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AN ECONOMIC ANALYSIS OF GASOLINE PRICE CONTROLS

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Since August 15, 1971, the United States petroleum products industry has functioned under a complex and changing system of price regulations. Prior to March 6, 1973, these controls were part of a general system of price regulations applied to most sectors of the U.S. economy. Since 1973, a specific program of petroleum industry controls has evolved. The key to this system is a multi-tiered structure of controls on crude oil prices.¹ Regulations on subsequent stages of production, from refining to retail distribution, tie ceiling price increases to cost factors. The apparent intent is to force the industry to pass along to final consumers any savings realized from reduced crude oil prices. The question of whether or not these controls have exerted any real influence on refined product prices has been debated at length. With regard to motor gasoline, the only major refinery product that remains controlled, the debate continues.²

Effective November 1973, petroleum refining firms faced price ceilings set at the price charged on May 15, 1973 plus specified cost increases incurred since that date.³ Increases in the average acquisition cost of crude oil and other petroleum product inputs were allowed to pass directly through to ceiling prices. These "product costs" were allocated across various refinery outputs on a simple volumetric basis. Price limit formulae made limited allowances for increases in such "nonproduct" cost items as labor and pollution control, but they excluded expenses for depreciation, marketing, and most taxes. Moreover, nonproduct costs could pass through to ceiling

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1. Regarding crude oil price controls, see Erickson, et al., *The Political Economy of Crude Oil Price Controls*, Nat. Res. J. (this issue).

2. As of this writing, the Department of Energy is considering exemption of motor gasoline from price controls.

3. For a more complete description of refined product price controls, see Johnson, *The Impact of Price Controls on the Oil Industry: How to Worsen an Energy Crisis*, in *ENERGY: THE POLICY ISSUES*, (G. D. Eppen, ed., 1976) and *Federal Energy Administration Regulations*, (P. W. MacAvoy, ed., 1977).

prices only if a firm's resulting profit margin did not rise above the level experienced in a specified prior period. Refiners who chose not to apply all available cost increases to product prices were permitted to accumulate "banked costs" that could be used to justify future price increases. Although banked costs were accumulated for specific refined products, there were limited provisions for reallocating these costs across various refinery outputs.

Downstream from the refining activity, the structure of controls was similar. Individual resellers and retailers were, in effect, permitted to charge the price they paid for refined products plus their May 15, 1973 markup. With respect to retail gasoline sales, a rule of thumb was adopted which, by March 1974, permitted ceiling mark-ups of ten cents per gallon.

During the summer of 1976 several refined products, included residual fuel oil, middle distillates, naphthas, jet fuel, and gas oils were exempted from price controls. The only major refined product that remains subject to ceiling price is motor gasoline.⁴

HAVE REFINED PRODUCT PRICE CONTROLS BEEN EFFECTIVE?

The mere presence of legal price restrictions does not, of course, imply that actual market prices are effectively regulated. Indeed, several analysts have concluded that competition has imposed a more stringent discipline on petroleum product prices than has the regulatory apparatus.⁵ Perhaps the most persuasive argument supporting this conclusion follows from the observation that, as a group, major refining firms and large integrated petroleum companies have not exercised all of the ceiling price increases available to them. At the industry level, banked costs for gasoline, distillates, and other products were positive in every month from 1974 through February 1978, the last month for which published data are currently available.⁶ For motor gasoline, unexercised price increase allowances averaged three to six cents per gallon in 1974-75, and they increased somewhat in 1976-77. In the context of a workably competitive industry, the conclusion that price controls are superfluous follows naturally.

