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INTERNATIONAL FINANCE DISCUSSION PAPERS

DOCK STRIKE ADJUSTMENT FACTORS FOR MAJOR CATEGORIES OF U.S. IMPORTS AND EXPORTS, 1958-1974

by

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I. Introduction

During the past seventeen years, U.S. trade volumes have fluctuated significantly in response to seven major shutdowns of U.S. ports; see Table 1. Together these dock strikes have curtailed trade volumes in 9 out of 68 quarters, while promoting trade, in anticipation of or recovery from the strikes, in approximately another 10 quarters. Thus, about 30 percent of the quarterly trade records since 1958 reflect the influence of strikes. Consequently, attempts to explain quarterly patterns of trade during this period must either discard a significant fraction of the sample or devise a suitable method for preventing dock strike fluctuations from biasing econometric estimates of the effects on trade volumes of income, prices and other explanatory variables.

This paper constructs and tests quarterly dock-strike adjustment factors for a number of major categories of U.S. imports and exports for the 1958-1974 period.1/ Our dock-strike adjustment factors are distinguished

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1/ Import categories are: (1) foods, feeds, and beverages, (2) consumer goods (excluding foods and automotive products), (3) consumer nondurables (excluding foods), (4) consumer durables (excluding automotive products), (5) industrial supplies and materials (excluding fuels and lubricants), (6) capital goods (excluding automotive products) and (7) all items. Export categories are: (8) agricultural products, (9) capital goods (excluding aircraft and automotive products), (10) consumer goods (excluding foods and automotive products), (11) consumer nondurables (excluding foods), (12) consumer durables (excluding automotive products), (13) industrial supplies and materials (excluding agricultural products) and (14) all items.

from most others[2/] in three important ways, each of which involves the introduction of prior information. (1) We derive quarterly adjustment

Table 1: Major U.S. Dock Strikes Since 1958[a/]

October 1 - 8, 1959	-- East and Gulf Coasts
December 24, 1962 - January 25, 1963	-- East and Gulf Coasts
January 11 - February 12, 1965[b/]	-- East and Gulf Coasts
December 21, 1968 - February 14, 1969[b/]	-- East and Gulf Coasts
July 1 - October 8, 1971	-- West Coast
October 1 - November 28, 1971	-- East and Gulf Coasts
January 17 - February 20, 1972	-- West Coast

a/ See Appendix A for a chronology of port closings.
b/ Terminal date for the port of New York. Other ports returned to work later; see Appendix A.

factors by aggregating an estimated series of daily strike impacts, where the day-to-day timing of the strike impacts is based on daily strike information. (2) The estimated magnitudes of our (daily) strike impacts are based on weekly information on longshore manhours, rather than monthly or quarterly information on trade volumes or manhours.[3/] And (3) we explicitly introduce estimated information on the shares of the various trade categories

2/ Other dock strike adjustment factors include those provided by the Labor Department report, Impact of Longshore Strikes on the National Economy (January 1970), and the various dock strike dummies employed in numerous empirical models of U.S. imports and exports. For a description of an unpublished dock strike dummy constructed somewhat in the spirit of ours, see W. Takacs, "The U.S. Import Surcharge of 1971," International Monetary Fund memorandum DM/74/43, April 22, 1974.
3/ Data on trade volumes are not available for periods shorter than one month.

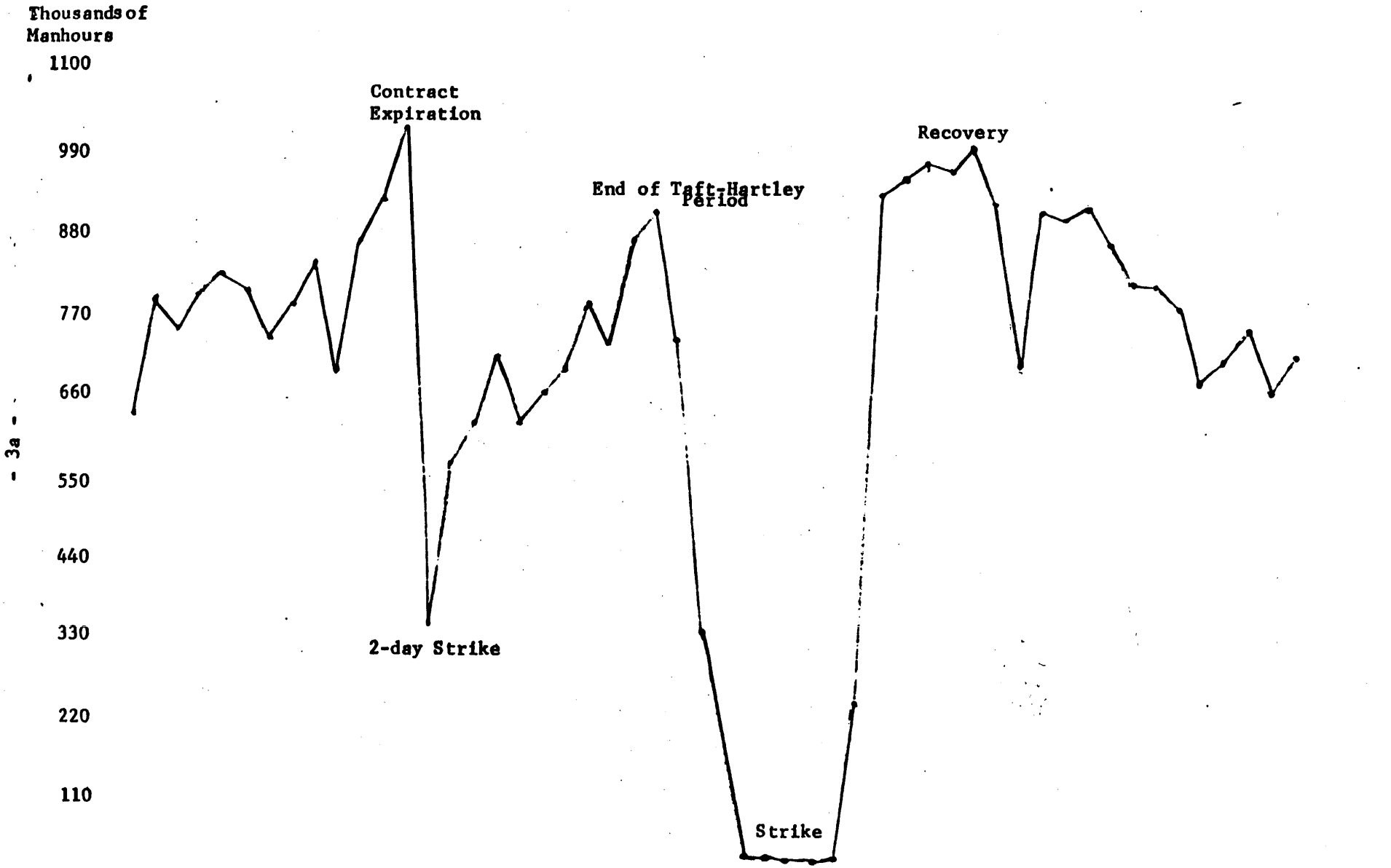
that are transported by ship through the striking regions.[4/]

Dock strikes do not coincide neatly with quarterly time periods, and there is much to be gained by first constructing strike adjustments on a daily basis and then obtaining quarterly adjustments as sums of the appropriate daily adjustments. Daily trade volumes: (a) rise sharply in anticipation of strikes during the weeks prior to the expiration of longshore contracts, and also during the final weeks of any Taft-Hartley injunction periods; (b) drop sharply during strike periods; and (c) typically are abnormally high during the weeks following a strike, reflecting attempts to recover the net loss of trade during the strike and anticipation periods. Although we do not have data on daily trade volumes or longshore manhours, the trade profile just described in evident in weekly manhour data, as shown in Figure 1.

The problem of dock strike adjustment is essentially a problem of estimating the time paths of trade volumes -- or in our approach, of longshore manhours -- that would have prevailed in the absence of the strikes. Since trade volumes -- and hence longshore manhours -- are sensitive to income, prices, and other variables that fluctuate over time, it is invalid to assume that manhours would have been purely a function of time (or some extrapolation of historic manhours) in the absence of dock strikes. Nor is it desirable to judge a-priori the impacts on longshore manhours (or trade volumes) of fluctuations in income, prices, etc. It is true, however, that

4/ Our construction of separate dock strike adjustment factors for different trade categories is a fourth distinction in comparison to many of the other dock strike dummies employed in econometric work.

Figure 1: Weekly Longshore Manhours for the Port of New York, Fiscal Year 1969



Source: See Appendix B.

if we had data on sufficiently many strikes we could invoke the law of large numbers, knowing that fluctuations about the seasonally-adjusted time trends of explanatory variables would wash out on the average and have no net effects on manhours, and thus accepting as the basis for our strike adjustments some average or representative profile of the deviation between the paths of actual and seasonally-adjusted time-trend manhours during individual strike episodes.

Unfortunately, we do not have good data on a large number of strike episodes. Of the seven major dock strikes during our data period, the 1959 and 1962-63 East and Gulf Coasts strikes predate our weekly longshore manhour data, while the 1971 and 1972 West Coast strikes and the 1971 East and Gulf Coasts strike had coincident impacts that are difficult to separate. Only for the 1964-65 and 1968-69 East and Gulf Coasts strikes can we use weekly data to estimate the time paths of deviations between actual and seasonally-adjusted trend manhours. For lack of an alternative, however, we have essentially chosen to apply the law of large numbers to these two strike episodes, adopting as our representative profile of dock strike impacts the profile of average percentage deviations of actual from seasonally-adjusted trend manhours during these two experiences.

Section 2 presents a detailed derivation of our representative profile of the impacts of dock strikes on longshore manhours. In Section 3 we combine this representative profile of the magnitude and duration of strike impacts with information from strike chronologies on the day-to-day

timing of these impacts during individual strike episodes. For each strike episode we aggregate the daily strike impacts into quarterly strike impacts, and percentage impacts on longshore manhours are translated into assumed percentage impacts on trade by ship through the striking region. The assumptions and calculations of this section lead to general formulas (one for each quarter affected by strikes) for the impact of dock strikes on the quarterly volumes of total U.S. imports or exports of any category, where these general formulas are stated in terms of the shares of these trade volumes that are transported by ship through the striking regions.

Since we do not have data on the shares of total U.S. imports or exports of individual commodity groups that are transported by ship through particular regions, we are forced to estimate these shares on the basis of reasonable assumptions. Section 4 discusses these assumptions and presents our share estimates and the implied numerical dock strike adjustment factors for each of the 14 trade categories. The major assumption on which our share estimates depend is the assumption that within each commodity category the share of West Coast trade transported by ship is the same as the share of East and Gulf Coasts trade transported by ship.

In constructing our strike adjustment factors we make no allowance for substitution, during dock strike episodes, between trade by ship and trade by other methods of transportation, or between trade through the striking regions and trade through other regions. Figure 2 seems to show

evidence of such substitution,[5/] but we do not feel comfortable with any method that might have been used to make crude allowances for these effects.

