .....	8.24	78
Hungary .....	.91	13
India .....	1.79	21
Ireland .....	.05	5
Italy .....	3.67	38
Japan .....	18.12	165
Netherlands .....	2.15	24
Norway .....	.31	8
Poland .....	2.79	30
Romania .....	1.84	21
Spain .....	2.50	27
Turkey .....	.70	11
United Kingdom .....	7.64	73
United States .....	28.42	257
U.S.S.R. ....	6.23	60
Yugoslavia .....	.97	14
Total .....	100.00	1,000

<sup>1</sup> Percent of world production as of Oct. 1, 1979.

<sup>2</sup> Percent of world consumption as of July 1, 1979.

Source: International Tin Council.

ing prices set by the ITC. The floor and ceiling prices are set during the quarterly meetings of the ITC and may be adjusted each quarter. The range between the floor and ceiling is divided into lower, middle, and upper sectors. These sectors determine if the BSM will buy, sell, or do nothing. If the market price of tin is above the ceiling, the BSM must sell tin until either the buffer stock is exhausted or the price falls below the ceiling. In the upper sector, he may sell or buy tin to prevent too rapid a rise in price, provided he is a net seller of tin. The BSM may not operate in the market when the price is in the middle sector without the express permission of the Council and, in the lower sector, provided he is a net buyer of tin he may buy or sell to prevent too steep a fall in price. If tin prices fall below the floor, the manager must buy tin until the market price is above the floor or until his funds are depleted. The Council, or its executive chairman if the Council is not in session may at any time suspend buffer stock operations if it believes they will not achieve their purpose.

The buffer stock price ranges are expressed in ring-

git<sup>7</sup> or Malaysian dollars (M\$) per picul<sup>8</sup> and are those prices found in the Penang Straits Tin Market or the London Metal Exchange (LME), or any other market the Council might recognize. It should be noted that the manager is under no obligation to operate in the lower or upper sectors, but must act only when prices actually reach the floor or ceiling. The buffer stock is the only tool available for defending the ceiling while export controls may augment the buffer stock to defend the floor.

## Buffer Stock Financing

The buffer stock is made up of mandatory contributions of tin metal or cash equivalents from the producing countries and similar, but voluntary contributions from the consuming countries. Prior to the fifth agreement contributions came only from the producers, although voluntary contributions would have been accepted from anyone. Currently, the optimal size of the buffer stock is set equal to 20,000 metric tons of tin or their cash equivalent from the producers, and up to a like amount from the consumers. Cash equivalents are accepted based on the floor price of the agreement at the time the contribution is announced. This is the major reason that all contributions to date have been in cash. The Council may decide the proportion of the stock that will be accepted in cash. The size of each country's contribution is apportioned by its percentage as set by the Council for the allocation of votes. Physical tin is to be received by the manager at London Metal Exchange warehouses and is to be of a brand registered with and recognized by the LME. In addition to these contributions, the Council may borrow for the purpose of the buffer stock or to supplement its resources.

Upon termination of the agreement buffer stock operations cease, and the buffer stock and its fund, with any tin metal valued at an appropriate market price, are liquidated. The total of the two is divided among contributing nations. Any surplus above the actual contributions is apportioned according to the size of individual contributions and the time they were held by the buffer stock. Contributions are repaid in the same proportion of tin or cash for each country, with each having the option of having its tin sold and being repaid entirely in cash. Prior to liquidation the manager allocates enough funds, either from the buffer stock account or through the sale of tin, to meet all expenses of liquidation. Any residual funds are then repaid to the contributing countries.

Of the consumer members of the ITC, so far the Netherlands, France, the United Kingdom, Denmark, Belgium, Japan, Norway, and Canada have made cash contributions. Although at the commencement of the agreement the United States had stated that it would not contribute to the buffer stock, it did state that its position would be reconsidered. Since then, several bills were put before Congress for disposal of tin from the strategic stockpile and in December 1979 the Sen-

ate sent to the White House a disposal bill (H.R. 595) (26) that included a donation of up to 5,000 long tons of tin to the buffer stock. The President signed the bill December 29, 1979. The proposed contribution to the buffer stock broached two areas of disagreement. First, the United States proposed that the donated tin be valued at its market price, rather than at the floor price at the time of its donation. The producers argued that when the tin was sold from the buffer stock, prices would be depressed, and if the tin were to be valued to the U.S. account at the higher market price at the time of the donation, the stock would be forced to take a loss, to be made up by other contributions upon liquidation. A compromise was reached in October 1980 valuing the tin at the price it actually sells for. Since this contribution is the first to be made in tin metal in the history of the ITC, the precedent on valuation is important. Secondly, the producers were concerned that any contribution of metal to the buffer stock, which under the ITC rules would immediately be sold since market prices were above the ceiling, would depress the market. This also gives the producers more reason to attempt to raise ceiling prices. These producers would prefer a contribution in cash. Negotiations between the ITC and the United States were underway in late 1980 to make arrangements for the donation of an initial increment of 1,500 metric tons.

## Export Quotas

The ITC's other price control tool, export controls, is designed to restrict the supply of tin to prevent or reverse a fall in price. Basically, the Council is empowered to hold down exports from the producer members of the agreement when it has determined that buffer stock operations would not be sufficient to maintain prices above the floor. To this end, Council rules state that export control may not be instituted when the amount of tin held by the buffer stock will likely be less than 5,000 metric tons at the beginning of the control period, and it may not be continued if the amount is likely to be less than 10,000 metric tons at the beginning of the next control period. Control periods are a calendar quarter in duration. The Council may, with a two-thirds vote of both consuming and producing countries, revise the quantities that the buffer stock must hold.

The quantity of tin each producing country is allowed to export during a control period is determined in proportion to its production or export figures for the last four consecutive quarters before the proposed control period during which no control period was in effect. Allowances are made if that amount falls below some minimum, and allowed exports are reduced if the country is unable to export the allowed amount. This latter provision is intended to allow the Council to control actual exports more precisely by allowing one country to make up for shortfalls in exports by another country. The exporting countries are responsible for controlling their own exports and while the Council has no police powers, in the event a country exports more than it is authorized, the Council's powers allow it to reduce that country's export quota for the next control period, require a buffer stock donation not to

<sup>7</sup> Prices were expressed in £ sterling until the pound was floated in 1972 at which time the price was switched to ringgit (Malaysian dollars (M\$)).

<sup>8</sup> A picul is 133 $\frac{1}{3}$  pounds.

## THE U.S.S.R. AND THE TIN MARKET

The U.S.S.R.'s tin industry, developed only after World War II, is believed to be capable of producing approximately 33,000 metric tons of tin per year, somewhat less than its consumption needs (21). As noted earlier, the U.S.S.R.'s massive exports of the late 1950's served as a conduit for China, where the bulk of this tin originated. At the time, the ITC considered restricting imports from nonmember nations while, at the same time, conducting negotiations with the Soviets. Several nonmember consuming countries also agreed to restrict imports. Notably, the United States said that the tin the U.S.S.R. was exporting was actually Chinese tin and therefore could not be imported. The ITC arrived at a settlement with the U.S.S.R. restricting exports to "nonsocialist" countries to less than 13,500 long tons (13,717 metric tons), and Soviet exports declined. Interestingly, exports from the U.S.S.R. fell to almost nothing in the early 1960's, coincident to the growing rift between the U.S.S.R. and China. This period also marked

the U.S.S.R. change from a net exporter to a net importer of tin. It became a consumer member of the Fourth International Tin Agreement with its votes based on its net imports of approximately 7,500 metric tons in 1971 (7).

The only other countries that are now substantial producers of tin and have not been members of the agreement are China and Brazil. As was seen, China exported tin to the West through the U.S.S.R. in the late fifties and has directly exported a substantial amount since then (17). China is estimated to produce some 20,000 metric tons of tin per year and has estimated reserves second only to Indonesia (21). It is reported as unlikely that China will join the Sixth ITA.

Brazil, the other major producer not a member of the ITA, has been steadily expanding its industry, from approximately 200 tons per year in 1962 to approximately 7,000 tons in 1978 (21). Until the expansion took place, Brazil had no influence on the tin market.

## PRODUCTION, CONSUMPTION, AND USE OF TIN

World tin mining and smelting capacities, mine production, primary consumption, and reserves are shown in table 6. Of the major producers, only Australia, Brazil, China, and the U.S.S.R. consume a significant proportion of their own production, and of these, only Australia is a producer member of the ITC. If Brazil joins the Sixth ITA, it too will be a producer member. Other than the U.S.S.R., none of the major consuming members produces an appreciable part of its consumption.