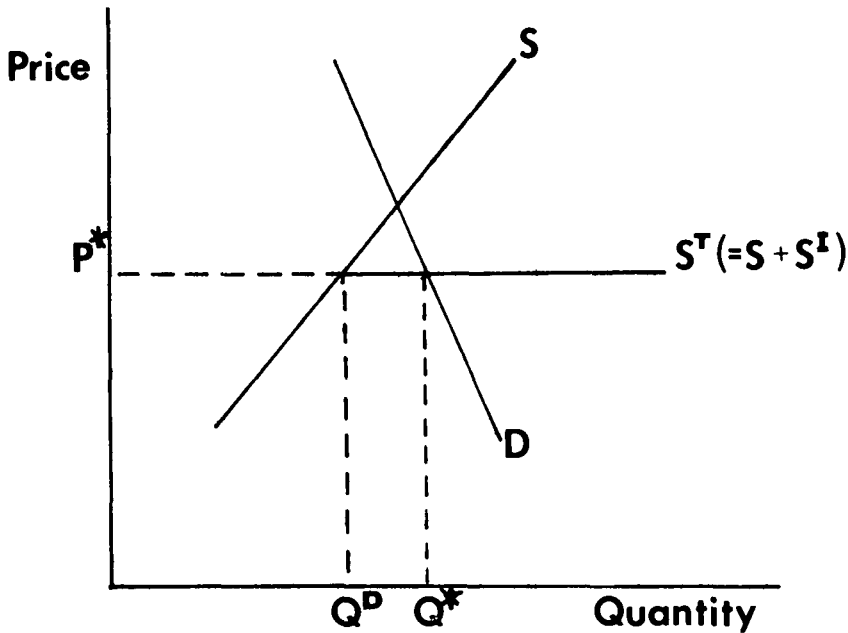
4. See, however, note 2.

5. The principal advocates of this view are C. E. PHELPS and R. T. SMITH, *PETROLEUM REGULATION: THE FALSE DILEMMA OF DECONTROL* (1976) and J. P. KALT, *FEDERAL REGULATION OF PETROLEUM PRICES: REGULATORY WEALTH REDISTRIBUTION* (mimeo, UCLA Law and Economics Workshop, 1977).

6. See Kalt, *supra* note 5, at 8, and Federal Energy Administration, *Preliminary Findings and Views Concerning the Exemption of Motor Gasoline* (August 1977), and Dep't. of Energy, *Monthly Energy Review*, June 1978, 62.

The presence of refined product imports to the U.S. throughout the price control period has also been cited as evidence of the ineffectiveness of controls. If the U.S. is a price taker in the international market for refined products, then domestic prices (allowing for transportation costs, trade barriers, and so forth) are effectively set by the forces of world supply and demand. Figure 1 illustrates this point. Domestic demand and supply schedules are shown as D and S respectively. An elastic supply schedule for refined products (S^I), expressed in terms of delivered prices, has been horizontally added to domestic supply to give the total supply schedule S^T . In the absence of price controls, equilibrium occurs at the price-quantity combination P^* , Q^* ; domestic production is Q^D and imports equal $Q^* - Q^D$. So long as imports are observed, the equilibrium domestic price is determined by the landed cost of foreign imports. A ceiling price established above P^* will have no effect on the market. To be constraining, the price limit must be set below the delivered foreign

FIGURE 1
U.S. REFINED PRODUCTS MARKET



price in which case imports would be eliminated. To summarize, effective price controls and foreign imports cannot coexist.⁷

Historically, residual fuel oil has been the most important refined product (in terms of volume) imported into the U.S. Since relaxation of import quotas in 1973, motor gasoline imports have averaged only two to three percent of domestic consumption, and most of this has supplied cities on the Gulf and Atlantic Coasts. Small import volumes do not, however, contradict the proposition that foreign supplies are marginal to the U.S. market. They merely indicate that autarkic equilibrium prices in foreign and domestic markets are too close to support a larger volume of trade.

The lines of reasoning outlined above implicitly characterize petroleum product price controls as a simple ceiling price system, and consider the U.S. refining industry as a collection of homogeneous firms. As implemented since November 1973, however, the price control apparatus has contained provisions which tend to produce different ceiling prices for different firms. Prior to enactment of the entitlements program in early 1975, access to price controlled "old oil" differed among refining firms. Since average crude oil acquisition cost is a primary factor used in computing allowed price increases, such differences automatically lead to differences in ceiling prices across firms. Even after the implementation of entitlements, which tended to equalize crude oil acquisition costs among firms, details of the program (e.g., the "small refiners bias," and the preferences given to users of domestic crude oil) allowed some crude oil cost differences to remain.⁸ Moreover, the base period used to compute allowed price increases was May 15, 1973. This was a time of rapidly increasing gasoline prices on world markets. Also, it roughly coincided with a switch from voluntary to mandatory price controls under Special Rule 1 of Phase III regulations, and with relaxation of U.S. quotas on imports of crude oil and refined products. In short, the base period was a time of dramatic change and possible disequilibrium in domestic petroleum markets and it may well have been characterized by temporary differences in prices listed by individual firms.