The empirical performance of our dock strike adjustment factors is analyzed in Section 5. These factors (D) have been constructed in a manner designed to yield an estimated c-coefficient of one when log (D) is used as a dummy variable in the regression equations:

$$\log (TVAL)_t = a + bt + c \log (D)_t + u_t$$

where for each commodity group of imports or exports

TVAL = value of trade in current dollars

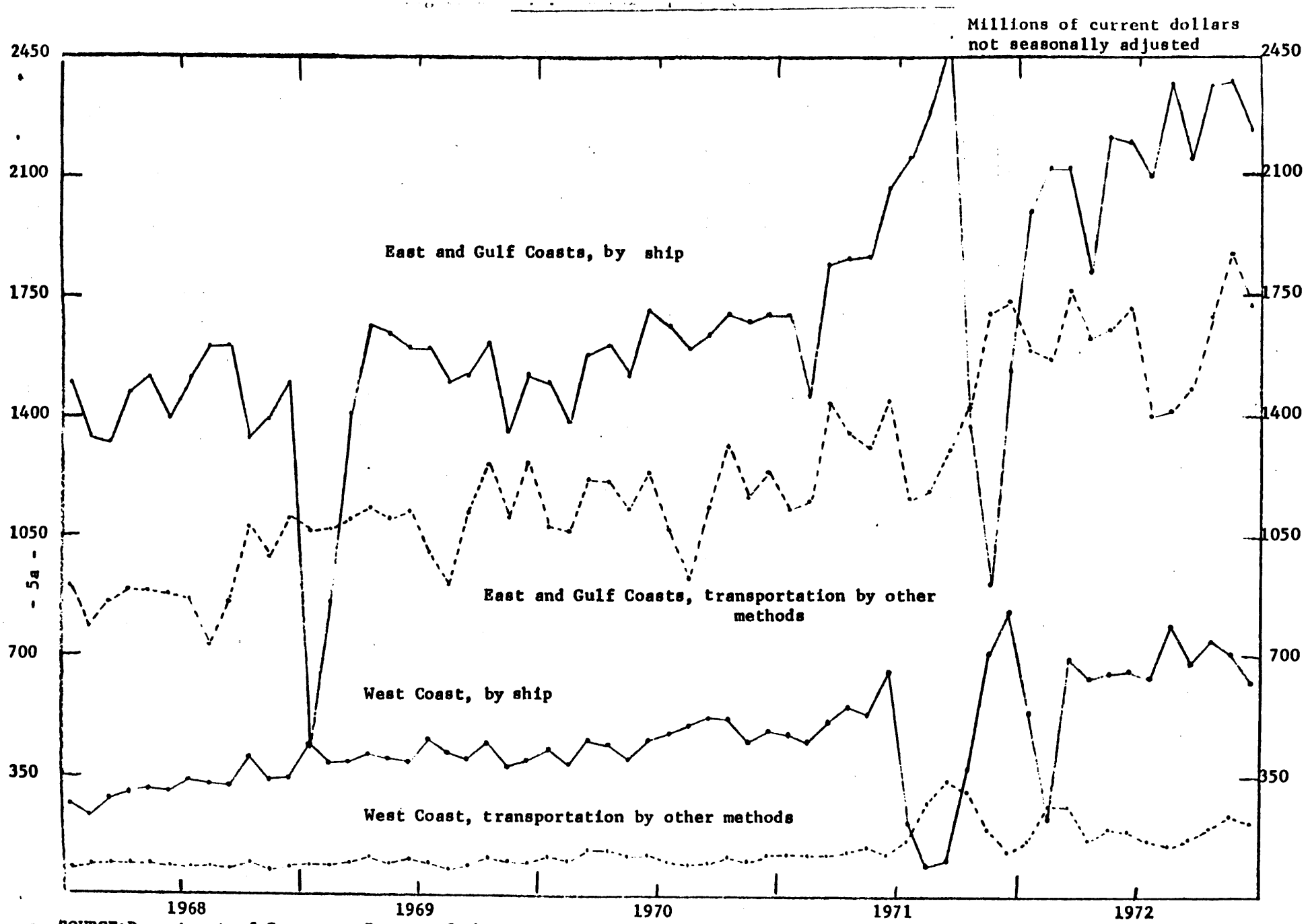
t = index of time

a,b,c = coefficients to be estimated

u = stochastic error term

Although for most of the 14 trade categories the estimates of c-1 differ significantly from zero on the basis of the t-test, the 14 estimates of c all lie within the range between .39 and 1.4. For each strike-affected quarter the signs of residuals greater than one standard error of regression (hereafter referred to as "large residuals") are tabulated and "aggregated" over the cross-section of commodity groups in an informal search for residual patterns that are similar in a large number of trade categories and might conceivably be attributed to deficiencies in the general strike-impact

5/ During January 1969, when East and Gulf Coasts longshoremen were on strike, there was a jump in the volume of West Coast ship handling; and perhaps some of the permanent jump in East and Gulf Coast imports by other methods of transportation, starting in October 1968, was related to the prospect of strike and/or to higher ship handling costs under a new longshore contract. Figure 2 also shows evidence of substitution between alternative methods of transportation during the 1971-72 strikes.



SOURCE: Department of Commerce, Bureau of the Census. U.S. Foreign Trade: Highlights of Exports and Imports (FT990 publications). Various issues. West Coast Imports represent imports through the Los Angeles and San Francisco Customs Regions; East and Gulf Coasts Imports are the residual.

formulas. On the basis of this analysis we re-examined the strike chronologies and found good reasons to revise the general formulas for two strike episodes, as described in detail below.[6/] For regressions using the revised adjustment factors, in 3 out of 19 strike-affected quarters at least half of the trade categories show large residuals of the same sign; but these residual patterns may be caused by factors other than errors in the strike-adjustment variables and we do not have good reasons to further revise the general strike-impact formulas for these quarters. During strike-affected quarters the average frequency of large residuals for the cross-section of commodity groups is 1.3 times as large as it is during other quarters.

We conclude that our empirical tests do not suggest any obvious deficiences that might easily be remedied. On the other hand, it is obvious that significant deficiencies, which are difficult to remedy, are inherent in the numerous simplifying assumptions that we are forced to make in constructing the strike adjustment factors. We do not really need empirical tests to tell that we are stretching the truth. Nevertheless, we feel that the prior-information content of our strike adjustment factors far exceeds that of any other set of dock strike dummies.

Before proceeding to the details of our calculations, the reader should be aware that East and Gulf Coasts strikes refer to strikes of the International Longshoremen's Association (ILA), whereas West Coast Strikes

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6/ The above discussion of c-coefficients and t-tests refers to the revised adjustment factors.

refer to those of the International Longshoremen's and Warehousemen's Union (ILWU). The trade data we use in this paper are disaggregated by 9 customs regions, on the basis of which we define the Los Angeles and San Francisco regions as the West Coast, and the Boston, New York, Baltimore, Miami, New Orleans, Houston and Chicago regions as the East and Gulf Coasts. Our treatment of the Chicago region (and the Boston region to a minor extent) is inaccurate -- the Great Lakes Districts of the ILA bargain separately and do not strike with the East and Gulf Coasts. However, our dock strike adjustment factors appear to be affected only marginally by this simplification.[7/]

Information on strike chronologies is presented in Appendix A. Appendix B tabulates the data we use on longshore manhours for the Port of New York. Our dock strike adjustment factors are listed in Tables 5 and 6 on pages 24b and c.

2. A Representative Profile of the Impacts of Dock Strikes on Longshore Manhours

In this section we examine weekly data on longshore manhours for the Port of New York and compare the behavior of actual manhours during the 1964-65 and 1968-69 dock strikes with a definition of seasonally-

7/ This assertion is based on the facts that the Chicago region accounts for less than 10 percent of both imports and exports by ship of the seven non-West-Coast regions, while trade by ship through Great Lakes Districts within the Boston Region is negligible. The errors due to the inaccurate treatment of the Great Lakes Districts are not dampened by the fact that Great Lakes shipping was closed for the Winter during most of the East and Gulf Coast shutdowns. Moreover, we have failed to consider three important Great Lakes shutdowns: (1) the Lake-wide Longshore strike during 1960; (2) the strike of Canadian Longshoremen during 1961; and (3) the closing of the Welland Canal and the subsequent strike by Canadian Longshoremen in September 1974.

adjusted trend manhours during the same period.[8] From these comparisons we define a representative profile of the impact of dock strikes on longshore manhours.

We define seasonally-adjusted trend manhours for any week ending on Sunday as average manhours per week during the two-year period of interest (796.91 thousand for 1964-65; 695.09 thousand for 1968-69) multiplied by a seasonal adjustment factor for the month which includes the Sunday on which the week ends. The seasonal adjustment factors are based on data for 1960,61, 66 and 70, since seasonal patterns in all other years covered by our manhour data were either affected significantly by dock strikes or, for 1967, by the disruption of trade during the months following the War in the Middle East.[9]

8/ As noted above, these are the only two strike episodes for which such comparison is both feasible and appropriate.

9/ For each month in each of these 4 years we calculated the ratio of average weekly manhours (for weeks ending on Sundays) during the month to the average level of manhours per week for the year as a whole. The 4 ratios corresponding to the same month in different years were then averaged, for each month, to yield the following seasonal factors:

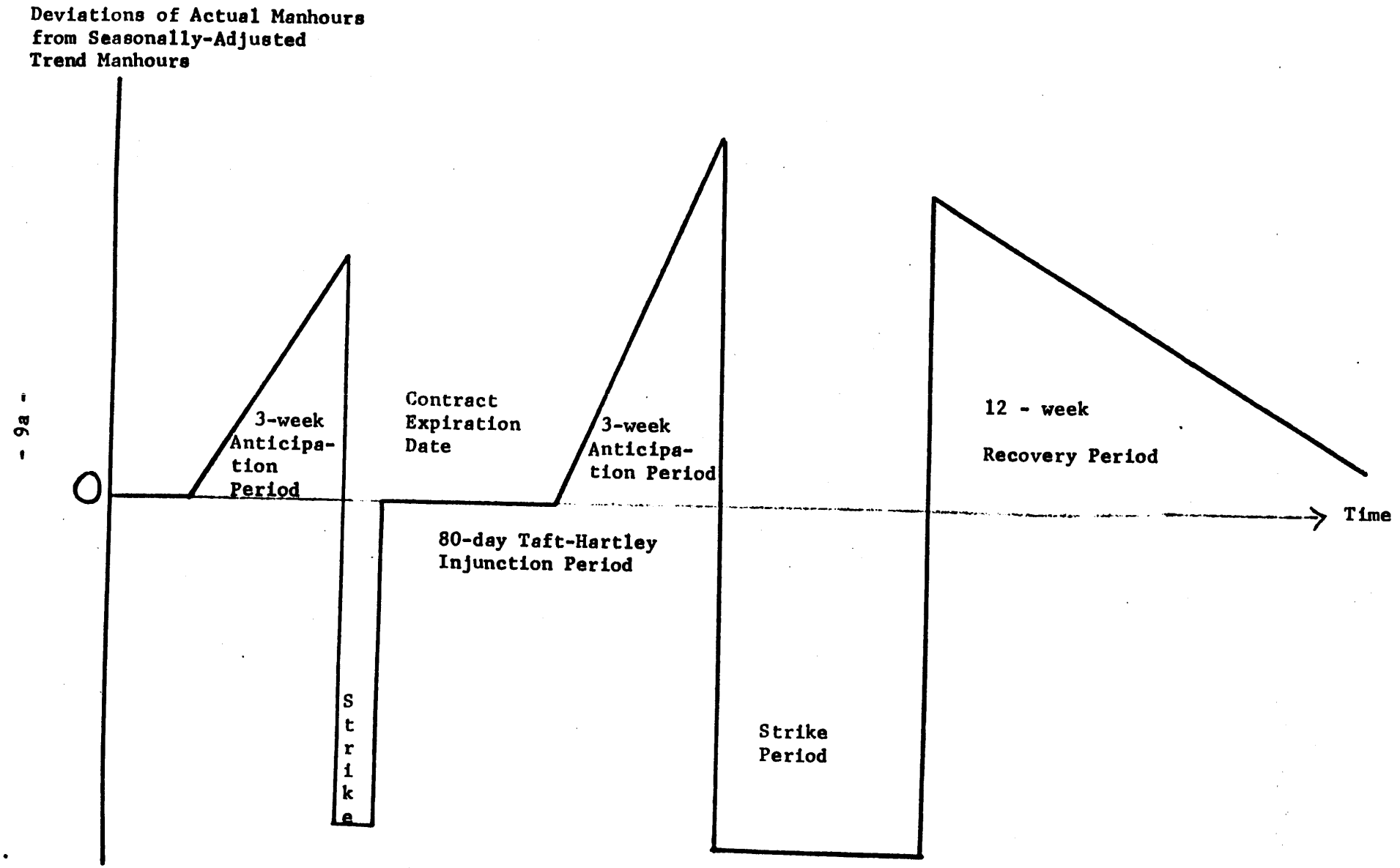
Jan. =	1.0224	May =	.9948	Sept. =	.9528
Feb. =	1.0467	June =	.9792	Oct. =	.9852
Mar. =	1.0872	July =	.9624	Nov. =	.9828
Apr. =	1.0344	Aug. =	.9720	Dec. =	.9792