World production of tin has not grown at a very rapid rate (table 7). While the uses for tin are expanding and developing countries are increasing their consumption in line with their economic progress, high tin prices, efficiency, and substitution are mitigating some of the gains in growth. Probably the major efficiency in tin use was the introduction of electrolytic tin plating in the 1950's. This replaced the hot-dipping process

and resulted in the ability to apply much thinner coatings of tin to the steel sheet. Increases in total tinplate tonnage since the 1940's have not therefore resulted in corresponding increases in the use of tin for tinplate. Also, the proportion of tin in solders has gradually declined. Substitution has affected tin consumption mostly in two areas: tinplate, and foil and collapsible tubes. Two-piece aluminum cans, first produced in the late 1950's have now taken over some 60 percent of the beverage can body market and aluminum has almost the entire market for beverage can lids (16). Aluminum offers easy formability, good corrosion resistance, and better recyclability.<sup>10</sup> Aluminum has also, for cost rea-

<sup>10</sup> Tinplated cans must be detinned to recycle the steel and the pop-top lid, which is made of aluminum, must be removed.

**TABLE 6.—World tin mine and smelter capacity, mine production, primary consumption, and tin reserves**

Country	1977 capacity, metric tons		1978 mine production, metric tons	1976 primary consumption, metric tons <sup>1</sup>	Reserves, metric tons
	Mine	Smelter			
Australia	12,000	10,500	11,800	3,646	330,000
Austria	NA	NA	NA	517	NA
Belgium-Luxembourg	NA	NA	NA	2,956	NA
Bolivia	31,000	15,000	30,000	90	980,000
Brazil <sup>2</sup>	6,500	16,800	7,000	4,520	400,000
Bulgaria	NA	NA	NA	850	NA
Burma <sup>2</sup>	NA	NA	800	NA	500,000
Canada	400	NA	<sup>3</sup> 300	4,700	20,000
China, mainland <sup>2</sup>	22,000	35,000	20,000	14,000	1,500,000
Czechoslovakia	NA	NA	NA	3,500	NA
Denmark	NA	NA	NA	360	NA
France	NA	NA	NA	10,521	NA
Germany, Democratic Republic of	1,200	1,500	<sup>3</sup> 1,200	2,500	NA
Germany, Federal Republic of	NA	3,600	NA	14,581	NA
Hungary	NA	NA	NA	1,327	NA
India	NA	NA	NA	2,600	NA
Indonesia	25,000	33,000	26,000	575	1,550,000
Ireland	NA	NA	NA	80	NA
Italy	NA	NA	NA	7,400	NA
Japan	900	3,500	<sup>3</sup> 600	35,088	NA
Korea, Republic of	NA	NA	NA	720	NA
Malaysia	65,000	130,000	60,000	281	830,000
Mexico <sup>2</sup>	600	2,200	<sup>3</sup> 500	1,600	5,000
Netherlands	NA	NA	NA	3,805	NA
Nigeria	5,000	13,000	3,500	80	280,000
Poland	NA	NA	NA	5,096	NA
Rhodesia, Southern	800	1,200	<sup>3</sup> 800	NA	NA
Romania	NA	NA	NA	3,125	NA
Rwanda <sup>2</sup>	1,200	NA	NA	NA	NA
South Africa, Republic of <sup>2</sup>	3,000	1,500	<sup>3</sup> 2,700	2,461	30,000
Spain	800	15,800	400	4,600	NA
Switzerland	NA	NA	NA	704	NA
Thailand	24,000	25,000	26,000	164	1,200,000
United Kingdom	5,000	20,000	3,000	13,109	260,000
United States	300	7,300	NA	<sup>4</sup> 51,767	40,000
U.S.S.R.	31,000	39,000	33,000	<sup>4</sup> 21,000	1,000,000
Yugoslavia	NA	NA	NA	1,200	NA
Zaire	5,000	4,000	3,000	120	200,000
Other	4,300	11,100	<sup>5</sup> 4,600	10,716	235,000
Total	245,000	389,000	235,000	230,359	10,000,000

NA Not available

<sup>1</sup> Estimated.

<sup>2</sup> Reference 17, except as noted.

<sup>3</sup> Not members of Fifth ITA.

<sup>4</sup> 1977 data.

<sup>5</sup> Reference 21.

<sup>6</sup> Other is the difference between the total and the sum of the individual countries, including those using 1977 data.

sons, virtually replaced tin in foil and collapsible tubes. The principal uses for primary tin are shown in table 8. The major uses for secondary tin in the United States are for bronze and brass, solder, and chemicals (17).

**TABLE 7.—Compound rates of growth of mine production for major metals, percent per year**

Major metal	1914–38	1950–60	1960–65	1965–70	1970–75	1975–78
Lead	<sup>1</sup> 1.2	<sup>1</sup> 2.8	2.6	4.7	0.3	–2.6
Zinc	<sup>1</sup> 2.8	<sup>1</sup> 3.0	5.2	4.9	.4	.1
Copper	<sup>1</sup> 3.3	4.3	3.5	3.7	3.1	2.9
Aluminum <sup>2</sup>	<sup>3</sup> 12.3	11.6	6.0	8.0	4.5	4.9
Steel <sup>2</sup>	<sup>1</sup> 3.7	6.3	5.8	5.3	1.9	2.3
Tin	1.2	.4	2.2	2.9	–.6	1.5

<sup>1</sup> Fox (7).

<sup>2</sup> Plant production.

<sup>3</sup> Bauxite.

**TABLE 8.—Principal uses of primary tin, United States and world, 1975, percent (17)**

Use	United States	World
Tinplate	43	42
Solder	24	27
Tinning	4	6
Bronze and brass	6	8
Other tin alloys:		
Babbit	4	NA
Type metal	—	NA
White metal	5	NA
Other	2	NA
Wrought tin:		
Mar tin	1	NA
Tubes and foil	—	NA
Pipes and tubing	W	NA
Chemicals	6	4
Powder	3	NA
Other	2	14 <sup>1</sup>

— Less than 0.5 percent.

W Withheld to avoid disclosing company proprietary data.

NA Not available.

<sup>1</sup> Includes other tin alloys, wrought tin, and powder.

## THE FIFTH INTERNATIONAL TIN AGREEMENT

The Fifth International Tin Agreement is the current agreement, and was originally scheduled to run from July 1976 to June 30, 1981. At the January 1981 meeting of the ITC the delegates voted to extend the agreement for 1 year because of difficulties in the negotiations for the sixth agreement. The fifth agreement's most notable aspect is that the United States became a member for the first time. Prior to signing the agreement, the United States had been opposed to membership in commodity agreements, and thus the Fifth ITA marks a major departure from previous policy. The specific issues involved are discussed in a later section.

With the entry of the United States, the agreement has as members all the major tin producing and consuming nations, except China and Brazil. China, as mentioned earlier, is a major producer and consumer and exports some 20 to 25 percent of its tin production (17). Brazil did not join the fifth agreement because it feared damage to its infant industry if the ITC found it necessary to impose export controls. Representatives of Brazil have been active in the negotiations for the sixth agreement and they apparently consider their tin industry to be sufficiently developed for Brazil to join the agreement.

## OPERATIONS OF THE AGREEMENT

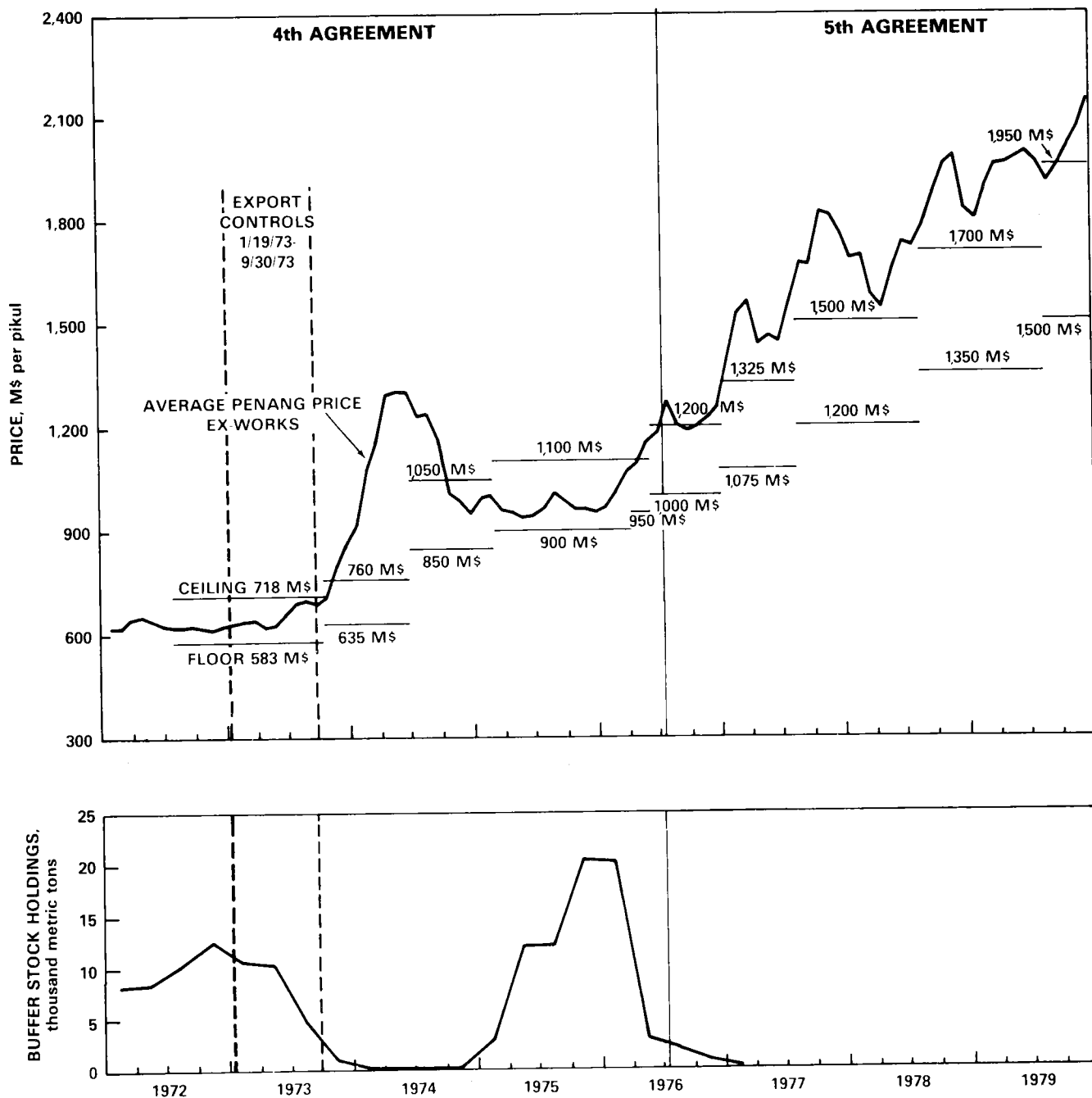
ITC price ranges, buffer stock holdings, and Penang market prices for tin from 1972 to 1979 are shown in figure 4. The period includes the change from the pound sterling to the Malaysian ringgit in mid-1972, the GSA sales of the early 1970's,<sup>11</sup> and the entire fifth agreement to date. The fifth agreement began with almost no buffer stock holdings in tin. The limited holdings were quickly exhausted in early 1977 trying to defend the ceiling, leaving the entire stock in cash since then. Export controls were imposed for three quarters of 1973, part of the time when the buffer stock manager was selling tin. Price ranges for the Agreement have consistently lagged behind the price trend since 1976, effectively denying the buffer stock any opportunity to replenish its tin and so help moderate future price increases. Market prices during the fifth agreement have been below the ceiling on three occasions, and