7. The force of this argument depends critically upon the elasticity of foreign supplies; see Phelps and Smith, *supra* note 5. Phelps and Smith extend this argument to conclude that the crude oil subsidy implicit in the entitlements program has merely altered trade flows without influencing domestic refined product prices.

8. A lucid discussion of the "small refiners bias" may be found in Roush, *Effects of Federal Price and Allocations Regulations on the Petroleum Industry*, Federal Trade Commission Staff Report (1976). The preference for domestic crude oil is analyzed in Cox and Wright, *The Effects of Crude Oil Price Controls, Entitlements, and Taxes on Refined Product Prices and Energy Independence*, LAND ECON. (February, 1978).

For all of these reasons, refined product price controls are better described as a system of firm specific ceiling prices.⁹ In such a context, the banked cost argument loses much of its force, since the presence of positive banks at the industry level simply indicates that *some* firms were unconstrained. In this regard, it is noteworthy that industry banked costs for gasoline and distillates were consistently positive between November 1973 and April 1974, a period when queues at gasoline stations and alleged shortages of other products were common.¹⁰ Further, as recently as early 1977 it was reported that three major refining firms had no banked costs for motor gasoline.¹¹

In a situation where at least some firms are constrained by regulation and ceiling prices vary among firms, a degree of dispersion in the prices charged by different refined product suppliers would be expected to arise. Available evidence indicates that significant price dispersion was associated with the implementation of specific petroleum industry controls. In New York and Boston, for example, differences between daily high and low wholesale spot quotations for regular gasoline averaged seven to nine cents per gallon in 1973-1975, and 1.5 to three cents per gallon in 1976-77.¹² Some of this dispersion, particularly in 1973-74, may have arisen from the unsettling consequences of OPEC cartelization and the embargo. It is significant, however, that high-low spot price differentials in Italy and Rotterdam averaged less than 1.5 cents per gallon in 1973-75. Prior to 1973, average differences between high and low quotations never exceeded .25 cents per gallon in either foreign or domestic markets.¹³

The characterization of controls as firm specific price constraints also has interesting implications for the refined products imports argument. In the presence of domestic price dispersion, foreign supplies need only be competitive with high priced domestic gasoline

9. Other sources of dispersion in individual firm's ceiling price schedules existed. See W. J. Mead and R. Deacon, PRICE CONTROLS AND INTERNATIONAL PETROLEUM PRODUCT PRICES, Department of Energy, June 1978.

10. See Phelps and Smith, *supra* note 5, at 25.

11. *Preliminary Findings and Views . . .*; *supra* note 6, at 113.

12. The gasoline price data cited are from Platt's Oilprice Handbook (New York: McGraw-Hill, various years). For more detailed evidence on this phenomenon, see Mead and Deacon, *supra* note 8, Ch. 3.

13. Clearly, such dispersion implies excess demand for the supplies of price constrained firms. However, the rationing problem is not necessarily as severe as would be the case under a simple industry wide price ceiling. If some firms are not controlled, their marginal supplies could effectively clear the market. In other words, buyers who are unable to obtain products at a low controlled price could still satisfy their demands at a higher marginal price. It should also be noted that the FEA operated a mandatory refined product allocation program throughout this period. See Roush, *supra* note 7, for further details.

produced by uncontrolled firms. The presence of imports does not refute the proposition that price ceilings are binding for some domestic producers and that the average domestic price is effectively constrained. A second and more damaging conclusion follows from regulatory provisions which allow the cost of imported crude oil and finished products to pass through to domestic ceiling prices. Under this policy, price controlled firms may well opt to import gasoline and other products even at prices that exceed levels they are allowed to charge domestic customers. Such imports offer one way for constrained firm to increase its price ceiling. Although the firm's average cost would be increased by such action, dollar-for-dollar pass-throughs for imports raise its ceiling price by the same amount; in terms of profits, such changes are a matter of indifference. The effect of this is to essentially eliminate any necessary relationship between domestic and delivered foreign prices.