For both the 1964-65 and 1968-69 strike episodes, a short shutdown began when contracts expired on October 1 and ended two days later under an 80-day Taft-Hartley restraining order. In both cases the strikes were resumed after the 80-day injunctions expired. As shown for 1968-69 in Figure 1 above, there were anticipatory build-ups of trade prior to both the contract expiration date and the end of the injunction period, and a recovery of trade after the strike period. (Throughout this paper we distinguish semantically between strike episodes and strike periods; the term strike episode refers to the sequence of anticipation periods, strike period, and recovery or re-adjustment period.)

On the basis of Figure 1 and other impressions, we assume that our representative manhours profile follows the pattern shown in Figure 3. This, of course, must be adjusted for cases in which Taft-Hartley injunctions are not applicable, for cases in which the strike is not resumed immediately following the Taft-Hartley expiration date, and so forth. The major assumptions embodied in Figure 3 are that anticipation periods last 3 weeks, recovery periods last 12 weeks, and during both types of periods, trade volumes change from day to day in the illustrated linear patterns. Obviously, strike episodes are not this regular; but we relax these assumptions only when we have information that suggests an appropriate modification. It should be noted that we have assumed the recovery period to begin in full force on the day after the strike ends; this may be particularly unrealistic for exports, which in many cases cannot resume until imports have been unloaded.

Under the above assumptions regarding the durations and shapes of the anticipation and recovery periods, together with the definition of

Figure 3: Representative Manhour Profile



seasonally-adjusted trend manhours, we now consider the actual manhour data for the 1964-65 and 1968-69 strikes, with the objective of estimating the average magnitudes of the anticipatory buildups, strike losses, and recoveries. Table 2 summarizes these data. (It may be noted that in the 1964-65 case, the strike was postponed following the expiration of the Taft-Hartley period, and actual manhours were assumed to be normal during the interval between the Taft-Hartley expiration date and the resumption of the strike.) Differences between the 1964-65 and 1968-69 profiles are attributed to different cyclical movements of income, relative prices, and other explanatory variables; for example, the apparent 100.5 percent readjustment after the earlier strike is evidently overstated due to cyclical phenomena. The rationale for taking the average profile as representative is the hope that the effects of these cyclical movements will wash out on the average.[10/] As tabulated, the profile we assume to be representative is a 29.5 percent increase in average weekly manhours during the three weeks prior to contract expiration, a 41.7 percent increase during the three weeks prior to the Taft-Hartley expiration date, a 93.5 percent reduction in average weekly manhours during the strike period, and in the 12 weeks following the strike, a 78.5 percent recovery of the net manhours lost during the strike and anticipation periods combined.

10/ It may be noted that the estimated 100.5 percent readjustment after the 1964-65 strike and 56.5 percent readjustment after the 1968-69 strike seem to reflect cyclical phenomena associated with the fact that real income grew faster between the first and second quarters of 1965 than between the corresponding quarters of 1969. These estimates are also consistent wit. possible anticipations of the boom in third-quarter 1965.

Table 2: Manhour Profiles

All manhour data are in units of one thousand. See Appendix B for actual manhour data.

1964-65 Strike

First anticipation period, September 10-30, 1964

Average weekly manhours = 859[a], 13.2% above normal[b] level of 759.
Total anticipatory buildup = 300 manhours.

Second anticipation period, November 30-December 20, 1964

Average weekly manhours = 1142[c], 46.4% above normal[b] level of 780.
Total anticipatory buildup = 1086 manhours.

Strike period, January 11-February 12, 1965

Average weekly manhours = 62[d]; normal[b] = 822.
Total strike loss = 3583 manhours
Percentage reduction in manhours = 92.5%

Readjustment period, February 13-May 7, 1965

Average weekly manhours = 1023[e]; normal[b] = 839.
Total readjustment = 2208 manhours.
Net manhours lost during strike and anticipation periods combined = 2197.
Percentage readjustment = 100.5%

1968-69 Strike

First anticipation period, September 10-30, 1968

Average weekly manhours = 965[a], 45.8% above normal[b] level of 662.
Total anticipatory buildup = 909 manhours.

Second anticipation period, November 30-December 20, 1968

Average weekly manhours = 933[c], 37.0% above normal[b] level of 681.
Total anticipatory buildup = 756 manhours.

Strike period, December 21, 1964 - February 14, 1965

Average weekly manhours = 39[f]; normal[b] = 709.
Total strike loss = 5360 manhours.
Percentage reduction in manhours = 94.5 percent

(continued)

Table 2: (continued)

Readjustment period, February 15-May 9, 1965

Average weekly manhours = 905[g/]; normal[b/] = 731.
Total readjustment = 2088 manhours
Net manhours lost during strike and anticipation periods combined = 3695.
Percentage readjustment = 56.5%

Average Profile

29.5% additional average weekly manhours during first anticipation period (prior to contract expiration)

41.7% additional average weekly manhours during second anticipation period (prior to Taft-Hartley expiration)

93.5% reduction in average weekly manhours during strike period

78.5% readjustment of net manhours lost during strike and anticipation periods combined.

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a/ Represents average weekly rate for September 9-30. September 30 manhours are assumed equal to one-sixth of manhours worked during week ending September 29.

b/ Normal = seasonally-adjusted trend manhours, as defined in the text.

c/ Represents average weekly rate for December 2-20. All manhours during the week ending Sunday December 22 are assumed to have been worked on or prior to December 20. During 1964, the port of New York was hit by a wildcat strike on December 21 and 22; during 1968, all East Coast ports were on strike during these two days.

d/ Represents average weekly rate for January 13-February 9.

e/ Represents average weekly rate for February 13-May 11. Assumes manhours at rate of 10 per day for February 10-12 strike period.

f/ Represents average weekly rate for December 23-February 9.

g/ Represents average weekly rate for February 15-May 11. Assumes manhours at rate of 7 per day for February 10-14 strike period.

3. Assumed Impacts of Dock Strikes on Quarterly Trade Volumes: General Formulas

In this section we apply the representative manhour profile to each of the seven major strike episodes of the 1958-74 period, adjusting the timing of the manhour profile to fit the specific chronologies of the individual episodes, and translating the impacts on manhours into impacts on trade-by-vessel (i.e., ship) in the striking regions. The estimates of daily impacts on trade-by-vessel in striking regions are then aggregated over quarters to arrive at general formulas for quarterly impacts on trade by all methods of transportation through all regions.

The translation of manhour changes into changes in trade-by-vessel is based on two assumptions. First, it is assumed that trade-by-vessel is negligable during strike periods, so that the 93.5% representative reduction in manhours corresponds to a 100% reduction in trade-by-vessel. Next it is assumed that the elasticity of trade-by-vessel with respect to manhours is constant, and hence equal to 100/93.5 = 1.07. Thus the 29.5% and 41.7% representative increases in manhours during anticipation periods are assumed to correspond to 31.6% and 44.7% increases in trade-by-vessel. A strong implicit assumption is that the same percentage changes apply to all commodity groups. Following the representative strike, there is a 78.5 % of recovery of both net manhours lost and net trade-by-vessel lost.

We now consider the major strike episodes individually, drawing heavily on the strike chronologies in Appendix A. Postponing any specific references to exports, imports, or particular commodity groups, we use the notation:

T = recorded or actual volume of trade through all regions by all methods of transportation, per quarter

T_n = normal (i.e., seasonally-adjusted trend) volume of trade through all regions by all methods of transportation, per quarter

s_{EG} = share of T_n normally traded by vessel through the East and Gulf Coasts regions

s_W = share of T_n normally traded by vessel through the West Coast region

The latter three variables are assumed to be approximately constant during each individual strike episode, but will later be assumed to vary between strike episodes, as well as between different trade categories.

3a. East and Gulf Coasts Strike, 1959-60. Based on the strike chronology (see Appendix A) we assume a 21-day anticipation period ending on September 30, 1959, during which the daily volume of trade-by-vessel was 31.6% greater than normal on the average.[11/] Trade-by-vessel is assumed to have been negligable between October 1 and October 8 and normal during the Taft-Hartley injunction period from October 9 through November 30. The recovery period is assumed to have started on December 1, the day a new contract agreement was reached, and was intially assumed to last for 12 weeks. (A revision of this latter assumption is reported at the end of this subsection.) The recovery is assumed to have been 78.5 percent of the net trade-volume lost during the anticipation and strike periods combined, with 60.2 percent of the recovery

11/ On the basis of Figure 3, the daily volume of trade-by-vessel is assumed to have increased at a constant rate from a normal level 22 days before the contract deadline to 63.2 percent above normal on the last day of September.

initially assumed to have occurred during the first 31 days (i.e., December).[12/] These assumptions imply:

for 1959 III (92 days): $T = T_n + \frac{21}{92} \times .316\, s_{EG}\, T_n$

$= (1 + .072\, s_{EG})\, T_n$

for 1959 IV (92 days): $T = T_n - \frac{8}{92}\, s_{EG}\, T_n$

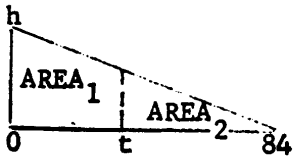
$+ .602 \times .785 \times (\frac{8}{92} - .072)\, s_{EG}\, T_n$

$= (1 - .080 s_{EG})\, T_n$

for 1960 I: $T = T_n + .398 \times .785 \times (\frac{8}{92} - .072)\, s_{EG}\, T_n$

$= (1 + .005 s_{EG})\, T_n$

12/ Consider the recovery triangle (with height h and base of 12 weeks or 84 days) from Figure 3:



The fraction of the recovery that occurs during the first t days of the 84 day period is $AREA_1/(AREA_1 + AREA_2)$

Since $AREA_1 + AREA_2 = \frac{84h}{2}$ and

$AREA_2 = \frac{1}{2}(84-t)\frac{(84-t)h}{84}$,

$\frac{AREA1}{AREA_1+AREA_2} = 1 - \frac{AREA_2}{AREA_1 + AREA_2} = 1 - \left(\frac{84-t}{84}\right)^2$.