as of the end of 1980 had on no occasion been below the upper sector of the price range.

During the four earlier agreements (see fig. 5), prices were above the ceiling on four separate occasions, for a total of 49 months, and were below the floor for 1 month, at the time of the massive Soviet exports in 1958. Price ranges have been raised at least twice in every agreement but the first, and the ranges have increased, approximately tripling along with a tripling in price, since 1973. Including the control period of 1973, export controls were in place on three occasions for a total of 57 months.

The first of these occasions is credited with successfully defending the floor price in the face of excess supply and declining demand. However, for a large proportion of the time, the buffer stock was selling tin, in effect replacing some production. This placed the ITC in the position of reducing production while depleting its ability to moderate future price increases. Shortly after the control period, Soviet tin exports shrank and, as demand picked up through the early

<sup>11</sup> Compare buffer stock sales of approximately 20,000 metric tons from mid-1973 to mid-1974 with GSA sales (table 5) of almost 40,000 long tons (40,642 metric tons) during the same period.



**FIGURE 4.—Average Penang monthly price of tin, and ITC price ranges, export control periods, and buffer stock holdings, 1972-79. Data for this figure are in tables A-3-A-6.**

1960's, prices increased, culminating in very large increases in 1963-65, with prices above the ceiling from November 1963 until July 1966, when the ceiling was raised with the third agreement. Importantly, the United States, after discussions with the ITC, sold large quantities of tin, which brought prices down from their peaks of 1964-65.<sup>12</sup> In October 1966, the United States

<sup>12</sup> GSA sales from 1962 to 1968 were approximately 93,000 long tons, or 94,664 metric tons, and net buffer stock transactions amounted to purchases of 11,471 metric tons.

agreed in principle with the ITC to moderate its sales if they appeared to be in conflict with buffer stock operations of the ITC (7). This effectively marked U.S. agreement with the price moderating activities of the Council. After the stockpile disposal program ended, the United States sold no significant quantities of tin at the same time that the buffer stock was buying tin.

The second period of export control, from September 1968 through December 1969, occurred when slightly depressed prices had remained in the lower sector of

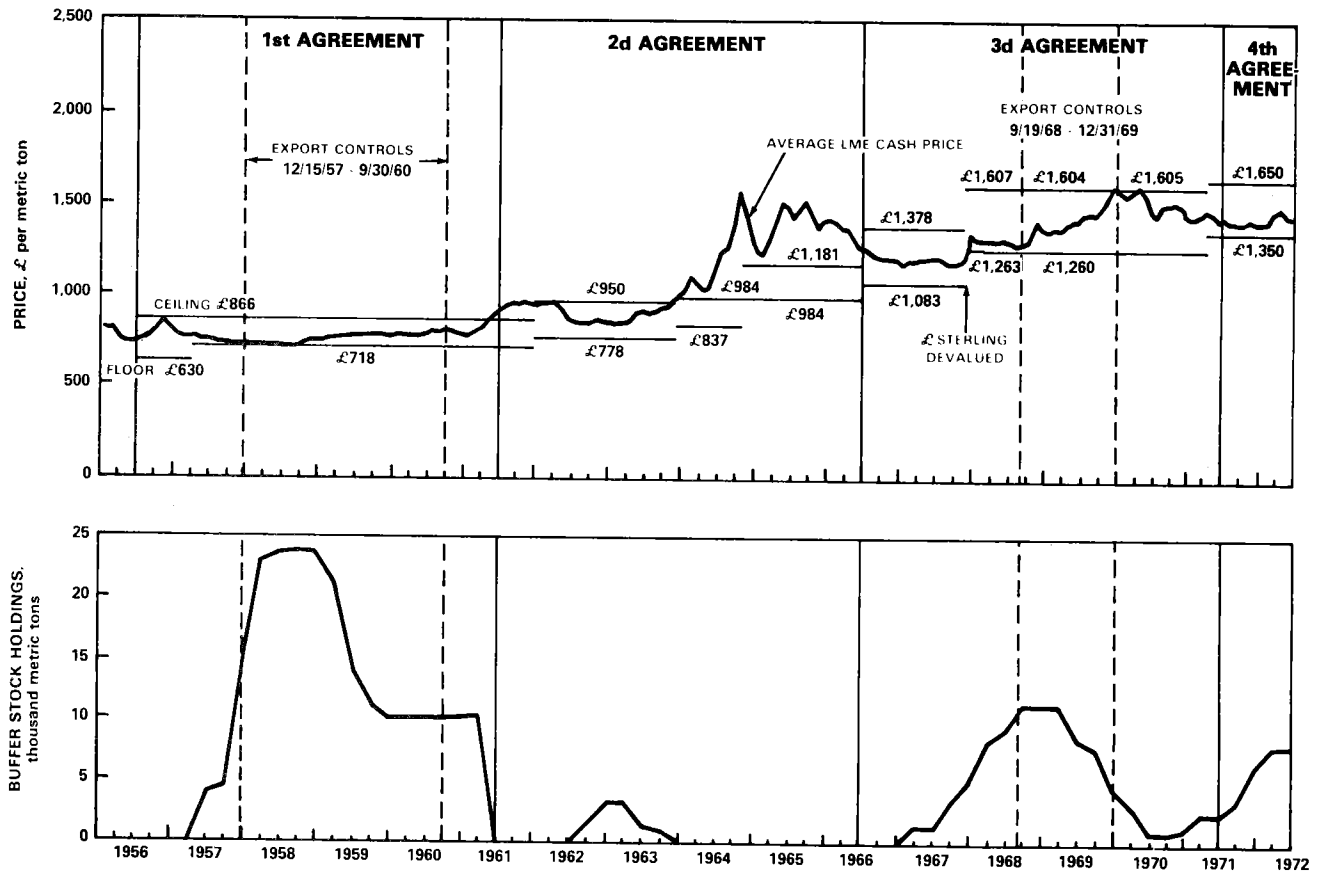


FIGURE 5.—Average LME cash price of tin, and ITC price ranges, export control periods, and buffer stock holdings, 1956-72. Data for this figure are in tables A-3—A-6.

the price range for a number of months. Although the floor was not actually threatened and the buffer stock had cash equivalent to approximately 5,000 long tons of tin, controls were imposed (7). Shortly afterwards, consumption revived and prices increased, almost exceeding the ceiling before the controls were lifted.

The Council then adopted the policy of encouraging producers to increase their production. This period also saw buffer stock sales while export controls were in effect, for the purpose of preventing too large an increase in price. Fox (7) reports that "the episode reflected little credit on the stabilizing policy of the Council. During the 15 months of control the London tin price (monthly average basis) rose by £316 per ton or by about one-quarter, a rise higher almost than any movement shown since the Council came into existence, except in 1964-65 when the Council was outside the field of influencing prices."