THE DELIVERED PRICE OF FOREIGN GASOLINE

Actual comparisons of foreign and domestic wholesale gasoline prices can shed light on the effectiveness of gasoline price controls. Substantial equality between domestic and imported gasoline prices, though not conclusive (due to pass-throughs), would provide prima facie evidence that U.S. price regulations have not been effective. On the other hand, if import prices consistently exceed prices from domestic suppliers, it would indicate that controls have been binding and that observed imports are directly attributable to cost pass-through provisions exercised by constrained firms.

Price comparisons were conducted for three foreign supply sources and three domestic consumption points; thus a total of nine comparisons were examined. The three foreign export centers are Italy, Rotterdam, and the Caribbean; during 1975-77 these three regions accounted for 66 to 74 percent of all gasoline imports into the U.S.¹⁴ During this same period, most imported gasoline entered U.S. customs districts I, II and V-VI (combined). The three domestic consumption points studied, i.e., Boston, New York, and New Orleans, are major population centers in these three respective districts.

The domestic price series employed¹⁵ are daily wholesale (ex-refinery) quotations, recorded at mid-month, for regular gasoline. Given the preceding discussion of price dispersion, comparisons

14. The only major excluded supply source is Canada, which was dropped from analysis for lack of consistent price data. See Mead and Deacon, *supra* note 8, Chapter 5.

15. Gasoline prices were taken from Platt's, *supra* note 12.

were conducted for both "average" (simple mean of high and low quotations) and "high" domestic prices.

The delivered foreign price for a particular origin-destination combination is computed as the sum of foreign FOB price, tanker transport charges (including insurance, port fees, etc.), and U.S. import tariff. Since foreign price dispersion was relatively insignificant during this period, the simple mean of high and low daily foreign quotations (at mid-month) was used. Price quotations for European gasoline are described as actual transaction prices. However, the minimum lot size for Rotterdam quotation is smaller than that appropriate for tanker shipments and, as a consequence, Rotterdam prices are slightly overstated (one to two cents per gallon). The only Caribbean prices available are postings by major petroleum firms. That posted prices may differ from true transactions prices is, of course, well known and this caveat should not be ignored when interpreting the results.¹⁶ Tanker transport charges for foreign imports are consecutive voyage rates for clean cargoes shipped aboard vessels in the 22,000 to 45,000 (Dead Weight Cargo Tons) class. The effective import tariff on crude oil and refined products varied over time and among individual importers. In all computations, the import duty applicable to those not holding duty free licenses under the old Mandatory Oil Import Program was used; this is appropriate since such licenses merely confer a rent to the holder. The most important change in import fees occurred in 1975 with the imposition of a \$1.00 per barrel supplemental tariff in February which was raised to \$2.00 per barrel in June, and discontinued in December 1975.¹⁷

Price comparisons are presented in terms of the following two hypotheses: (i) the landed foreign price of gasoline was equal to the *average* domestic price, and (ii) the landed foreign price equalled the *high* domestic price. The overall period studied, 1975-1977, was split into two subperiods, 1975-76 and 1977. This was done primarily because certain changes in price control policy (e.g., exemption of several products, an alteration in the formula for computed banked costs, and increased allowances for nonproduct costs) were instituted in the last half of 1976.

Table 1 shows domestic wholesale prices and differences from landed foreign prices. All figures are in cents per gallon and are

16. See M. A. Adelman, *THE WORLD PETROLEUM MARKET*, 38. The pattern of monthly data revealed that posted Caribbean prices followed the general trend of European prices, but that Caribbean price changes tended to follow changes in other world markets only after delay of several months.