For t = 31, this fraction is $1 - \left(\frac{53}{84}\right)^2 = .602$

After strike adjustment factors constructed from these assumptions were tested for a cross-section of trade categories, as discussed in Section 5 below, we conjectured (largely on the basis of the pattern of residuals) that it would be more appropriate to assume that the recovery was accelerated during the pre-Christmas season. Given that net trade losses were less than 8 day's worth of shipping volumes, our revised assumption is that the entire recovery occurred during December. This leads to the following changes:

$$\text{for 1959 IV:} \quad \text{revised } T = T_n - \frac{8}{92} s_{EG} T_n + .785 \times \left(\frac{8}{92} - .072\right) s_{EG} T_n = (1 - .075 s_{EG}) T_n$$

$$\text{for 1960 I:} \quad \text{revised } T = T_n$$

3b. East and Gulf Coasts Strike, 1962-63. Trade-by-vessel is assumed to have been 31.6 percent greater than normal during a 21-day anticipation period ending September 30.

$$T(62III) = T_n + \frac{21}{92} \times .316 s_{EG} T_n = (1 + .072 s_{EG}) T_n$$

Trade-by-vessel was down 100 percent during the first 5 days of October, then normal until the last 3 weeks of the Taft-Hartley period, during which time (12/3 - 12/23) it was 44.7 percent above normal in anticipation of a strike resumption. Trade-by-vessel was down 100 percent during the last 8 days of December.

$$T\ (62IV) = T_n - \frac{5}{92}\, s_{EG}\, T_n + \frac{21}{92} \times .447 s_{EG}\, T_n - \frac{8}{92}\, s_{EG}\, T_n$$

$$= (1 - .039 s_{EG})\, T_n$$

The striking ports remained closed for the first 25 days of January. During the remaining 65 days of the first quarter, 94.9 percent[13/] of the 78.5 percent recovery occurred; the final 5.1 percent of the recovery occurred in the second quarter.

$$T\ (63I) = T_n - \frac{25}{90}\, s_{EG}\, T_n + .949 \times .785 \times (\frac{25}{90} + .039 - .072) s_{EG}\, T_n$$

$$= (1 - .095 s_{EG})\, T_n$$

$$T\ (63II) = T_n + .051 \times .785 \times (\frac{25}{90} + .039 - .072) s_{EG}\, T_n$$

$$= (1 + .010 s_{EG})\, T_n$$

3c. East and Gulf Coasts Strike, 1964-65. Trade-by-vessel is assumed to have been 31.6 percent greater than normal during a 21 day anticipation period ending September 30.

$$T\ (64III) = T_n + \frac{21}{92} \times .316 s_{EG}\, T_n$$

$$= (1 + .072 s_{EG})\, T_n$$

Trade-by-vessel was down 100 percent on October 1 and 2, then normal until the last 3 weeks (11/30 - 12/30) of the Taft-Hartley period, during which time it averaged 44.7 percent above normal. The December 20 strike deadline was extended (on December 16) for 20 days, during which time we assume that trade-by-vessel was normal.

13/ This, and similar calculations below, are based on the formula derived in footnote 12.

$$T\ (64IV) = T_n - \frac{2}{92} s_{EG} T_n + \frac{21}{92} \times .447\ s_{EG} T_n$$

$$= (1 + .080 s_{EG})\ T_n$$

On January 11 the strike resumed, lasting 33 days. During the 47 remaining days of the quarter, 80.6 percent of the 78.5 percent recovery occurred; the remaining 19.4 percent occurred in the second quarter.

$$T\ (65I) = T_n - \frac{33}{90} s_{EG} T_n + .806 \times .785 \times (\frac{33}{90} - .072 - .080) s_{EG} T_n$$

$$= (1 - .231 s_{EG})\ T_n$$

$$T\ (65II) = T_n + .194 \times .785 \times (\frac{33}{90} - .072 - .080) s_{EG} T_n$$

$$= (1 + .033 s_{EG}) T_n$$

3d. East and Gulf Coasts Strike, 1968-69. Trade-by-vessel is assumed to have been 31.6 percent greater than normal during a 21 day anticipation period ending September 30.

$$T(68III) = T_n + \frac{21}{92} \times .316 s_{EG} T_n$$

$$= (1 + .072\ s_{EG})\ T_n$$

Trade-by-vessel was down 100 percent on October 1 and 2, then normal until the last 3 weeks (11/30 - 12/20) of the Taft-Hartley period, during which time it averaged 44.7 percent above normal. Trade-by-vessel was down 100 percent during the last 11 days of December.

$$T(68IV) = T_n - \frac{2}{92} s_{EG} T_n + \frac{21}{92} \times .447\ s_{EG} T_n - \frac{11}{92} s_{EG} T_n$$

$$= (1 - .039 s_{EG}) T_n$$

The strike was initially treated as continuing through the first 45 days of

the first quarter (the back-to-work-date initially assumed here, but revised below, is that for the port of New York; see chronology, Appendix A). Accordingly, it was initially assumed that 78.4 percent of the 78.5 percent recovery occurred during the remaining 45 days of the quarter, with the remaining 21.6 percent of the recovery occurringduring the second quarter.

$$T(69I) = T_n - \frac{45}{90} s_{EG} T_n + .784 \times .785 \times (\frac{45}{90} - .072 + .039) s_{EG} T_n$$

$$= (1 - .213 s_{EG}) T_n$$

$$T(69II) = T_n + .216 \times .785 \times (\frac{45}{90} - .072 + .039) s_{EG} T_n$$

$$= (1 + .079 s_{EG}) T_n$$

When strike adjustment factors constructed from these assumptions were tested for a cross-section of trade categories, as discussed in Section 5 below, we found that trade volumes tended to be overestimated in 1969 I and underestimated in 1969 II. Accordingly, we decided to refine our assumptions about the timing of the recovery, based on knowledge of the dates that individual ports returned to work, together with information regarding the importance of individual ports in East and Gulf Coasts trade by vessel. Specifically, given the back-to-work date for each major port, we first estimated the fraction of each port's recovery that occurred in 1969 I, and then computed a weighted average of these fractions using as weights each port's share in the 1968 plus 1969 imports by vessel of all the ports combined. This weighted average fraction of the recovery that occurred in 1969 I is .670, rather than .784 which we initially estimated

under the simplying assumption that all ports returned to work on the date that the port of New York actually returned. Using the same weights, the number of days on strike during 1969I was refined from 45 (for the port of New York) to a weighted averageof 52.73.[14/] Thus:

$$\text{for 1969 I:} \quad \text{revised } T = T_n - \frac{52.73}{90} s_{EG} T_n$$

$$+ .670 \times .785 \times \left(\frac{52.73}{90} - .072 + .039\right) s_{EG} T_n$$

$$= (1 - .295 s_{EG}) T_n$$

$$\text{for 1969 II:} \quad \text{revised } T = T_n + .330 \times .785 \times \frac{52.73}{90} - .072 + .039) s_{EG} T_n$$

$$= (I + .143) s_{EG} T_n$$

3e. West Coast Strikes, 1971 and 1972. Since the West Coast Strike (7/1-10/8) was the first major shutdown in the West in over 20 years, and since informed opinion holds that there was little evidence of advance buying in anticipation of the strike, we assume there was no anticipatory build up before the strike. There was no West Coast trade-by-vessel during the third quarter:[15/]

$$\Delta T_W \text{ (71 III)} = - s_W T_n$$

The strike continued through the first 8 days of October, following which trade losses began to be recovered during a Taft-Hartley cooling-off period.

14/ It is important to note that the representative profile of strike-impacts, which is partly based on this 1968-69 strike episode, is estimated from manhours data for the Port of New York in isolation, and is independent of the treatment of the strike termination dates for other Ports.

15/ We let ΔT_W and ΔT_{EG} denote the impacts on total trade (T) of the West Coast and East and Gulf Coasts strikes.

The entire 84-day recovery occurred during the fourth quarter. During the last 3 weeks of the 80-day Taft-Hartley period (12/4/-12/25), trade-by-vessel increased by 44.7 percent in anticipation of a strike resumption, which was postponed, however, until January.

$$\Delta T_W \text{ (71 IV)} = -\frac{8}{92} s_W T_n + .785 \left(1 + \frac{8}{92}\right) s_W T_n + \frac{21}{92} \times .447 s_W T_n$$

$$= .868 s_W T_n$$

Trade-by-vessel was normal for the first 16 days of January, then down 100 percent during a 35 day strike. The last 40 days of the quarter brought 72.6 percent of the recovery from this second strike; the remaining 27.4 percent occurred during the second quarter.

$$\Delta T_W \text{ (72 I)} = -\frac{35}{91} s_W T_n + .726 \times .785 \times \left(\frac{35}{91} - .447 \times \frac{21}{92}\right) s_W T_n$$

$$= -.224 s_W T_n$$

$$\Delta T_W \text{ (72 II)} = .274 \times .785 \times \left(\frac{35}{91} - .447 \times \frac{21}{92}\right) s_W T_n$$

$$= .061 s_W T_n$$

3f. East and Gulf Coasts Strike, 1971-72. Because of the West Coast Strike underway and the apparent reluctance of the Nixon Administration to invoke its powers under the Taft-Hartley Act, the anticipatory build-up of trade prior to the East and Gulf Coasts contract deadline is assumed to have been abnormally large. Specifically, we assume a six week anticipation period, ending September 30, during which trade-by-vessel was 38.15 percent (the average of the representative 31.6 and 44.7 percent anticipations) greater than normal.

$$\Delta T_{EG} \text{ (71 III)} = \frac{42}{92} \times .3815\ s_{EG}\ T_n = .174\ s_{EG}\ T_n$$

A 59 day strike began on October 1, ending under a Taft-Hartley injunction. An 84 day recovery period began when ports resumed work on November 29, with 63.1 percent of the recovery occurring during the final 33 days of the year.

$$\Delta T_{EG} \text{ (71 IV)} = -\frac{59}{92} s_{EG}\ T_n + .631 \times .785\ (\frac{59}{92} - .174) s_{EG}\ T_n$$

$$= -.410 s_{EG}\ T_n$$

The remaining 36.9 percent of this recovery occurred during the first 51 days of the first quarter. In addition, trade-by-vessel increased by 44.7 percent of normal volumes during the 3 weeks (1/26-2/16) preceding the end of the Taft-Hartley period, in anticipation of a strike resumption. However, workers remained on their jobs and after a new contract was ratified on March 8, it is assumed that trade volumes dipped below normal for 12 weeks to reduce importers' inventories by 78.5 percent of the previous anticipatory build up. 51.0 percent of this reduction occurred during the last 24 days of the quarter, with the remaining 49.0 percent occurring in the second quarter.