Under circumstances similar to those before the second control period, controls were imposed in January

1973 when prices entered the lower sector of the price range. They remained in effect until September 1973, when prices were about to break the ceiling.<sup>13</sup> Buffer stock sales, which had continued throughout the control period, resulted in the buffer stock being almost sold out by the time controls were lifted and subsequently, when prices rose dramatically through the middle of 1974, GSA was again the only exogenous supplier of tin to the market. Prices declined after the cessation of the GSA sales, but this may have been due more to the recession of 1974-75. During the period covered by the fifth agreement (1976-81), there have been no export control periods or purchases or sales of any magnitude by either the buffer stock or GSA.

<sup>13</sup> It should be noted that the export quotas under the controls of 1968-69 and 1973 were fairly lenient in comparison with controls of 1957-59 (see table A-3). The first intended a reduction of approximately 4 percent, and the second was intended only to freeze export levels. Also, evasion of the quotas existed to some extent (7). Black-market dealings in tin also presented, as they still do, significant additions to supply from Southeast Asia.

## STATUS OF THE AGREEMENT

The United States experience as a member of the fifth agreement will serve as prologue to its experience in the sixth. The United States has participated in the U.N. tin conferences since the first one in 1950 and sent a delegation to the conference negotiating the fifth agreement.<sup>14</sup> The delegation's objective was to negotiate an agreement which the United States could join if a decision to join was made (5). The other members of the agreement greatly desired to see the United States become a member in order to bring the largest consumer of tin under the agreement's auspices. Also, the issue of stockpile disposals, which were of great concern to the ITC, would then be under the scrutiny of the ITC to a greater extent (12). To this end, Article 43 of the agreement obligates a member to consult the ITC on its plans for stockpile disposals and requires that such disposals "shall be made with due regard to the protection of tin producers, processors and consumers against avoidable disruption of their usual markets" (10), and with due regard to its effects on the tin economies of the producing nations. The United States had already agreed in principle in 1966 to do just this.

The desire for the United States to join probably reduced the producers' effectiveness in insisting on mandatory consumer contributions to the buffer stock. This issue was opposed by the United States on the grounds that without such a provision the agreement could be considered a treaty and thus subject only to ratification by the Senate (5). A donation would require approval of the entire Congress. The consumer viewpoint was adopted, and such contributions were made voluntary. On September 1, 1975, Secretary of State Henry Kissinger announced (5) that the United States intended to sign the agreement and that, "We welcome its emphasis on buffer stocks, its avoidance of direct price fixing, and its balanced voting system. We will retain our right to sell from the strategic stockpile, and we recognize the right of others to maintain a similar program." (6) The decision was a shift in U.S. policy regarding minerals and, to an extent, regarding commodities in general. During the 1950's the United States held the view that noninterference in markets resulted in the most efficient allocation of resources and thus was skeptical of commodity agreements. While it recognized that certain commodity markets did not operate efficiently, until the Fifth International Tin Agreement they were said to be only in the agricultural commodity sector. During the early 1960's and the Kennedy round of trade negotiations, "U.S. policy increasingly viewed commodity agreements as a potential means of transferring income from industrialized to developing countries, thus supplementing our foreign aid and gaining some political advantage" (5). It was at this time that the United States joined agricultural commodity agreements for wheat, coffee, and sugar. In the later 1960's and early 1970's, policy swung back to its traditional free market stance and was again skeptical of commodity agreements. The view was that commodity

agreements operated "to stabilize prices above the long-run equilibrium of supply and demand" (5). And a distrust of commodity agreements' ability to accommodate conflicting views grew from experience with previous agreements.

The 1970's brought increased volatility in commodity prices, in part generated by the success of OPEC in imposing cartel prices on oil. Increasing energy costs affected the mineral-exporting LDC's to a much greater extent than they did the developed nations, exacerbating their export earnings problems. These inflationary pressures brought a degree of solidarity to the LDC's and demands for a new International Economic Order intended to transfer wealth from the developed to the developing nations. Concurrently, U.S. policy was being reviewed in the wake of raw-materials shortages and the commodity price boom of 1972-74. It was seen as possible that extreme price volatility and commodity shortages would become the new order of affairs. Concern for U.S. dependence on energy and raw material supplies led to the Trade Act of 1974, "which permits U.S. negotiators to seek agreements assuring that it and other countries enjoy continued access to supplies of strategic resources at prices fair to both producers and consumers." Combined with the necessity for developed nations to compromise on other commodity issues in order to achieve cooperation among oil-consuming nations, "the stage was set for a State Department initiative to reevaluate U.S. commodity policy" (5).

Prior to the U.S. decision to join the tin agreement, debate was carried on among the concerned executive departments by the Economic Policy Board/National Security Council Interagency Task Force on Commodity Policy. Participating agencies were the Departments of State, Treasury, Commerce, and Interior, the GSA, the Council of International Economic Policy, and the Office of Management and Budget. The task force voted against recommending that the United States join the agreement. The issue was basically divided between the policies of free trade and noninterference in the mineral market, the views held by Treasury and Interior, and the State Department view that political advantages were to "be gained by accommodating the desires of LDC's in establishing commodity agreements to stabilize prices." Treasury also thought that to join the Agreement would not produce any benefit and would prove costly by a reduction in U.S. flexibility in disposing of stockpiled tin to moderate prices. Finally, "this policy decision went all the way to the President, and at that time foreign policy criteria were paramount" (2), so the United States decided to join. The Senate ratified the agreement on September 16, 1976, by a vote of 71 to 17, indicating that the agreement was relatively uncontroversial at the time.

During the fifth agreement the United States has been the leading consumer opponent of increases in price ranges. Opposition is based in part on the view that high taxes in producing countries have restricted production and caused shortages and higher prices and that these high prices do not represent a long-term trend. Too, the view is held that the high prices and price ranges encourage substitution that could reduce

<sup>14</sup> Conferences were in 1950, 1953, 1960, 1965, 1970, 1975, and 1980-81. The United States participated actively in all of them except the one in 1960, which it attended only as an observer.

consumption and production in the future. Also, the United States has opposed the producers' view that taxes should be included in the cost of production and that cost of production should be the exclusive base for determining price ranges. The United States has held that other factors must be open for consideration with regards to price range adjustment.

Since the first Council session under the Fifth ITA, in July 1976, the United States has opposed, with varying amounts of support from other consuming nations and with varying degrees of success, every proposed increase in the price range. The first successful price increase proposal, in December 1976, was a compromise between the proposed 10-percent increase in the floor and 14-percent increase in the ceiling and a smaller increase, 5 percent for the floor and 8 percent for the ceiling, which the United States would go along with. The compromise increase, 7.5 percent in the floor and 12 percent in the ceiling, was passed with only the United States voting against. In early 1977, the ITC established the Economic and Price Review Panel (EPRP), a group of four producers and four consumers that conducts semiannual studies of tin industry conditions and reports to the Council the "appropriateness" of the current price range. The panel was established in response to the controversy in the price range discussions and because of Bolivia's threat not to ratify the Fifth ITA. After its first meeting the panel, which included the U.S. representative, recommended to the Council that the price range was not appropriate and should be raised. However, the size of the increase was intensely debated, the United States favoring a minimal increase and the producers and several consumers favoring and passing increases of 12 and 13 percent, respectively, in the floor and ceiling. The United States abstained from the voting only in order to avoid voting against a U.S. inspired resolution calling on producers to take domestic action to increase production that had been added to the price range increase proposal.

At the next meeting, in January 1978, the United States, with the Federal Republic of Germany, Japan, Canada, and Hungary, voted down a request to raise the floor M\$200 and the ceiling M\$100. A similar proposal at the April meeting was voted down by the United States, the Federal Republic of Germany, the United Kingdom, Japan, and Canada. In July 1978, after the EPRP had been unable to reach a consensus, the producers negotiated with the consumers that were normally aligned with the U.S. position. They came to a "gentlemen's agreement" to raise the floor price from M\$1,200 to M\$1,350 and the ceiling price from M\$1,500 to M\$1,700 in exchange for a producer commitment not to request any further price range in-

creases for 1 year. The producers' original request was for an increase from M\$1,200 to M\$1,500 for the floor and from M\$1,500 to M\$1,900 for the ceiling. The United States had been willing to accept increases to M\$1,250 for the floor and M\$1,700 for the ceiling, arguing that there was no economic justification for an increase over M\$1,250 for the floor. The increases were approved by the Council without a vote. Bolivia opposed the "gentlemen's agreement" and continued to request that the price range be adjusted further upward.

The July 1979 meeting of the ITC was the first upon expiration of the "gentlemen's agreement" and again, after some disharmony, a compromise increase in the price range was approved. The United States, the Federal Republic of Germany, and the United Kingdom voted against it, as did Bolivia, which argued that the increase was inadequate. The increase for the floor was from M\$1,350 to M\$1,500 and for the ceiling was from M\$1,700 to M\$1,950. Attempts to arrive at another "gentlemen's agreement" were unsuccessful, although the major consumers agreed amongst themselves not to discuss the price range issue for another year. Producer attempts to increase the range at the January 1980 ITC meeting were unsuccessful. Increases to M\$1,950 and M\$2,400 for the floor and ceiling, respectively, were voted down by consumers. However, in April 1980 producers and consumers agreed to an increase of 10 percent in the price ranges, from M\$1,500 to M\$1,650 for the floor and from M\$1,950 to M\$2,145 for the ceiling. The members also agreed informally not to change the ranges for 1 year.