17. See Mead and Deacon, *supra* note 8, Ch. 4 for further discussion of data sources.

TABLE 1
FOREIGN-DOMESTIC GASOLINE PRICE COMPARISONS
(all figures in cents/gallon; t statistics in parentheses)

	<i>Boston</i>		<i>New York</i>		<i>New Orleans</i>	
	<i>1975-76</i>	<i>1977</i>	<i>1975-76</i>	<i>1977</i>	<i>1975-76</i>	<i>1977</i>
1. Average Domestic Price:	35.99	38.83	34.48	38.43	33.13	37.13
Differences from Landed Foreign Prices:						
2. Rotterdam	4.47* (8.00)	.19 (.25)	5.96* (13.80)	.60 (.99)	7.78* (19.10)	2.26* (3.91)
3. Italy	2.51* (4.52)	-1.17 (1.49)	4.03* (9.02)	-.76 (1.20)	5.77* (13.73)	.91 (1.54)
4. Caribbean	2.05* (3.89)	2.94* (3.95)	3.48* (12.16)	3.24* (8.00)	4.77* (14.91)	4.43* (9.80)
5. High Domestic Price:	37.90	39.84	35.65	39.09	34.89	38.04
Differences from Landed Foreign Prices:						
6. Rotterdam	2.56* (4.59)	-.82 (1.04)	4.79* (11.10)	-.06 (.10)	6.02* (15.34)	1.27 (2.29)
7. Italy	.59 (1.09)	-2.18* (2.83)	2.86* (6.52)	-1.42 (2.30)	4.01* (9.96)	-.07 (.13)
8. Caribbean	.13 (.25)	1.92 (2.52)	2.31* (8.33)	2.57* (6.56)	3.01* (9.61)	3.45* (7.79)

Sources: see text.

* significant at 1%

means of monthly data for the periods indicated. The delivered foreign price may be obtained by *adding* the reported difference to the domestic price. Thus a positive difference indicates that the delivered foreign price exceeds the domestic price. The statistics in parentheses are appropriate for the null hypothesis that mean price differences equal zero.

For the period 1975-76, all landed foreign prices significantly exceed *average* domestic prices (see rows 1-4 in Table 1). Similarly, delivered foreign prices exceeded *high* domestic prices in 1975-76 for all comparisons and, with two exceptions, these differences are statistically significant. Estimated price differences for this period are not only generally significant, they are large in an absolute sense. For *average* domestic price comparisons, foreign supplies were priced two to eight cents per gallon above domestic gasoline. *High* price comparisons involving New York and New Orleans reveal a differential of approximately two to six cents per gallon. These results are, therefore, inconsistent with the proposition that foreign gasoline supplies effectively determined either the average or marginal U.S. wholesale price of gasoline during 1975-1976.¹⁸

18. When comparing price differences from Italy versus Rotterdam, recall the earlier comment on the basis for price quotations.

The monthly price data reveal that foreign-domestic price differentials were consistently observed during 1975-1976. The delivered price of foreign gasoline (from all three sources) exceeded the average New York price in every month of this period, and exceeded the high New York Price in all months except one. Similar monthly patterns are evident for Boston and New Orleans. Moreover, imports from Europe and the Caribbean were observed in almost all months of 1975-76. The only obvious explanation for this phenomenon is the availability of cost pass-throughs for constrained firms. Ironically, the presence of imports during this period strongly indicates the effectiveness of price controls on gasoline.

Comparing price differences in 1975-76 to those in 1977, a marked trend toward equality is evident. From the monthly data, this trend began in late 1976. In 1977, landed European (non-Caribbean) prices did not significantly exceed *high* domestic prices in any of the U.S. cities examined; thus imports from Europe during 1977 can be rationalized without appeal to the pass-through argument. Moreover, European imports were significantly more expensive than *average* domestic supplies only in New Orleans, and here the difference could easily be attributed to the rather small lot sizes upon which Rotterdam prices are quoted.¹⁹

In contrast to European differentials, the price spread between domestic and Caribbean gasoline did not decline in 1977 (and imports from the Caribbean were observed, though at substantially reduced volumes). In all likelihood, the lack of similarity in European and Caribbean price changes is due to the fact that the latter are company postings and may well be biased. Although the degree of bias is not known with any precision, the estimated price differentials appear sufficiently small to be considered inconclusive.