$$\Delta T_{EG} \text{ (72 I)} = .369 \times .785 \times (\frac{59}{92} - .174) s_{EG}\ T_n$$

$$+ \frac{21}{91} \times .447 s_{EG}\ T_n - .510 \times .785\ \frac{21}{92} \times .447 s_{EG}\ T_n$$

$$= .198 s_{EG}\ T_n$$

$$\Delta T_{EG} \text{ (72 II)} = -.490 \times .785 \times \frac{21}{92} \times .447 s_{EG}\ T_n$$

$$= -.041 s_{EG}\ T_n$$

3g. All Strikes, 1971 and 1972. When we combine the West Coast and East and Gulf Coasts strikes, using the formula $T = T_n + \Delta T_W + \Delta T_{EG}$, we have:

$$T\ (71\ III) = (1 - s_W + .174s_{EG})\ T_n$$

$$T\ (71\ IV) = (1 + .868s_W - .410s_{EG})\ T_n$$

$$T\ (72\ I) = (1 - .224s_W + .198\ s_{EG})\ T_n$$

$$T\ (72\ II) = (1 + .061s_W - .041s_{EG})\ T_n$$

4. Assumptions Regarding Estimated Trade Shares and Implied Dock Strike Adjustment Factors

In this section we discuss the assumptions which underlie our estimates of the s_{EG} and s_W shares, and then plug these estimates into the formulas from the previous section to calculate implied values of T/T_n, our dock-strike adjustment factors. Trade shares, which vary between strike episodes, are estimated for 14 categories of imports or exports (as listed in footnote 1); thus we estimate a different dock strike adjustment variable for each trade category.

Apart from total imports, total exports, and exports of agricultural products, the trade categories which interest us here are end-use commodity groups. Import and export data for end-use commodity groups --- or for selected Schedule A or Schedule B commodity groups --- are not broken down jointly by method of transportation and Customs Regions. Data on trade by either method of transportation or Customs Region are not readily available

for end-use commodity groups, although both sets of data are readily available since 1967 for Schedule A import commodities and Schedule B export commodities.

Under these data constraints, we first match the end-use commodity groups of interest with similar groups of Schedule A import commodities or Schedule B export commodities. For the 1968-69 and 1971-72 strike periods, we estimate the s_{EG} share (respectively, the s_W share) for each Schedule A or B commodity group as the product of (1) the fraction of total U.S. imports or exports of that commodity group that are shipped by vessel during the two year period of interest (either 1968-69 or 1971-72) and (2) the fraction of total U.S. imports or exports of that commodity group that enter or leave the U.S. through East and Gulf Coast Customs Regions (respectively, through West Coast Customs Regions) during the two-year period of interest. In essence, this methodology assumes that within each commodity group, West Coast trade by vessel is the same share of total West Coast trade as East and Gulf Coasts trade by vessel is of total East and Gulf Coasts trade, although this share may vary between different commodity groups and over time. Table 3 presents these estimates, along with the definitions and sources of the import and export records on which the estimates are based.

For the strike episodes prior to 1967 we do not have data by commodity on shares of trade by vessel and shares of trade through different Customs Regions. Apparently, the only useful information available is a time series on the shares of imports and exports of all commodities that enter and leave

Table 3: Estimated Fractions of U.S. Trade Normally Transported by Vessel Through Striking Regions

	East and Gulf Coasts[b/] 1968-69	East and Gulf Coasts[b/] 1971-72	West Coast[a/] 1971-72
IMPORTS			
Foods, Feeds, Beverages c/	.722	.702	.118
Consumer Goods d/	.510	.491	.179
Nondurables d/	.540	.512	.121
Durables d/	.475	.461	.249
Industrial Supplies e/	.558	.542	.087
Capital Goods f/	.425	.387	.114
All Items g/	.523	.495	.105
EXPORTS			
Agricultural Products h/	.745	.753	.142
Capital Goods i/	.388	.343	.061
Consumer Goods j/	.416	.409	.071
Nondurables j/	.475	.428	.048
Durables j/	.333	.383	.103
Industrial Supplies k/	.634	.624	.104
All Items l/	.479	.451	.089

SOURCE: U.S. Department of Commerce, Bureau of the Census. U.S. Foreign Trade: Highlights of Exports and Imports (FT990 publications), various issues, Tables I-2, I-6, E-2, E-5.

a/ Los Angeles plus San Francisco Customs Regions.

b/ All Customs Regions except Los Angeles and San Francisco.

c/ "Food and live animals" plus "beverages and tobacco."

d/ Consumer nondurables represent "clothing, excl. footwear" plus "footwear-rubber, leather and other" plus "printed matter." Consumer durables represent "watches, clocks, and parts" plus "musical instruments and parts, incl. phonographs, tape recorders, phonograph records, etc." plus "toys, sporting goods, and amusement equipment" plus "artworks collectors' items and antiques" plus "radio receiving sets" plus "television receiving sets. Consumer goods represent the sum of consumer nondurables plus consumer durables. Automotive products are excluded.

e/ "Crude materials, except fuels --- inedible" plus "animal and vegetable oils and fats" plus "chemicals" plus "manufactured goods classified chiefly by material." Petroleum products and gas are excluded.

f/ "Machinery" plus "aircraft and parts (excl. tires, engines, and electrical)." Transport equipment other than aircraft are excluded.

g/ "Grand total" of Schedule A imports with no exclusions.

h/ "Agricultural commodities" in Tables E-5.

i/ "Machinery--electric and nonelectric" minus "household electrical appliances" plus "railway vehicles and parts." Transport equipment other than railway vehicles and parts are excluded.

j/ Consumer nondurables represent "clothing, excl. footwear" plus "books, periodicals and other printed matter" plus "photographic supplies -- sensitized film, paper, etc." Consumer durables represent "household electrical appliances" plus "muisical instruments and parts -- phonographs, tape recorders, phonograph records, etc." plus "toys, sporting goods, and amusement equipment." Consumer goods represent the sum of consumer nondurables plus consumer durables. Automotive products are excluded.

k/ "Crude materials, except fuel -- inedible" plus "mineral fuels, libricants, and related material" plus "chemicals" plus "manufactured goods classified chiefly by materials.

l/ "Grand total" of Schedule B exports with no exclusions.

the United States by vessel, together with our estimates of trade shares in the years subsequent to 1967. In most cases we therefore approximated the s_{EG} shares for each strike episode prior to 1967 as (1) our estimates of the s_{EG} shares for corresponding commodity groups during the 1968-69 years, multiplied by (2) the fraction of all U.S. imports or exports traded by vessel in the two years including the strike episode, divided by (3) the fraction of all U.S. imports or exports traded by vessel during 1968 and 1969. That is, we simply scaled our estimated s_{EG} shares for 1968-69 to reflect trends in the fraction of total imports or exports traded by vessel. This procedure reflects the assumptions that prior to 1968-69: (a) each group of imports or exports showed the same trend as total imports or exports in the proportion traded by vessel; and (b) the fraction of each group traded through a given region was the same as in 1968-69.

In the cases of imports of foods, feeds and beverages for 1959-60 and exports of agricultural products for each of the three strike episodes prior to 1968-69, assumption (a) cannot be made, since it would imply that shares of trade by vessel exceeded one. For these cases we take the share of trade by vessel to equal one, and combine this with assumption (b) in constructing the s_{EG} shares.

Table 4 presents our estimates of the extrapolated s_{EG} shares for the strike episodes prior to 1968-69, along with details of their calculation.

The final step in our calculation of dock strike adjustment factors was to combine the estimated s_{EG} and s_{W} shares with the expressions, from

Table 4: Extrapolated Estimates of Fractions of U.S. Trade Normally Transported by Vessel Through East and Gulf Coasts Regions a/

	1959-60	1962-63	1964-65
IMPORTS			
Foods, Feeds, Beverages	.855 b/	.841	.825
Consumer Goods	.611	.594	.583
Nondurables	.647	.629	.617
Durables	.569	.553	.543
Industrial Supplies	.668	.650	.638
Capital Goods	.509	.495	.486
All Items	.627	.609	.598
EXPORTS			
Agricultural Products	.814 b/	.825 b/	.836 b/
Capital Goods	.444	.452	.450
Consumer Goods	.476	.485	.482
Nondurables	.543	.554	.551
Durables	.381	.388	.386
Industrial Supplies	.725	.739	.735
All Items	.548	.559	.555

SOURCES: (i) Table 3 and (ii) U.S. Department of Commerce, Bureau of the Census. U.S. Foreign Trade: Waterborne Exports and General Imports (formerly U.S. Waterborne Foreign Trade), FT985 publications, various issues, Tables I-1 and E-1.

a/ All notes to Table 3 apply. In-transit imports and exports were excluded in using Source (ii) to compute the fractions of total U.S. imports or exports traded by vessel.

b/ Share of trade by vessel assumed equal to one; see text.

Table 5. Dock Strike Adjustment Factors: IMPORTS a/

	Foods, Feeds and Beverages	Consumer Goods	Consumer Non-durables	Consumer Durables	Industrial Supplies	Capital Goods	All Items
REVISED FACTORS							
1959 III	1.0616	1.0440	1.0466	1.0410	1.0481	1.0367	1.0451
IV	.9358	.9542	.9515	.9573	.9499	.9618	.9530
1960 I	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1962 III	1.0606	1.0428	1.0453	1.0398	1.0468	1.0356	1.0439
IV	.9672	.9768	.9755	.9784	.9746	.9807	.9762
1963 I	.9201	.9436	.9402	.9474	.9382	.9530	.9421
II	1.0084	1.0059	1.0063	1.0055	1.0065	1.0050	1.0061
1964 III	1.0594	1.0420	1.0444	1.0391	1.0459	1.0350	1.0430
IV	1.0660	1.0466	1.0494	1.0434	1.0510	1.0389	1.0478
1965 I	.8094	.8653	.8574	.8746	.8527	.8878	.8619
II	1.0272	1.0192	1.0204	1.0179	1.0210	1.0160	1.0197
1968 III	1.0520	1.0367	1.0389	1.0342	1.0402	1.0306	1.0377
IV	.9718	.9801	.9789	.9815	.9782	.9834	.9796
1969 I	.7870	.8496	.8407	.8599	.8354	.8746	.8457
II	1.1032	1.0729	1.0772	1.0679	1.0798	1.0608	1.0748
1971 III	1.0041	.9064	.9681	.8312	1.0073	.9533	.9811
IV	.8146	.9541	.8951	1.0271	.8533	.9403	.8882
1972 I	1.1126	1.0571	1.0743	1.0355	1.0878	1.0511	1.0745
II	.9784	.9908	.9864	.9963	.9831	.9911	.9861
INITIAL ESTIMATES b/							
1959 IV	.9316	.9511	.9482	.9545	.9465	.9593	.9499
1960 I	1.0043	1.0031	1.0032	1.0028	1.0033	1.0025	1.0037
1969 I	.8332	.8822	.8753	.8903	.8711	.9018	.8792
1969 II	1.0570	1.0403	1.0427	1.0375	1.0441	1.0336	1.0413

a/ Numbers represent estimated ratios of actual to normal trade volumes; for all other quarters these ratios are one. In general, these factors must be transformed before they are appropriate for use as dummy variables in trade equations; see Section 5.

b/ Initial estimates equal revised factors in all but the four listed quarters. Recall Sections 3a and 3d for distinction between initial and revised factors.