During the summer and fall of 1979, the proposed disposal of tin from the U.S. strategic stockpile became a major issue in the ITC. The U.S. position was that the sale of tin would have no detrimental effect on the market in that the market had already discounted the effect of the sales and that a large part of the tin would go to replenish inventories, which had declined substantially. The producing countries, especially Bolivia, believed the sales would result in a long-term decline in tin prices and disinvestment within the tin mining industry. GSA planned to sell by auction some 500 metric tons of tin during each 2-week period, up to a maximum total of 10,000 metric tons per year. This would allow a moderation of sales if the market appeared to be affected. Bolivia charged that the United States was involved in economic aggression and opposed any sales at all. It had been reported that some of the producers actually welcomed the sales, since the GSA would eventually run out of tin and the possibility of sales would no longer hang over the market. GSA auctions began in July 1980 and through the end of 1980 only a small amount of tin had been sold.

## THE SIXTH INTERNATIONAL TIN AGREEMENT

Negotiations for the Sixth International Tin Agreement took place in Geneva, Switzerland, from April 14 to May 14, 1980. Problems arose dividing the consumers and producers, leaving them unable to agree to a sixth agreement. Further talks in December 1980 also failed, and the fifth agreement was extended for 1 year beyond its normal June 1981 closing date.

The major issues of dispute were the existence of export controls and the size of the buffer stock. U.S. proposals on both of these issues differed sharply with producers' desires. The United States, in continuing its longstanding opposition to export controls, called for their elimination from a sixth agreement. The United States believes that the free market should operate if prices fall below the floor and the buffer stock has bought up to the limit, contending that export controls exacerbate long run price volatility, reduce investment in the tin industry and hinder defense of the price ceiling. Also they tend to hurt efficient or new producers and freeze existing production patterns. Since the imposition of export controls has been the only effective way to defend the floor price during previous agreements, producers strongly support them and would not agree to their removal. The United States believes that a properly sized buffer stock would be sufficient to defend the floor and to this end proposed a stock size of 70,000 metric tons and recommended mandatory contributions from both consumers and producers. The 70,000-ton stock size was based upon an econometric model and would, in the U.S. view, be an effective stock size. Producers strongly opposed the proposal and instead argued for a stock size of 30,000 metric tons, a reduction from the fifth agreement's recommended stock size. After further negotiations the United States said that it would agree to export controls as a last resort in return for a larger buffer stock. Negotiations in March 1981 were scheduled to discuss the issue.

Several other issues were not negotiated because of the deadlock on export controls and the buffer stock and will be matters of contention before a sixth agreement can be settled. The producing nations proposed that the matter of assigning votes in the Council be changed. Currently, the practice of giving each of the 23 consuming nations at least five votes results in the remaining 885 votes being distributed by consumption percentages. The producers' proposal would give each member at least 15 votes, resulting in 650 votes being left to be distributed by percentage. Using the current percentages the United States would get a total of 201 votes, Japan would get 133 votes, and the Federal Republic of Germany would get 69 votes. The three-nation total would be 403 votes, compared to the current 500 vote total. At the same time, since there are only seven producers the 15-vote proposal would change their relative voting power to a much lesser extent. The United States made a counterproposal that would increase the voting power of both large consumers and producers, by reducing the minimum num-

ber of votes allowed each country to one. Since the consumers would have approximately three times the votes freed to be allocated by percentages, the United States would gain 22 votes, while the largest producer, Malaysia, would gain only 5 votes.

Producers are arguing that the buffer stock ranges, as they are now, are inadequate. They are in favor of a new system based on a weighted average of production costs and a market trend. Bracketing this would be ceiling and floor prices set 15 percent above and below it. They argue that such a system would be continuous process, eliminating the need to regularly negotiate new price ranges. This would give an advantage to the producers in the ITC, in light of their limited success so far in achieving their desired price range increases. No formula for calculating the reference price has been proposed and consumers, who have in the past opposed any indexing of price ranges, will oppose such a system for the sixth agreement. In addition, the United States and other consumers have long felt that producer royalties and taxes should not be included in the cost of production when determining floor prices.<sup>15</sup> They believe that such increases in costs reduce profitability, investment, and efficiency in the industry and result in long-term reductions in production. They feel that the consuming nations should not be forced to subsidize producing nations' tax systems. The U.S. position on changing the price range structure is to establish a fixed reference price with a stabilization band about it, with the reference price to be reviewed once a year. This, it is believed, will fix the price range more closely to the long-range trend and be less affected by short-term fluctuations.

Two other proposals are being made by the producers that will be opposed by the consumers. First, it has been proposed that buffer stock donations be made in cash only. This would make it easier to defend the floor and more difficult to defend the ceiling. Secondly, ITC approval of government tin disposals has been sought. Consumers, particularly the United States, oppose this for much the same reason as the producers oppose ITC authority over their taxation policies.

These issues will be the most contentious during the renegotiation, while several differences will likely be settled more amicably. Among these settlements some of the significant ones will probably be producer commitments to pursue policies insuring increased availability of tin, ITC support for research into increasing the production and consumption of tin, that only two Council sessions be held each year, requirements for a price range review upon explicit movements in exchange rates, and the percentage of consumption represented by countries ratifying the agreement necessary to achieve definitive entry into force.

<sup>15</sup> The effective tax rate in each of the three high-tax countries is shown in table A-7. Since taxation is considered to be an internal matter, there is strong opposition to any ITC authority over it.

## SUMMARY AND DISCUSSION

The positions taken by the producing and consuming nations for the negotiation of the Sixth International Tin Agreement highlight the differing viewpoints on the advantages and disadvantages of the tin agreement and commodity agreements in general. The concept of fair and stable prices, which is the primary goal of the agreement, is being viewed from two perspectives, that of the producer and that of the consumer. The producer view, particularly that of Bolivia, is that the price should be stabilized at some point above production costs. Producer proposals that the floor price be set equal to Bolivia's production costs,<sup>16</sup> which are high, are bound to conflict with the consumers' view that prices be stabilized about the long-term market trend, as well as conflicting with economic efficiency theory (3). The dichotomy reflects the interests and philosophies of the producers and consumers (that is, in this case, the LDC's and the developed countries respectively).

The stated economic advantages of the tin agreements goals to consuming nations are basically twofold: the assurance of supply and the moderation of rising prices. The first is most important in the short term, as substitution and efficiency can alleviate shortages in the long run.

It can be argued that the agreement can actually subvert its purpose through the mechanisms of the buffer stock and export controls. The results of one model show that the operations of an inadequately sized buffer stock can cause higher overall prices than if there were no stock. Such a buffer stock could, at the price ceiling, aggravate future price increases by satisfying demand at a level higher than if the price had been allowed to rise and then, if the buffer stock is completely sold out, leaving a shortage of supply.

At the floor price the use of export controls, which if stringently applied are identical to production quotas, can cause disinvestment within the industry, which can cause future supply shortages when demand picks up. They also conflict with producers' desires to maintain employment and export earnings, but in the long run may benefit producers through future, higher prices. Thus, one argument is that such market control mechanisms serve to destabilize price (18).

The benefits of the agreement as perceived by the producers and covered at the beginning of this report, are both more numerous and of much greater importance to them. Since most of the producers are LDC's and for many of them the tin industry is a major one, such benefits are a vital matter economically and politically. For this reason, perhaps, it is not surprising that the tin-producing nations have made greater and more numerous efforts to control the market than have the consuming nations. According to one view, however, such efforts are actually attempts at accruing a semblance of monopoly profits at prices above the long term trend (3). Another view, though, is that the absence of backwards vertical integration within the

industry is evidence that monopoly prices do not, presently at least, exist (25).

Disadvantages to producers from commodity agreements may exist primarily from possible substitution and efficiencies in the use of tin at artificially induced higher prices, as well as the already mentioned possible disinvestment and lowered production and employment when export quotas are enforced. Consuming nations, particularly the United States, also believe that imposing export controls results in lowered production being spread throughout the industry. Efficient producers then do not reap the benefit of a larger share of the market, and less efficient producers stay in the market, causing average costs of production to be higher and discouraging technological advances and expansion by more efficient producers. For the LDC's the matter of inefficient production is probably secondary to the desire to maintain employment and exports.

Maintenance of a floor price without export controls is seen as producing the benefit of production stability, which is of most use to that segment of the industry employing capital-intensive methods.<sup>17</sup> One study, however, states that "buffer stocks will always be less advantageous than production cuts when the price elasticity of demand is less than  $-1.0$  at the time of disposal, even if stockholding costs are disregarded. The reasoning is that below this elasticity level at the time of disposal, production for stocks will not be economical because marginal revenue is negative, and additional sales from stocks will reduce profits, even if their production and shortage costs are zero" (17).