On balance, observed price relationships and import activity provide strong support for the proposition that gasoline price controls were effective, at least for some U.S. refiners, in 1975 and 1976. By 1977, however, foreign and domestic prices had reached virtual parity. Though the evidence is not conclusive, it is consistent with the contention that U.S. price ceilings had become ineffective by 1977.

THE SOURCES OF FOREIGN AND DOMESTIC PRICE INCREASES

Between 1970, prior to the imposition of U.S. price controls, and 1977, wholesale gasoline prices in domestic markets rose about twenty-five cents per gallon. This fact alone demonstrates consider-

19. Monthly price comparisons indicate that even this difference was eliminated by mid-1977.

able flexibility in the U.S. system of price regulation. Over the same period, however, prices in European markets increased by thirty cents per gallon. Although the analysis of gasoline import prices suggests that U.S. controls were ineffective in 1977, these differences in foreign and domestic market price increases are sufficiently large to merit further scrutiny.

Significant differences between foreign and domestic prices naturally might be attributable to influences other than U.S. price regulations. Factors such as U.S. import quotas on crude oil and refined products (prior to 1973), differences in foreign and domestic tax policies, current U.S. controls on crude oil prices, etc. would all affect the pattern of gasoline price increases in foreign and domestic markets since 1970. To address the question of whether such factors can fully account for differences in realized gasoline prices, wholesale price increases in four major U.S. cities—Boston, New York, New Orleans and Los Angeles—were compared to price changes in the Netherlands.²⁰ The methodology employed implicitly assumes that refined product price differences in the two countries can be traced to differences in marginal costs, and that marginal cost differentials can be attributed entirely to differences in factor prices and taxes. The first assumption is essentially one of competitive supply in both countries. The latter assumption is accurate if both nations have access to the same refining technology and if, at the industry level, refining takes place at constant returns to scale.²¹

Comparisons of this sort are complicated by the joint production nature of refining, since the marginal cost of a particular item depends upon the mix of final products produced. Any change in the

20. The choice of a comparison country was largely dictated by available data and by the requirement that the foreign price series be free of government controls. Retail petroleum product prices are subject to government control in the Netherlands, as is the case in virtually all industrialized nations. However, these regulations do not apply to products produced for export. Nevertheless, retail controls may affect production decisions and thus influence wholesale prices indirectly, and this fact should be recognized in the interpretation of results. For further discussion, see Mead and Deacon, *supra* note 8, Ch. 5.

21. With constant returns to scale, the marginal cost of refined products, C , can be expressed as function of factor prices. In the two factor case, where r_1 and r_2 are input prices,

$$C = f(r_1, r_2).$$

Changes or differentials in marginal cost are specified by taking a total differential

$$dC = (\partial f / \partial r_1) dr_1 + (\partial f / \partial r_2) dr_2.$$

From cost minimization, it follows that

$$dc = (x_1/q) dr_1 + (x_2/q) dr_2$$

where q is the output of refined products and x_1 and x_2 are levels of inputs used. Thus, changes in factor prices are simply weighted by input-output ratios. Adjustments for specific or *ad valorem* taxes on refined products are straightforward.

mix of outputs will alter the marginal cost of each product, even if factor prices remain constant. Refinery yields in the U.S. and the Netherlands differ markedly; between 1970 and 1977, motor gasoline accounted for 43 percent to 45 percent of U.S. refinery production as compared to 8 percent to 11 percent in the Netherlands. Although widely different, gasoline yields in the two countries were quite stable during the 1970's. For this reason it was assumed that marginal cost changes induced by output mix changes were insignificant.^{2 2}

In summary, wholesale gasoline price changes (net of cost changes) between a precontrol period (1970-71) and 1977 were compared for the two countries. The specific cost factors taken into account were crude oil prices, including tanker transport costs and import duties where applicable, and taxes levied directly on refined products. Each cost factor was expressed in cents per gallon for use in computing net price changes.