Table 6: Dock Strike Adjustment Factors: EXPORTS a/

	Agricultural Products	Capital Goods	Consumer Goods	Consumer Non-durables	Consumer Durables	Industrial Supplies	All Items
REVISED FACTORS							
1959 III	1.0586	1.0320	1.0343	1.0391	1.0274	1.0522	1.0395
IV	.9390	.9667	.9643	.9592	.9714	.9456	.9589
1960 I	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1962 III	1.0594	1.0326	1.0349	1.0399	1.0280	1.0532	1.0402
IV	.9678	.9824	.9811	.9784	.9849	.9712	.9782
1963 I	.9216	.9570	.9539	.9474	.9631	.9298	.9469
II	1.0083	1.0045	1.0049	1.0055	1.0039	1.0074	1.0056
1964 III	1.0602	1.0324	1.0347	1.0396	1.0278	1.0529	1.0400
IV	1.0669	1.0360	1.0386	1.0440	1.0309	1.0588	1.0444
1965 I	.8069	.8961	.8886	.8728	.9108	.8303	.8718
II	1.0276	1.0148	1.0159	1.0182	1.0127	1.0242	1.0183
1968 III	1.0536	1.0279	1.0300	1.0342	1.0240	1.0456	1.0345
IV	.9709	.9849	.9838	.9815	.9870	.9753	.9813
1969 I	.7802	.8855	.8773	.8599	.9018	.8130	.8587
II	1.1065	1.0555	1.0595	1.0679	1.0476	1.0907	1.0685
1971 III	.9890	.9987	1.0002	1.0265	.9636	1.0046	.9895
IV	.8145	.9123	.8939	.8662	.9324	.8344	.8923
1972 I	1.1173	1.0542	1.0651	1.0740	1.0528	1.1003	1.0694
II	.9778	.9897	.9876	.9854	.9906	.9808	.9869
INITIAL ESTIMATES b/							
1959 IV	.9349	.9645	.9619	.9565	.9695	.9420	.9562
1960 I	1.0041	1.0022	1.0024	1.0027	1.0019	1.0036	1.0027
1969 I	.8297	.9104	.9039	.8903	.9231	.8535	.8894
1969 II	1.0589	1.0307	1.0329	1.0375	1.0263	1.0501	1.0378

a/ Numbers represent estimated ratios of actual to normal trade volumes; for all other quarters these ratios are one. In general, these factors must be transformed before they are appropriate for use as dummy variables in trade equations; see Section 5.

b/ Initial estimates equal revised factors in all but the four listed quarters. Recall Sections 3a and 3d for distinction between initial and revised factors.

Section 3, for the ratios of actual trade (T) to normal trade (T_n) during quarters affected by strikes. Tables 5 and 6 present the resulting numerical estimates of the ratio T/T_n for the various groups of imports and exports.

5. Empirical Performance of Dock Strike Adjustment Factors

Our dock strike adjustment factors (D) have been constructed as estimates, in each strike-affected quarter, of the ratios of actual trade volumes (T) to the "normal" trade volumes (T_n) that would have occurred in the absence of strikes.[16/] If T_n is explained by some "true" function

$$T_n = f \text{ (income, prices, other explanatory variables)} \qquad (5.1)$$

then

$$T = (T/T_n)\, f = D.f \qquad (5.2)$$

and

$$\log T = \log f + \log D \qquad (5.3)$$

On the basis of condition (5.3), we can test the appropriateness of our construction of D by using logD as a dummy variable in a regression explaining logT and examining whether the estimated coefficient on logD is close to one.[17/] Moreover, on the assumption that log D is uncorrelated

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16/ We are assuming that unit values (prices) of tradeables are unaffected by dock strikes. Strictly speaking, the D factors have been constructed as estimates of the ratios of actual trade values to "normal" trade values.

17/ It is important to note that D must be transformed before it becomes an appropriate dummy variable. If the independent variable in our trade equation was T instead of log T, the appropriate analog of (5.3) would be $T = f + D'$, where $D' = T - T_n = T(1-1/D)$. Thus, the appropriate dock strike dummy in such cases is constructed from both the dock strike adjustment factors and observations on the dependent variable.

with the variables that explain log f, we do not need to know the "true" form of the trade equation to test the coefficient on log D.

Our tests of the appropriateness of D are based primarily on the simple specification hypothesis:

$$\log TVAL_t = a + bt + c \log D_t + u_t \qquad (5.4)$$

where

TVAL = value of trade in current dollars

t = index of time (t=1 for 1958 I, t = 67 for 1974 III)

a,b,c = parameters to be estimated

u = stochastic error term

This choice of dependent variable avoids the problem of choosing a deflator, or obversely, of limiting the sample to a period for which an "appropriate" deflator is available. (For most of our trade categories, unit value indexes are not available on a quarterly basis before 1967.) The time index is intended as a proxy for trends in omitted independent variables, such as income and prices. On the presumption that either (i) trends in these omitted variables shift over time, or (ii) the impact of given trends on log TVAL shifts over time, due perhaps to a constant impact on trade volumes combined with a shifting rate of inflation in the prices of tradeables, the error terms are very likely to exhibit positive first-order serial correlation. Ordinary least-squares regressions in fact show very low Durbin-Watson statistics, so we have adopted the Cochrane-Orcutt procedure to adjust for serial correlation.

It should be emphasized that our tests rely critically on the assumption that log D is uncorrelated with the omitted price deflators and the

omitted cyclical components of the variables that enter the "true" relationship (5.1).[18/] If log D is highly correlated with an omitted variable, then we are not justified in expecting the estimates of c (from 5.4) to equal one (the coefficient of log D in 5.3).[19/] It should also be stressed that despite the impressive t-statistics associated with the estimates of a and b (reported below), model (5.4) is not appropriately designed for forecasting purposes; if it is desired to forecast TVAL on the basis of time and dock strikes alone, attempts should at least be made to pick up shifts in the b-coefficients over time.

Tables 7 and 8 present the regression results based on our initial specification of the dock strike adjustment factors. Table 9 compares the c-coefficient estimates and their t-values: (i) for estimates of (5.4) over the full sample period using a Cochrane-Orcutt correction for first-order serial correlation; (ii) for ordinary least squares estimates of (5.4), unadjusted for serial correlation, over the full sample period; and (iii) for specification (5.4) estimated with a Cochrane-Orcutt first-order correlation over roughly half of the sample period. (The low Durbin-Watson statistics mentioned above are reported in column 6 of Table 9.)

18/ If P is the omitted price deflator and $TVAL_n = P.T_n$ is the "normal" value of trade, then

$$TVAL = P \cdot f(\ ) \cdot \frac{TVAL}{TVAL_n} = P \cdot f(\ ) \cdot D$$

and

$$\log TVAL = \log P + \log f + \log D$$

19/ For a discussion of the omitted variable problem see H. Theil (1971), Principles of Econometrics, New York : John Wiley and Sons, pp 548-50.

Table 7: Results for Regressions (5.4) based on Initial Formulas for D: IMPORTS

Commodity group	estimated coefficients a	b	c	$\bar{R}^2$	D.W.	RHO*
Foods, feeds, beverages (#0)	6.37 (55.8)	.0204 (7.95)	1.14 (12.1)	.972	2.32	.858
Consumer goods (#4)	5.59 (57.0)	.0390 (18.0)	.593 (4.97)	.996	1.91	.869
Consumer nondurables (#40)	4.58 (55.7)	.0390 (20.4)	.536 (3.65)	.994	2.02	.800
Consumer durables (#41)	4.85 (39.5)	.0419 (15.7)	.683 (5.88)	.996	1.82	.886
Industrial supplies (#1)	7.52 (55.7)	.00503 (1.06)	.376 (3.33)	.984	1.71	1.09*
Capital goods (#2)	4.42 (34.4)	.0495 (16.9)	.903 (3.58)	.993	2.28	.831
All items	5.98 (11.2)	-.027 (-1.76)	7.31 (8.43)	.996	1.66	1.02*

Sample period is 1958 I - 1974 III.
t-values in parentheses.

Import data are seasonally-adjusted and correspond to the Census end-use numbers in the parentheses following commodity-group titles, in millions of dollars. Imports of "all items" are seasonally-adjusted balance-of-payments basis, in millions of dollars.

*RHO is the coefficient of first-order serial correlation in the residuals, estimated by the Cochrane-Orcutt procedure. For all cases in which RHO > 1, the Hildreth-Lu procedure was also used to scan the range $.8 \leq$ RHO ≤ 1. In each case this procedure selected RHO=1 and changed the estimated c-coefficients by less than .001, although changes in the estimated a and b coefficients were very large.

Table 8: Results for Regressions (5.4) based on Initial Formulas for D: EXPORTS

Commodity group	estimated coefficients a	b	c	$\bar{R}^2$	D.W.	RHO*
Agricultural products	5.79 (8.26)	.039 (.312)	1.26 (9.03)	.956	2.05	.947
Capital goods (#2)	4.70 (6.47)	.0558 (6.00)	.935 (8.96)	.996	1.97	.976
Consumer goods (#4)	3.34 (3.75)	.0531 (4.49)	1.34 (10.5)	.988	2.34	.975
Consumer nondurables (#41)	4.68 (22.6)	.028 (6.76)	1.25 (11.1)	.984	2.34	.927
Consumer durables (#400)	-7.61 (-4.64)	.119 (3.36)	1.59 (7.65)	.984	2.29	.990
Industrial supplies (#1)	-16.3 (-1.88)	-.146 (-2.33)	1.23 (12.7)	.979	1.58	1.01*
All items	7.38 (27.2)	-.022 (-1.61)	1.13 (12.6)	.993	1.68	1.02*

Sample period is 1960 I - 1974 III for agricultural products and all items, 1958 I - 1974 III for all other commodity groups.

t-values in parentheses

Export data are seasonally-adjusted and correspond to the Census end-use numbers in the parentheses following the commodity-groups titles, in millions of dollars. Exports of "all items" are seasonally-adjusted balance-of-payments basis, in millions of dollars. Exports of agricultural products are seasonally-adjusted Survey of Current Business data, in millions of dollars.

*RHO is the coefficient of first-order serial correlation in the residuals, estimated by the Cochrane-Orcutt procedure. For all cases in which RHO $>$ 1, the Hildreth-Lu procedure was also used to scan the range .8 $\leq$ RHO $\leq$ 1. In each case this procedure selected RHO=1 and changed the estimated c-coefficients by less than .001, although changes in the estimated a and b coefficients were very large.