One further disadvantage to the operation of a buffer stock is the possibility of speculative manipulation of the market. If it becomes known that the buffer stock holds little material and if prices are near or above the ceiling, a buying surge could deplete the stock and render it unable to defend any further price increases. At the floor, knowledge that export controls can prevent further drops in price makes such speculation futile.

The success of the five International Tin Agreements is debatable. On the one hand, ITC officials state that the agreements do work and are worthwhile pursuing, while on the other hand consumer representatives claim no real economic benefits and cite possible political advantages as their primary value.<sup>18</sup>

Looking to the history of the agreement, it can be seen that the floor price has been successfully defended on all but one occasion, and then the floor was broken for a very short time and in the face of extremely unusual circumstances. Most reports credit the defense of the floor to the ITC, while one claims that the ITC was defending fairly low floors to begin with (18). This study shows that floor prices were more than 15 percent below ex-post trend prices during 14 of 19 years covered, averaging more than 18 percent be-

<sup>16</sup> If the commodity agreement fulfills its purpose, this would result in price stabilization somewhere between a floor (production cost) and a ceiling, hence, a price somewhat higher than costs to the highest cost producer.

<sup>17</sup> The small producers, mostly gravel pump operations, have relatively low fixed overhead costs and thus enter and leave the industry fairly easily (25).

<sup>18</sup> U.S. Government officials have said that membership should not be expected to confer economic benefits or secure access to tin supplies and cite political benefits such as better relations with LDC's as their primary advantages (23).

low the trend for all years. At the same time, price ceilings were less than 15 percent above the ex-post trend in all but 3 years, averaging 1.2 percent above the trend for all years. The price bands themselves, then, were such that there was little pressure upon the price floor during most of the agreement and thus little was needed to defend it. At the other end of the price band, ceilings were frequently broken, often for substantial periods of time, perhaps more than if the price ranges had been more realistically set. It is also argued that the price ranges have been rather easily adjusted upwards, following price trends (7) rather than successfully restraining price increases. The United States has long said that the price ranges have been raised too frequently and too much. However, the price ranges have been consistently below the long term trend, and the purpose of the agreement is to moderate fluctuations about the trend.

Other than successful defense of the price floors or ceilings, effectiveness of the agreements can be debated on their success in moderating price fluctuations. Fox (7) and others say that they have been successful in this respect, and cite reduced fluctuations during the period in which the five agreements have been operating as compared with previous time periods. However effectiveness must be judged against what would have happened during the same time in the absence of the agreement. A simulation of the period, with and without the ITA, concludes that the buffer stock and export controls have had a minor effect on the market, and, in fact, states that the U.S. strategic stockpile has had a far more influential role. Simulation results show that GSA activities resulted in substantial reductions in price fluctuations and a reduction of one-third in the instability of producers' income around its trend (18). As mentioned previously, another study concludes that the stockpile has behaved as a buffer stock. The common theory behind the ITA's lack of success in defending the ceiling is that the buffer stock is too small, and it may be increased in size in the next agreement.

The manner in which the buffer stock is financed can also be important to its effectiveness. Prior to the U.S. contribution of tin metal, all contributions have been in cash. Unless prices are in the lower sector of the price range when tin can be bought, a cash contribution will not affect the market. A Commerce Department paper states that contributions in either cash or metal will have an equal effect if a member sells tin to generate a cash contribution in the upper sector and buys tin to generate cash in the lower sector. While true in

the case of a metal contribution in the lower sector, such a cash contribution in the upper sector presumes the availability of tin to be sold by the contributor in addition to normal tin sales. Except in the cases of nations with a tin stockpile, this seems unlikely in time of high prices (that is, relatively high demand), particularly for consumers. While at the lower end of the range a metal contribution would restrict supply (unless it came from government stocks) and a cash contribution could be used to purchase tin, at the upper end such financing could be self-defeating. Since the only price influencing effect of the buffer stock in the upper sector is to increase supply, either a cash or a metal contribution will be effective only if additional tin is brought to the market. Also, such contributions could have an opposite effect if they increased the time it took for the tin to be sold. A partial solution to the problem of financing the stock in the upper sector is to limit sales from the stock in the sector, thus avoiding a depletion of the stock and allowing it to influence prices over a longer period of time.

Many arguments in defense of the tin agreements' effectiveness quite often cite their intentions and longevity rather than their achievements (1-2, 6) and somewhat belatedly point out the operations of the U.S. stockpile and the inadequate size of the buffer stock. The findings of one opposing study (18) seem more appropriate:

- (1) The Tin Agreement has only marginally reduced the instability of prices and producer income. Of far greater importance in this respect have been U.S. Government Stockpile transactions of tin made outside the Tin Agreement.
- (2) The ITA has endured while other agreements have failed, in part because it has lacked effective power, in the face of the United States strategic stockpile, to make critical price decisions which would otherwise have intensified producer-consumer conflict.
- (3) If the ITA had been designed from the beginning as an effective market stabilizer along the lines envisaged for other products, there is a good chance it would have fallen apart.

This study suggest that a buffer stock size adequate to defend the ceiling in the absence of the GSA (in the range of 40,000 to 70,000 metric tons during 1966-74, "would have required far greater financial commitments and considerably longer time horizons than could reasonably be expected from most governments" (18).

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## APPENDIX

TABLE A-1.—World production and consumption of tin, and surpluses and deficits, 1910–78<sup>1</sup>

Year	Production, long tons <sup>2 3</sup>	Consumption, long tons <sup>3</sup>	Surplus or deficit, long tons <sup>3 4</sup>	Surplus or deficit as a percentage of consumption	Year	Production, long tons <sup>2 3</sup>	Consumption, long tons <sup>3</sup>	Surplus or deficit, long tons <sup>3 4</sup>	Surplus or deficit as a percentage of consumption
1910	116,000	118,000	-2,000	-1.7	1945	88,000	96,500	-8,500	-8.8
1911	117,000	118,000	-1,000	-.9	1946	89,000	112,000	-23,000	-20.5
1912	125,000	125,000	0	0	1947	112,500	123,500	-11,000	-8.9
1913	134,000	130,000	4,000	3.1	1948	151,500	129,000	22,500	17.4
1914	124,000	110,000	14,000	12.7	1949	161,500	114,000	47,500	41.7
1915	128,000	127,000	1,000	.8	1950	174,000	152,000	22,000	14.5
1916	126,000	119,000	7,000	5.9	1951	168,000	140,000	28,000	20.0
1917	130,000	127,000	3,000	2.4	1952	162,000	125,000	37,000	29.6
1918	124,000	120,000	4,000	3.3	1953	174,000	126,000	48,000	38.1
1919	122,000	111,000	11,000	9.9	1954	176,600	134,200	42,400	31.6
1920	123,000	124,000	-1,000	-.8	1955	169,800	143,900	25,900	18.0
1921	116,000	80,000	36,000	45.0	1956	166,900	150,100	16,800	11.2
1922	123,000	132,000	-9,000	-6.8	1957	158,200	143,000	15,200	10.6
1923	126,000	134,000	-8,000	-6.0	1958	121,100	136,200	-15,100	-11.1
1924	142,000	138,000	4,000	2.9	1959	114,000	148,200	-34,200	-23.1
1925	146,000	150,000	-4,000	-2.7	1960	145,900	162,200	-16,300	-10.1
1926	143,000	146,000	-3,000	-2.1	1961	135,700	165,900	-30,200	-18.2
1927	159,000	150,000	9,000	6.0	1962	144,200	165,100	-20,900	-12.7
1928	178,000	169,000	9,000	5.3	1963	142,000	166,200	-24,200	-14.6
1929	196,000	184,000	12,000	6.5	1964	141,000	173,800	-32,800	-18.9
1930	179,000	163,000	16,000	9.8	1965	148,200	173,100	-24,900	-14.4
1931	144,000	141,000	3,000	2.1	1966	154,700	175,800	-21,100	-12.0
1932	100,000	105,000	-5,000	-4.8	1967	177,200	174,900	2,300	1.3
1933	88,000	133,000	-45,000	-33.8	1968	187,800	180,300	7,500	4.2
1934	120,500	123,000	-2,500	-2.0	1969	183,300	187,300	-4,000	-2.1
1935	138,000	146,000	-8,000	-5.5	1970	183,600	185,600	-2,000	-1.1
1936	181,000	156,000	25,000	16.0					
1937	206,000	189,000	17,000	9.0	1971	185,900	189,400	-3,500	-1.9
1938	165,000	150,000	15,000	10.0	1972	190,700	192,000	-1,300	-.7
1939	167,500	154,000	13,500	8.8	1973	187,300	214,200	-26,900	-12.6
1940	235,000	151,000	84,000	55.6	1974	179,800	200,300	-20,500	-10.2
1941	246,000	173,000	73,000	42.4	1975	177,300	174,700	2,600	1.5
1942	121,000	113,000	8,000	7.1	1976	182,200	195,700	-13,500	-6.9
1943	139,000	90,500	48,500	53.6	1977	179,500	184,300	-4,800	-2.6
1944	100,000	100,500	-500	-.5	1978	189,900	184,600	5,300	2.9

<sup>1</sup> Excluding China, the U.S.S.R., the German Democratic Republic, North Korea, and the Republic of Korea.