The cost of crude oil to domestic refiners was directly influenced by mandatory import quotas prior to 1973, and by crude oil price controls after mid-1971 since both policies created differences between U.S. and international crude oil prices. During 1970-71, the marginal supply of petroleum to U.S. refiners was from domestic sources, and crude oil input cost was computed as the domestic wellhead price, plus gathering and pipelining charges, plus tanker transport costs where relevant. In 1977, on the other hand, the price of domestically produced petroleum, and hence its supply, was controlled. For this period foreign petroleum was the marginal supply and the landed price of foreign crude is the relevant input cost item. Further, the entitlements feature of domestic crude oil price controls resulted in an effective subsidy to U.S. refiners who imported petroleum in 1977. Throughout the 1970's, most of the crude oil refined in the Netherlands was imported from the Persian Gulf and delivered crude oil costs from this supply source were used to adjust foreign prices.^{2 3}

The foreign and domestic price series reported in Table 2 are net of excise taxes and represent the price received by the seller. The

22. Assuming constant returns to scale, the marginal cost of a given refinery output can be expressed as function of factor prices and percentage yields of various final products. If yields remain constant, the formula in note 21 can be used to compute changes in the marginal cost of a particular refined product.

23. Regarding crude oil import tariffs, the fee applicable for U.S. importers not possessing duty free licenses was used. Petroleum imports to the Netherlands were not subject to tariffs during the 1970's. All petroleum input cost estimates (for both foreign and domestic refiners) were based upon crude oil of 34° (API) gravity and 1.7% sulfur content. A detailed discussion of data sources may be found in Mead and Deacon, *supra* note 8, Ch. 4, 5.

only other tax taken into account in adjusting prices is the value-added tax (i.e., a noncumulative sales tax) levied in the Netherlands. Although the rate remained constant between 1970 and 1977, it is levied on an *ad valorem* basis so the actual levy depends upon the price of the product.

Table 2 displays the results of adjusted price comparisons. All items in this Table (except those in row 7) are expressed in U.S. cents per gallon and are means of monthly data for the periods indicated. The first three rows report changes in mean prices between the precontrol period and 1977. Changes in delivered crude oil costs (wellhead price plus transportation and tariff charges) and taxes on refined products appear in Row 4. Although the entitlements program is actually a part of the structure of price controls on crude oil rather than refined products, the effect of entitlements upon U.S. crude oil costs and refining margins is reported separately in Row 5 to highlight its influence.

From Row 6 it can be seen that increases in refining margins

TABLE 2
CHANGES IN WHOLESALE PRICES, REFINING COSTS
AND REFINING MARGINS
1970-71^a versus 1977

	<i>New York</i>	<i>Boston</i>	<i>New Orleans</i>	<i>Los Angeles</i>	<i>Rotterdam</i>
1. 1977 Wholesale Price	38.43	38.83	37.13	38.04	36.57
2. 1970-71 ^a Wholesale Price	13.48	13.12	12.65	11.63	6.46
3. Price Change (1-2)	24.95	25.71	24.48	26.41	30.11
4. Total Cost Change Excluding Entitlement	22.40	22.34	23.24	23.03	23.01
5. Entitlement Benefit	5.44	5.44	5.44	5.44	---
6. Margin Change Including Entitlement (3-4+5)	7.99 (.90)	8.81 (.90)	6.68 (.98)	8.82 (1.07)	7.10 (2.33)
7. t statistics ^b	1.50	3.09	- .59	2.73	

Note: All figures are in cents per gallon and are means of monthly data for the periods noted. U.S. wholesale prices are derived from averages of high and low daily quotations. Figures in parentheses are standard errors.

^aJanuary 1970 through July 1971.

^bt statistics are constructed under the null hypothesis that the *mean* change in a particular U.S. refining margin is equal to that in the Netherlands. The critical level for rejection at 1 percent is 2.47.

between precontrol and control periods were actually larger in three of the four U.S. cities examined than in the Netherlands. Only in New Orleans is the increase lower than that experienced in the comparison country, and here the difference is less than 0.5 cents per gallon. On average, adjusted price increases in the U.S. exceeded those in the Netherlands by slightly less than one cent per gallon.