Table 9. Estimated c-coefficients and t-values from initial trend tests for U

	Full-sample with Cochrane-Orcutt correction			Full-sample Ordinary Least Squares			Subsample estimates with Cochrane-Orcutt correction	
	c	t- value associated with c	t-value associated with c-1	c	t-value associated with c	D. W.	c	t-value associated with c
IMPORTS								
Food, feeds, beverages	1.14	12.1	1.49	1.24	4.28	.274	1.36 b/	9.96
Consumer goods	.593	4.97	-3.41	.672	2.00	.277	1.06 b/	7.25
Nondurables	.536	3.65	-3.15	.512	1.45	.393	.852 b/	5.33
Durables	.683	5.88	-2.73	.779	2.25	.255	.91. b/	6.75
Industrial supplies	.376	3.33	-5.53	.657	1.10	.141	.471 c/	2.62
Capital goods	.903	3.58	-.385	1.23	1.96	.370	1.71 c/	6.49
All items	.731	8.43	-3.10	.938	2.17	.141	.989 b/	8.89
EXPORTS								
Agricultural products	1.26	9.03	1.86	1.65	2.79	.163	1.39 b/	6.92
Capital goods	.935	8.96	-.623	1.18	2.65	.176	.786 c/	5.81
Consumer goods	1.34	10.5	2.66	1.60	2.67	.138	1.29 c/	5.60
Nondurables	1.25	11.1	2.22	1.38	3.50	.231	1.35 c/	6.24
Durables	1.59	7.65	2.84	2.18	2.14	.126	1.22 c/	3.40
Industrial supplies	1.23	12.7	2.37	1.42	3.42	.169	1.43 c/	10.9
All items	1.13	12.6	1.45	1.43	2.78	.112	1.22 b/	9.66

a/ Full-sample periods and commodity groups are defined in Tables 7 and 8.
b/ Subsample period is 1967 I - 1974 II, chosen for comparison with Hooper and Morisse, "Forecasting Techniques and the December Quarterly Trade Forecasts," Federal Reserve Board memorandum, December 13, 1974.
c/ Subsample period is 1968 I - 1974 II, chosen for comparison with Hooper and Morisse, ibid.

On the basis of the t-values in the second column of Table 9, all of the c-coefficients estimated in the first column may be regarded as greater than zero with a very high degree of confidence. On the basis of the t-values in the third column of Table 9, however, a majority of c-coefficients may also be regarded as different from one (since c-1 may be regarded as different from zero) with a very high degree of confidence.

Nevertheless, the casual impression conveyed by a comparison of the full sample and subsample estimates of the c-coefficients is that these parameters are not as precisely estimated as the high t-values (in columns 2 and 3) suggest. In any case, it does not seem appropriate to reject these dock strike dummies flatly on the grounds that the t-tests indicate the estimated c-coefficients to be significantly different from one (given the fact that all coefficients in column are exceed .37 and are less than 1.6). In the first place, we can never be very confident that our specification form satisfies the conditions required for the t-test to be valid.[20/] Moreover, it may be that the dock strike dummies are slightly correlated with omitted variables, in which case we cannot expect the c-coefficients to precisely equal one.[21/]

20/ In particular, the t-tests are not valid if the Cochrane-Orcutt procedure does not succeed in completely eliminating the serial dependence of the residuals; see J. Johnston, Econometric Methods, second edition, New York: McGraw-Hill, 1972, pp.246-9.

21/ If we could be confident that the full-sample results with Cochrane-Orcutt correction indeed reflected the "true model," Table 9 would show an interesting counterexample to the presumption (see Johnston, ibid., p249) that ordinary least squares is likely to understate the sampling variances in the presence of serial correlation. The t-values associated with the Cochrane-Orcutt correction exceed those associated with the ordinary least squares procedure in all cases, even though the estimated c-coefficients are lower with the Cochrane-Orcutt correction in all cases but one.

The dock strike dummies should also be judged on the basis of the patterns of residuals that emerge from regressions (5.4). Table 10 describes these residuals for the ten non-overlapping commodity groups. (Imports and exports of consumer goods and all items are excluded to avoid double counting.) The table shows that the average frequency of residuals larger than one standard devation is one and one-half times greater during strike episodes (38 percent) than during other quarters (25 percent). The last two columns also suggest that in the 1959-60, 1968-69 and 1971-72 strikes, better assumptions might be made about the timing of dock strike impacts (leaving aside the magnitudes of these impacts), since for each of these episodes the table shows a large number of large positive residuals in one quarter balanced by a large number of large negative residuals in another quarter. It seems unlikely that this pattern of residuals could be due to fluctuations in omitted income variables, which tend to exhibit cycles longer than the cycles in the signs of these residuals, although the pattern could be due to fluctuations in omitted price variables.

On the basis of these residual patterns we decided to re-examine the assumptions which underlie the general strike-impact formulas that were initially adopted in Section 3. Although this is a procedure of seeking rationalizations for revising the general formulas ex-post, it is apparent from the patterns of residuals that our ex-ante formulas very probably are at least slightly misspecified for the 1959-60, 1968-69 and 1971-72 strike episodes. Thus, if convincing rationalization for revision can be found, we feel that a modification of the general strike-impact formulas is warranted. We have tried to err in the direction of rejecting ex-post

Table 10: Signs of Residuals Greater Than One Standard Error of Regression, Based on Initial Formulas for D.

	MFFB	MCND	MCD	MIS	MKG	XAG	XKG	XCND	XCD	XIS	Total +	Total -
59 III									+		1	0
IV		+2		+	+	Outside sample	+			+2	5(7)	0
60 I				-	-			-	-	+	1	4
62 III	-				-	-	-2		-	-	0	6(7)
IV	+	-									1	1
63 I						+				+	2	0
II	-		-								0	2
64 III	-2										0	1(2)
IV			-		-						0	2
65 I		+	+2	+	+		-		-		4(5)	2
II	-						+2		+		2(3)	1
68 III											0	0
IV							-	-2			0	2(3)
69 I				-2	-	-2		+		-	1	4(6)
II		+	+	+	+	+2	-			+	6(7)	1
71 III	+		-					+2	+2		3(5)	1
IV	-2			-	-		-	-3	-2	-2	0	7(12)
72 I		+	+2	-	+	-	-			-	3(4)	4
II				+		+		+	+		4	0
Percent of Residuals Greater than one Standard Error of Regression During Strike Quarters	37	26	32	42	47	38	42	32	42	42	Average Percent 38	
Other Quarters	23	26	30	26	21	21	30	26	17	26	25	

Residuals are from regressions using the Cochrane-Orcutt procedure to adjust for first-order serial correlation, and are computed as actual minus estimated values of the dependent variable.

Blank squares indicate residuals less than one standard deviation; signs of residuals greater than two or three standard deviations are followed by the numbers 2 or 3, respectively.

The symbol headings on the first ten columns respectively represent imports of foods-feeds-and-beverages, consumer nondurables, consumer durables, industrial supplies, and capital goods, and exports of agricultural products, capital goods, consumer nondurables, consumer durables and industrial supplies.

rationalization, however, on the recognition that an improvement in the residuals may either reflect a true improvement in the accuracy of the strike adjustment factors or any of the apparent but erroneous improvements that are bound to emerge randomly in data-mining experiments. In particular, given that many important variables have been omitted from our regression equations, the rationalizations for adjustment and the implied changes in parameter values should be quite plausible if we are to have a high degree of subjective confidence that any improvements in the residuals are due to a washing-out of true specification errors in the strike adjustment factors, rather than a random washing-out of other specification errors.

In the end our reexamination led us to revise the general strike-impact formulas for the 1959-60 and 1968-69 episodes, leaving unchanged the formulas for 1971-72. For the 1968-69 case the revision can be defended strongly; we abandoned the simplifying assumption that all ports returned to work when the Port of New York re-opened, and based our revised formulas on accurate information about the sequence of dates on which individual ports re-opened (see Section 3d). In the 1959-60 case we are considering a very short 8-day strike with a recovery period beginning on December 1; and it seemed reasonable to adopt the revised assumption that the recovery from such a short strike occurred entirely during the pre-Christmas season, instead of being spread out over a 12-week period (see Section 3a). For the 1971-72 case our best rationalizations for revision were not as convincing, so we abandoned them.

Tables 11-14, based on revised adjustment factors, are the analogs of Tables 7-10. Comparisons of Tables 7 and 11 and Tables 8 and 12 reveal

Table 11: Results for Regressions (5.4) with Revised Strike Adjustments: IMPORTS

Commodity Group	Estimated Coefficients a	b	c	$\bar{R}^2$	D.W.	RHO*
Food, feeds, beverages (#0)	6.37 (55.9)	.0203 (7.95)	1.05 (12.0)	.972	2.34	.857
Consumer goods (#4)	5.59 (55.7)	.0391 (17.7)	.555 (5.30)	.997	1.86	.874
Consumer nondurables (#40)	4.58 (55.0)	.0390 (20.1)	.515 (3.93)	.994	1.99	.805
Consumer durables (#41)	4.85 (39.0)	.0419 (15.6)	.644 (6.08)	.996	1.79	.888
Industrial supplies (#1)	7.52 (59.5)	.00588 (1.35)	.395 (3.92)	.985	1.63	1.09*
Capital goods (#2)	4.41 (33.4)	.0496 (16.5)	.884 (3.99)	.993	2.25	.838
All items	7.03 (26.3)	-.0144 (-1.28)	.696 (9.37)	.996	1.47	1.02*

Sample period is 1958 I - 1974 III.
t-values in parentheses.

Import data are seasonally-adjusted and correspond to the Census end-use numbers in the parentheses following commodity-group titles, in millions of dollars. Imports of "all items" are seasonally-adjusted balance-of-payments basis, in million of dollars.

*RHO is the coefficient of first-order serial correlation in the residuals, estimated by the Cochrane-Orcutt procedure. For all cases in which RHO $>$ 1, the Hildreth-Lu procedure was also used to scan the range $.8 \leq$ RHO ≤ 1. In each case this procedure selected RHO=1 and changed the estimated c-coefficients by less than .001, although changes in the estimated a and b coefficients were very large.

Table 12: Results for Regressions (5.4) with Revised Strike Adjustments: EXPORTS

Commodity Group	Estimated Coefficients a	b	c	$\bar{R}^2$	D.W.	RHO*
Agricultural products	5.39	.0442	1.21	.963	1.82	.957
	(6.13)	(3.13)	(10.5)			
Capital goods (#2)	5.61	.0470	.817	.995	2.11	.967
	(12.1)	(6.75)	(8.09)			
Consumer goods (#4)	4.10	.0454	1.19	.987	2.50	.967
	(6.47)	(4.75)	(9.52)			
Consumer Nondurables (#41)	4.75	.0265	1.13	.982	2.47	.915
	(26.4)	(7.14)	(10.2)			
Consumer Durables (#400)	-2.57	.0934	1.40	.983	2.40	.986
	(-.898)	(3.47)	(7.17)			
Industrial Supplies (#1)	.691	-.0753	1.14	.980	1.57	1.01*
	(.299)	(-2.17)	(13.2)			
All items	7.40	-.0220	1.02	.993	1.74	1.02*
	(27.8)	(-1.63)	(12.7)			

Sample period is 1969 I - 1974 III for agricultural products and all items, 1958 I 1974 III for all other commodity groups.

t-values in parentheses

Export data are seasonally-adjusted and correspond to the Census end-use numbers in the partheneses following the commodity-groups titles, in millions of dollars. Exports of "all items" are seasonally-adjusted balance-of-payments basis, in millions of dollars. Exports of agricultural products are seasonally-adjusted Survey of Current Business data, in millions of dollars.