<sup>2</sup> Starting 1950, tin metal; previously, tin-in-concentrates.

<sup>3</sup> Starting 1970, metric tons.

<sup>4</sup> Minus figures indicate deficits.

Source: American Metal Market.

**TABLE A-2.—Yearly extreme and average prices of Straits Tin, prompt delivery, New York, and yearly surpluses and deficits of tin, as a percentage of consumption, 1910-79**

Year	Price, cents per pound <sup>1</sup>			Surplus or deficit as a percentage of consumption <sup>2</sup>	Year	Price, cents per pound <sup>1</sup>			Surplus or deficit as a percentage of consumption <sup>2</sup>
	High	Low	Average			High	Low	Average	
1910	38.75	31.75	34.27	-1.7	1945	52.00	52.00	52.00	-8.8
1911	48.50	37.60	42.68	-.9	1946	70.00	52.00	54.58	-20.5
1912	51.05	42.05	46.43	0	1947	94.00	70.00	77.94	-8.9
1913	51.00	36.75	44.32	3.1	1948	103.00	94.00	99.25	17.4
1914	65.00	28.50	35.70	12.7	1949	103.00	77.50	99.32	41.7
1915	57.00	32.00	38.66	.8	1950	163.50	74.125	95.56	14.5
1916	56.00	37.50	43.48	5.9	1951	184.00	103.00	128.31	20.0
1917	86.00	42.50	61.65	2.4	1952	121.50	103.00	120.44	29.6
1918	110.00	70.00	86.80	3.3	1953	121.50	78.25	95.77	38.1
1919	72.50	52.75	65.54	9.9	1954	101.00	84.25	91.81	31.6
1920	65.00	32.50	50.36	-.8	1955	110.00	85.75	94.73	18.0
1921	39.00	25.50	30.00	45.0	1956	113.75	92.875	101.26	11.2
1922	39.00	28.75	32.58	-6.8	1957	103.00	87.125	96.17	10.6
1923	51.50	37.50	42.71	-6.0	1958	99.625	86.50	95.09	11.1
1924	59.00	40.00	50.20	2.9	1959	104.875	98.00	102.01	-23.1
1925	64.50	50.00	57.90	-2.7	1960	104.75	99.25	101.40	-10.1
1926	72.50	58.50	65.30	-2.1	1961	125.75	100.125	113.27	-18.2
1927	71.00	56.125	64.37	6.0	1962	124.25	107.375	114.61	-12.7
1928	57.75	45.75	50.46	5.3	1963	133.00	108.125	116.64	-14.6
1929	50.375	38.375	45.19	6.5	1964	217.00	131.375	157.72	-18.9
1930	39.75	23.75	31.70	9.8	1965	200.875	148.50	178.17	-14.4
1931	27.50	20.60	24.46	2.1	1966	183.00	153.50	164.02	-21.0
1932	25.625	18.35	22.01	-4.8	1967	156.00	151.25	153.40	1.3
1933	55.80	21.80	39.12	-33.8	1968	167.75	141.25	148.11	4.2
1934	56.65	50.00	52.16	-2.0	1969	187.50	152.50	164.43	-2.1
1935	54.00	45.75	50.39	-5.5	1970	188.00	160.50	174.13	-1.1
1936	53.50	40.50	46.42	16.0	1971	177.50	172.00	174.36	-1.9
1937	66.625	41.00	54.24	9.0	1972	183.75	170.50	177.47	-.7
1938	46.75	35.00	42.26	10.0	1973	345.00	177.75	227.48	-12.6
1939	75.00	45.00	50.18	8.8	1974	473.25	280.00	395.75	-10.2
1940	58.00	44.75	49.82	55.6	1975	378.25	300.75	339.83	1.5
1941	55.00	50.10	52.01	42.2	1976	NA	NA	379.82	-6.9
1942	52.00	52.00	52.00	7.1	1977	NA	NA	534.60	-2.6
1943	52.00	52.00	52.00	53.6	1978	NA	NA	629.58	2.9
1944	52.00	52.00	52.00	-.5	1979	NA	NA	753.9	NA

NA Not available.

<sup>1</sup> After 1975, AMM Composite New York tin price.<sup>2</sup> Minus figures indicate deficits.

Source: American Metal Market.

**TABLE A-3.—Export control periods under the agreements**

Period of export control	Permissible export amount, long tons <sup>1</sup>	Period of export control	Permissible export amount, long tons <sup>1</sup>
<b>First agreement:</b>		<b>Third agreement:</b>	
12/15/57- 3/31/58	27,000	9/19/68-12/31/68	42,950
4/ 1/58- 6/30/58	23,000	1/ 1/69- 3/31/69	38,000
7/ 1/58- 9/30/58	23,000	4/ 1/69- 6/30/69	38,750
10/ 1/58-12/31/58	20,000	7/ 1/69- 9/30/69	39,500
1/ 1/59- 3/31/59	20,000	10/ 1/69-12/31/69	41,500
4/ 1/59- 6/30/59	23,000		
7/ 1/59- 9/30/59	25,000	<b>Fourth agreement:</b>	
10/ 1/59-12/31/59	30,000	1/19/73- 3/31/73	35,040
1/ 1/60- 3/31/60	36,000	4/ 1/73- 6/30/73	42,644
4/ 1/60- 6/30/60	37,500	7/ 1/73- 9/30/73	42,644
7/ 1/60- 9/30/60	37,500		

<sup>1</sup> Metric tons after 1969.

Source: International Tin Council.

TABLE A-4.—Price ranges in the tin agreements

Period of operation	Floor price	Sector			Ceiling price
		Lower	Middle	Upper	
£ PER LONG TON					
7/ 1/56– 3/22/57 .....	640	640– 720	720– 800	800– 880	880
3/22/57– 1/12/62 .....	730	730– 780	780– 830	830– 880	880
1/12/62–12/ 4/63 .....	790	790– 850	850– 910	910– 965	965
12/ 4/63–11/12/64 .....	850	850– 900	900– 950	950–1,000	1,000
11/12/64– 7/ 6/66 .....	1,000	1,000–1,050	1,050–1,150	1,150–1,200	1,200
7/ 6/66–11/22/67 .....	1,100	1,100–1,200	1,200–1,300	1,300–1,400	1,400
11/22/67– 1/16/68 .....	1,283	1,283–1,400	1,400–1,516	1,516–1,633	1,633
1/16/68– 1/ 2/70 .....	1,280	1,280–1,400	1,400–1,515	1,515–1,630	1,630
£ PER METRIC TON					
1/ 2/70–10/21/70 .....	1,260	1,260–1,380	1,380–1,490	1,490–1,605	1,605
10/21/70– 7/ 4/72 .....	1,350	1,350–1,460	1,460–1,540	1,540–1,650	1,650
M\$ PER PICUL <sup>1</sup>					
7/ 4/72– 9/21/73 .....	583	583– 633	633– 668	668– 718	718
9/21/73– 5/30/74 .....	635	635– 675	675– 720	720– 760	760
5/30/75– 1/31/75 .....	850	850– 940	940–1,010	1,010–1,050	1,050
1/31/75– 3/12/76 .....	900	900– 980	980–1,040	1,040–1,100	1,100
3/12/76– 5/ 7/76 .....	950	950–1,000	1,000–1,050	1,050–1,100	1,100
5/ 7/76–12/ 9/76 .....	1,000	1,000–1,065	1,065–1,135	1,135–1,200	1,200
12/ 9/76– 7/15/77 .....	1,075	1,075–1,150	1,150–1,250	1,250–1,325	1,325
7/15/77– 7/14/78 .....	1,200	1,200–1,300	1,300–1,400	1,400–1,500	1,500
7/14/78– 7/20/79 .....	1,350	1,350–1,450	1,450–1,600	1,600–1,700	1,700
7/20/79– 3/13/80 .....	1,500	1,500–1,650	1,650–1,800	1,800–1,950	1,950
3/13/80 <sup>2</sup> .....	1,650	1,650–1,815	1,815–1,980	1,980–2,145	2,145

<sup>1</sup> A picul is 133-1/3 pounds.

<sup>2</sup> Source: Metals Week, Mar. 17, 1980. Price range had not been changed prior to publication of this paper.

NOTE.—Beginning in January 1981, ITC price ranges are to be expressed in Malaysian dollars per kilogram (M\$/kilo).  
Source: International Tin Council.