Figures in Row 7 are *t* statistics constructed under the null hypothesis that price increases (net of cost increases) in the uncontrolled foreign market have been identical to those experienced in the U.S. The only items in this row that are statistically significant involve comparisons of Boston and Los Angeles where margin increases exceed those in the Netherlands. In a statistical sense, therefore, these results are inconsistent with the proposition that U.S. gasoline price increases (as of 1977) have been abnormally low when judged against an uncontrolled foreign situation. Thus, a measure of corroboration for the analysis of refined product import prices is obtained. Moreover, a comparison between cost adjusted prices in the U.S. and the Netherlands as of 1976 indicates that foreign price increases exceeded domestic increases by 2.0 to 2.5 cents per gallon between 1970 and 1976. This is consistent with the earlier indication from import price comparisons that U.S. controls on wholesale gasoline prices were binding as recently as 1976.

The overall difference between foreign and domestic price increases as of 1977 (about one cent per gallon, on average) appears to lie within the bounds of confidence one can place upon the underlying data and methodology. The difference could be due to variations in environmental regulations such as U.S. restrictions on the use of lead as an octane enhancer, to unmeasured differences in product quality, or to other factors. Although regulations on gasoline prices are apparently ineffective, price controls imposed upstream on crude petroleum (and implemented with entitlements) are evidently holding refined product prices down. The magnitude of the effect on the wholesale price of gasoline is shown in Row 5 of Table 2. If crude oil controls and the entitlements program are phased out as planned, the cost of marginal barrels of crude oil to U.S. refiners will increase, and corresponding refined product price increases, perhaps mitigated by product imports, can be expected. It is possible that offsetting gains through reduced government involvement and complying company administration costs will also occur.

CONCLUSIONS

The central conclusion that emerges from this analysis is that competition, not regulation, is enforcing the current structure of gaso-

line prices in the U.S. Thus it is difficult to see why controls should continue; they appear to do little more than to impose an administrative burden on government and industry. It is possible that a few petroleum product suppliers remain effectively constrained. However, in the context of a firm specific price control system, decontrol of such firms need not result in unambiguous product price increases. Prices charged by constrained firms would presumably rise with decontrol, and this would be reflected in increases in low market price quotations. But these price increases would induce greater supplies from previously constrained firms, placing downward pressure on unconstrained prices. Spreads between high and low price quotations would be reduced, but average prices could either rise or fall.²⁴

Although the ineffectiveness of current price regulations is a sufficient basis to argue for decontrol, it is not necessarily the only basis upon which the argument can be made. The inefficiencies in production and exchange induced by general price ceilings are familiar. Price increases for refined products are merely symptomatic of a more fundamental change—in this case, reduced world supplies of crude petroleum. It makes little difference whether this scarcity stems primarily from international political events or from purely physical or market phenomena. Suppressing the symptoms of the change hinders market responses that would alleviate its effect. In addition, the U.S. system of refined product price controls contains its own peculiarities that are difficult to rationalize. For example, firms that are able to demonstrate high production costs are rewarded with ceiling price increases, and refiners who limit production are granted preferential treatment.²⁵ Moreover, the general attempt to reduce gasoline prices paid by final consumers coexists with regulations to improve gasoline mileage in new automobiles and thereby reduce consumption.

The present system of gasoline price controls reflects an attempt to redistribute the windfall gains accompanying world crude oil price increases from domestic oil producers to consumers of final products. The complexity of this multi-tiered regulatory structure attests to the difficulty of the task. If nothing else, the U.S. experiment with petroleum product price controls has demonstrated the inefficiency of the gasoline pump as a tool for redistribution.

24. Of course, the current situation may change; a reduction in the entitlement subsidy or a rise in foreign oil prices could set off future gasoline price increases. However, given the cost pass through allowances in the present control policy, refined product price increases would result regardless of whether or not price controls are in effect.

25. Preferences exist in the "small refiners bias" feature of the entitlements program and in an attractive pass through formula available to those refiners who limit production to within 10% of 1973 levels. See Mead and Deacon, *supra* note 8, Ch. 1.