TABLE A-5.—Buffer stock operations during the agreements, metric tons (18)

Year and quarter	Purchases <sup>1</sup>	Sales <sup>2</sup>	Holdings <sup>3</sup>	Year and quarter	Purchases <sup>1</sup>	Sales <sup>2</sup>	Holdings <sup>3</sup>
First agreement:				Third agreement—Con.			
1957, II .....	3,978	0	3,978	1969, III .....	0	818	7,768
1957, III .....	406	0	4,384	1969, IV .....	0	3,104	4,664
1957, IV .....	11,162	0	15,546	1970, I .....	0	732	3,932
1958, I .....	7,254	0	22,800	1970, II .....	0	2,962	970
1958, II .....	874	0	23,674	1970, IV .....	262	0	1,232
1958, III .....	51	0	23,725	1971, I .....	1,460	0	2,692
1958, IV .....	0	26	23,699	Fourth agreement:			
1959, I .....	0	2,342	21,357	1971, III .....	785	0	3,477
1959, II .....	0	7,143	14,214	1971, IV .....	3,160	0	6,637
1959, III .....	0	2,885	11,329	1972, I .....	1,462	0	8,099
1959, IV .....	0	1,118	10,211	1972, II .....	20	0	8,119
1960, I .....	0	20	10,191	1972, III .....	2,012	0	10,131
1961, I .....	51	0	10,242	1972, IV .....	2,348	0	12,479
1961, II .....	0	10,242	0	1973, I .....	0	2,004	10,475
Second agreement:				1973, II .....	0	406	10,069
1962, III .....	1,834	0	1,834	1973, III .....	0	5,329	4,740
1962, IV .....	1,488	0	3,322	1973, IV .....	0	3,739	1,001
1963, I .....	5	0	3,327	1974, I .....	0	859	142
1963, II .....	0	1,971	1,356	1974, III .....	0	20	122
1963, III .....	0	193	1,163	1974, IV .....	20	0	142
1963, IV .....	0	1,163	0	1975, I .....	2,751	0	2,893
Third agreement:				1975, II .....	8,937	0	11,830
1966, IV .....	36	0	36	1975, III .....	112	0	11,942
1967, I .....	1,498	0	1,534	1975, IV .....	8,129	0	20,071
1967, III .....	1,961	0	3,495	1976, I .....	0	440	19,631
1967, IV .....	1,336	0	4,831	1976, II .....	0	16,809	2,822
1968, I .....	3,526	0	8,357	Fifth agreement:			
1968, II .....	991	0	9,348	1976, III .....	0	924	1,898
1968, III .....	2,123	0	11,471	1976, IV .....	0	1,092	806
1969, II .....	0	2,885	8,586	1977, I .....	0	806	40

<sup>1</sup> Net purchases.

<sup>2</sup> Net sales.

<sup>3</sup> At the end of period stated.

<sup>4</sup> The stock was exhausted Jan. 13, 1977.

Source: International Tin Council.

**TABLE A-6.—Tin prices,<sup>1</sup> 1956–79 (Average LME, 1956–June 1972; average Penang, July 1972–79)**

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1956	814.2	805.5	805.5	764.3	748.2	742.2	749.9	769.4	788.9	805.2	852.3	806.1
1957	789.2	770.8	770.7	774.2	765.4	762.5	753.2	740.0	739.7	731.6	730.2	730.6
1958	730.7	731.5	731.3	730.9	730.8	730.3	731.2	730.4	718.1	740.8	757.6	756.4
1959	758.7	772.5	779.5	782.3	784.2	788.4	792.3	792.9	792.7	794.1	795.4	789.2
1960	791.4	792.4	787.5	790.6	785.1	793.2	812.5	801.6	804.9	804.4	800.6	795.5
1961	783.6	792.8	814.6	837.3	862.2	893.9	913.7	945.4	952.9	945.3	964.3	949.3
1962	946.6	951.5	962.0	949.3	919.5	876.0	862.9	851.8	851.3	855.7	873.5	859.4
1963	851.8	852.1	856.1	880.7	905.3	907.5	901.2	904.6	934.0	939.8	974.9	1,010.4
1964	1,041.4	1,109.1	1,073.0	1,043.4	1,054.4	1,183.1	1,251.5	1,271.8	1,425.6	1,584.1	1,488.3	1,317.1
1965	1,254.6	1,230.6	1,301.0	1,431.0	1,529.7	1,499.1	1,439.4	1,484.5	1,527.1	1,455.4	1,386.4	1,404.1
1966	1,424.7	1,406.9	1,369.0	1,365.4	1,338.4	1,277.8	1,275.5	1,244.0	1,225.8	1,219.8	1,204.4	1,210.0
1967	1,198.5	1,201.1	1,203.8	1,216.2	1,218.7	1,221.9	1,220.2	1,194.5	1,185.4	1,190.5	1,214.9	1,351.4
1968	1,323.1	1,316.7	1,317.5	1,314.9	1,305.8	1,306.0	1,301.7	1,296.8	1,300.0	1,316.9	1,405.4	1,379.5
1969	1,366.7	1,373.7	1,372.9	1,398.8	1,420.9	1,430.7	1,456.1	1,469.3	1,468.7	1,496.5	1,542.2	1,616.3
1970	1,601.3	1,569.6	1,581.4	1,604.2	1,557.8	1,476.8	1,458.0	1,508.3	1,518.9	1,528.8	1,506.9	1,457.2
1971	1,444.2	1,442.8	1,469.3	1,484.5	1,466.5	1,436.9	1,439.9	1,419.9	1,416.4	1,402.0	1,431.1	1,417.1
1972	1,411.9	1,413.4	1,475.2	1,497.0	1,466.6	1,456.6	622.40	623.92	627.48	622.02	609.82	619.79
1973	629.46	634.79	636.99	623.53	628.98	652.65	690.52	694.76	688.35	704.99	788.59	853.11
1974	910.79	1,072.10	1,165.15	1,290.62	1,302.80	1,300.57	1,129.42	1,238.16	1,162.02	1,002.62	983.20	947.86
1975	989.89	996.77	954.35	947.92	932.69	933.66	956.04	1,001.13	987.38	957.03	956.29	953.50
1976	960.24	1,002.96	1,064.80	1,084.64	1,144.70	1,172.41	1,263.60	1,195.01	1,178.24	1,195.72	1,221.25	1,250.80
1977	1,394.64	1,525.47	1,557.27	1,434.73	1,458.73	1,440.37	1,543.32	1,665.86	1,659.78	1,815.92	1,804.71	1,751.86
1978	1,680.48	1,686.67	1,573.75	1,534.42	1,644.32	1,718.85	1,709.73	1,770.38	1,866.17	1,950.92	1,975.38	1,820.00
1979	1,792.21	1,886.52	1,950.92	1,951.52	1,967.36	1,984.48	1,951.50	1,894.13	1,946.40	2,005.48	2,056.72	2,126.00

<sup>1</sup> Pounds per long ton, January 1956–December 1969; pounds per metric ton, January 1970–June 1972; and Malaysian dollars per picul July 1972 to present.

Source: International Tin Council.

**TABLE A-7.—Tin prices and taxes in Malaysia, Thailand, and Bolivia, 1957–79**

Year	Malaysia			Thailand			Bolivia		
	Price, M\$ per picul	Amount of tax M\$	Tax as % of price	Price, Baht per picul	Amount of tax, Baht	Tax as % of price	Price, US\$ per pound (N.Y.)	Amount of tax, US\$	Tax as % of price
1957	373	56	15	2,479	639	26	0.96	( <sup>1</sup> )	( <sup>1</sup> )
1958	369	56	15	2,487	641	26	.95	( <sup>1</sup> )	( <sup>1</sup> )
1959	397	60	15	2,696	694	26	1.02	( <sup>1</sup> )	( <sup>1</sup> )
1960	394	60	15	2,715	696	26	1.01	( <sup>1</sup> )	( <sup>1</sup> )
1961	447	71	16	3,028	777	26	1.13	0.18	16
1962	448	71	16	3,025	776	26	1.14	.19	16
1963	455	73	16	3,095	793	26	1.16	.19	16
1964	619	99	16	4,196	1,068	25	1.57	.32	20
1965	703	112	16	4,767	1,211	25	1.78	.21	12
1966	645	103	16	4,367	842	19	1.64	.16	10
1967	600	97	16	4,059	765	19	1.53	.12	8
1968	566	90	16	3,834	708	18	1.48	.11	7
1969	626	100	16	4,248	812	19	1.64	.16	10
1970	665	106	16	4,479	870	19	1.74	.20	11
1971	632	101	16	4,334	833	19	1.67	.17	10
1972	627	100	16	4,642	911	20	1.77	.21	12
1973	686	109	16	5,800	1,200	21	2.27	.42	19
1974	1,137	263	23	9,653	2,163	22	3.96	1.21	31
1975	964	185	19	8,235	1,801	22	3.40	.96	28
1976	1,147	267	23	9,205	2,051	22	3.74	1.00	27
1977	1,588	451	28	13,159	3,280	25	5.33	1.72	32
1978	1,743	471	27	15,305	4,472	29	5.89	2.00	34
1979	1,959	535	27	18,281	5,484	30	7.54	2.00	36

<sup>1</sup> Data not given in source.

<sup>2</sup> For years in which more than one tax rate was applicable, tax rate in effect for the longest period was used for whole year.

<sup>3</sup> Amount of tax calculated by applying tax rate to yearly average prices.

<sup>4</sup> All numbers rounded.

Source: U.S. Dept. of Commerce.