*RHO is the coefficient of first-order serial correlation in the residuals, estimated by the Cochrane-Orcutt procedure. For all cases in which RHO$\geq$1, the Hildreth-Lu procedure was also used to scan the range .8 $\leq$ RHO $\leq$ 1. In each case this procedure selected RHO=1 and changed the estimated c-coefficients by less than .001, although changes in the estimated a and b coefficients were very large.

Table 13: Estimated c-coefficients and t-values with Revised Strike Adjustments[a/]

	Full-sample with Cochrane-Orcutt correction			Subsample estimates with Cochrane-Orcutt correction	
	c	t-value associated with c	t-value associated with c-1	c	t-value associated with c
IMPORTS					
Foods, feeds, beverages	1.05	12.0	.571	1.15 b/	8.80
Consumer goods	.555	5.30	-4.25	.818 b/	6.35
Nondurables	.515	3.93	-3.70	.707 b/	5.35
Durables	.644	6.08	-3.36	.805 b/	6.57
Industrial supplies	.395	3.92	-6.00	.473 c/	3.26
Capital goods	.884	3.99	-.524	1.37 c/	6.51
All items	.696	9.37	-4.09	.847 b/	9.70
EXPORTS					
Agricultural products	1.21	10.5	1.82	1.27 b/	8.63
Capital goods	.817	8.09	-1.81	.626 c/	4.94
Consumer goods	1.19	9.52	1.52	1.06 c/	4.89
Nondurables	1.13	10.2	1.17	1.14 c/	5.39
Durables	1.40	7.17	2.05	1.00 c/	3.27
Industrial supplies	1.14	13.2	1.62	1.24 c/	10.9
All items	1.02	12.7	.249	1.03 b/	9.43

a/ Full sample periods and commodity groups are defined in Tables 7 and 8.

b/ Subsample period is 1967 I - 1974 II, chosen for comparison with Hooper and Morisse, "Forecasting Techniques and the December Quarterly Trade Forecasts," Federal Reserve Board memorandum, December 13, 1974.

c/ Subsample period is 1968 I - 1974 II, chosen for comparison with Hooper and Morisse, ibid.

Table 14: Signs of Residuals Greater Than One Standard Error of Regression Based on Revised Strike Adjustment Factors

	MFFB	MCND	MCD	MIS	MKG	XAG	XKG	XCND	XCD	XIS	Total +	Total -
59 III									+		1	0
IV		+2		+	+	Outside sample	+			+2	5(7)	0
60 I				-	-					+	1	2
62 III					-	-	-		-	-	0	5
IV	+	-									1	1
63 I						+				+	2	0
II	-		-								0	2
64 III	-2										0	1(2)
IV					-						0	1
65 I			+	+	+		-		-		3	2
II							+2		+		2(3)	0
68 III											0	0
IV							-	-2			0	2(3)
69 I				-		-2	+	+	+	-	3	3(4)
II	-	+		+		+	-	-	-		3	4
71 III	+	-	-					+	+2		3(4)	2
IV	-3			-	-		-	-3	-2	-2	0	7(13)
72 I		+	+2	-	+	-					3(4)	2
II				+		+		+			3	0
Percent of Residuals Greater Than One Standard Error of Regression During											Average Percent	
Strike Quarters	32	26	21	42	37	38	42	32	42	32	34	
Other Quarters	23	28	34	28	21	28	28	23	19	28	26	

Residuals are from regressions using the Cochrane-Orcutt procedure to adjust for first-order serial correlation, and are computed as actual minus estimated values of the dependent variable.

Blank squares indicate residuals less than one standard deviation; signs of residuals greater than two or three standard deviations are followed by the numbers 2 or 3, respectively.

The symbol headings on the first ten columns respectively represent imports of foods - feeds-and-beverages, consumer nondurables, consumer durables, industrial supplies, and capital goods, and exports of agricultural products, capital goods, consumer nondurables, consumer durable and industrial supplies.

strikingly similar estimates of the a and b coefficients in at least half the cases, although in some cases the estimates of these coefficients are affected considerably. In column three of Table 13, the critical t-value is 1.67 for the one-tailed 95-percent confidence test and 1.30 for the 90-percent confidence test; and on this basis most of the c-coefficients may still be regarded as different from one with a very high degree of confidence, even though all lie within the range between .39 and 1.4. This suggests the unsurprising conclusion that our construction of strike adjustment factors still involves significant errors.22/

Comparison of Tables 10 and 14 shows that the suspicious cyclical patterns of residuals have been partially eliminated by the revisions. There remain three strike-affected quarters (1959 IV, 1962 III, and 1971 IV) in which estimated trade values contain large errors of the same sign for at least half of the commodity groups; but these large residuals could be caused by factors other than errors in the strike adjustment variables. During strike-affected quarters the average frequency of large residuals for the cross-section of commodity groups is 1.3 times as large as it is during other quarters, based on the revised strike adjustment factors.

We conclude on the note that our empirical tests of the revised strike adjustment factors do not suggest any obvious deficiences that might easily be remedied. On the other hand, it is obvious that significant deficiences, which are difficult to remedy, are inherent in the numerous simplifying assumptions that underlie the strike adjustment calculations.

22/ As noted above, this conclusion could be challenged by asserting either that serial correlation invalidates the t-tests or that the dock strike dummies are correlated with omitted variables.

We do not really need formal t-tests to tell that we have been stretching the truth. Nevertheless, we feel that the prior-information content of our strike adjustment factors far exceeds that of any other set of dock strike dummies.

Appendix A: Chronology of Major U.S. Dock Strikes Since 1958[23/]

1.) East and Gulf Coast Ports, 1959. Contract expired 12:01 AM on October 1. Shutdown began immediately, surprising union leaders, employers and mediators, who thought they had arranged a 15-day extension. Taft-Hartley was invoked. Ports reported back to work on October 9. Three-year contract was reached on December 1 and ratified by rank and file on December 10.

2. East and Gulf Coast Ports, 1962-63. Strike began October 1, 1962 upon expiration of work contracts. As in the four previous Atlantic and Gulf Coasts contract negotiations, a temporary restraining order (Taft-Hartley Injunction) was issued on October 4, with return to work on October 6. Strike resumed at 5 p.m. on Sunday December 23 at the end of the 80-day injunction period. All ports returned to work on January 26.

3. East and Gulf Coasts Ports, 1964-65. Strike began at one minute after midnight, October 1, 1964, and was ended the same day at 8 p.m. by a 10-day restraining order. Return to work began at 7 p.m., October 2. The injunction was extended through the remaining 70 days of the Taft-Hartley "cooling off" period. A master contract was outlined on December 16, with agreement to continue work 20 days past the December 20 strike deadline

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23/ Principal sources of the information provided in this section are:

U.S. Department of Labor, Bureau of Labor Statistics. "Fact Sheet on Collective Bargaining in the Longshore Industry, 1958-70." News Release 71-470, September 10, 1971 (plus updated information provided by Mr. Harry Cohaney of B.L.S.).

U.S. Department of Labor. Impact of Longshore Strikes on the National Economy. January 1970

The New York Times, various issues.

in order to allow time for union membership to ratify the new contract.[24/] However, port activity was below normal during this 20-day interval. Due partly to confusion over new contract terms, over half of New York piers were closedby a 2-day wildcat strike on December 21 and 22. Baltimore was also shut down from December 21 through the Christmas holidays, and some South Atlantic and Gulf ports were operating below normal. On January 8 the New York rank and file rejected a revised master contract, to the shock of I.L.A. President Gleason, who blamed rejection on a lack of information and understanding by the union membership. All ports from Maine to Texas were struck at 12:01 a.m. on January 11. On January 20, the New York membership accepted the same contract, after "an intensive educational campaign." On February 10 all ports were still on strike (settlements had not been reached in the Galveston and Miami areas[25/], and President Johnson named an informal committee to catalyze a return to work. A return to work order, effective February 13, reopened all ports north of Norfolk, along with Mobile and New Orleans. The strike continued in other South Atlantic and Gulf ports, which began returning to work on March 6.

4. East and Gulf Coasts, 1968-69. Strike began on October 1, 1968 with cargo operations resumed in all ports on October 3, following a Taft-Hartley return-to-work order. Strike resumed on December 21 after the

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24/ The master contract, negotiated in New York, came to terms on 5 main items: wages, duration of contract, hours of work, pensions and welfare. These terms applied as well to other Atlantic ports as far south as Norfolk, with local problems to be negotiated separately. South Atlantic and Gulf Ports bargained separately on all issues.

25/ At the time, the ILA followed the rule that all ports must settle before any port returned to work.

injunction period expired. New York returned to work on February 15; New Orleans, Baltimore, Norfolk, Miami, and Bridgeport on February 22; Tampa, Charleston, Savvannah and Wilmington on February 24; Philadelphia and Mobile on February 25; Portland on March 17; Boston and the last of the Atlantic ports, Galveston and Houston on April 2; and the last of the Gulf ports on April 13.[26/]

5. East, Gulf and West Coasts, 1971-72. West Coast ports struck on July 1, 1971 upon expiration of work contracts. This was the first major West Coast strike since 1948, with little evidence of advance buying in anticipation of the strike.[27/] On September 1, 9 of Chicago's 10 largest grain elevators were closed by a strike on Grain Workers Local 418 (an affiliate of the I.L.A.), tying up exports of corn and soybeans. On October 1, 45,000 East and Gulf Coast Longshoremen struck, joining 15,000 West Coast longshoremen. A back-to-work order for West Coast longshoremen and Chicago grain handlers was obtained on October 6,[28/] with work resuming on October 9. East and Gulf Coast longshoremen returned to work on November 29 (negligible numbers on November 28) under a Taft-Hartley injunction, but New York docks

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26/ More detailed information on back-to-work dates is provided in a Maritime Administration memorandum, "Longshore Strike - Atlantic and Gulf Ports: December 21, 1968 - April 13, 1969," dated April 15, 1969.

27/ In addition to the history of West Coast settlement without strikes, advance buying may have been discouraged by the fact that each of the last 7 East and Gulf Coast strikes had been followed by 80-day work resumptions under Taft-Hartley injunctions.

28/ At the time, the East and Gulf Coast strike was not judged to be critical, partly because shippers had greatly accelerated trade in recent months in anticipation on the strike.

were "comparatively inactive" during the first week of return. West Coast cooling off period ended December 25, but ILWU President Bridges declared that workers would not resume their strike until at least January 10. West Coast strike resumed January 17, followed by a settlement on February 19 and return to work beginning February 21. Cooling-off period for East and Gulf Coasts expired February 16, but workers remain on their jobs. On March 8, the union memberships in most East and Gulf Coast ports ratified a new contract, with Philadelphia becoming the last port to reach settlement on March 29.

Appendix B: Hours Worked by Members of the International Longshoremen's Association in the Port of New York

Table B.1 Average I.L.A. Weekly Hours per Month, 1960-63
in units of one thousand hours

	1960	1961	1962	1963
January	783	810	800	166
February	836	797	817	1,092
March	906	871	887	967
April	872	778	845	857
May	849	722	802	788
June	861	698	786	782
July	787	765	777	781
August	824	757	769	769
September	803	767	800	760
October	815	771	718	796
November	803	800	781	795
December	817	785	961	821
Total hours worked per year	43,734	40,529	41,641	40,903

Table B.2 Thousands of I.L.A. Hours Worked Per Week, 1964

Week Ending	Hours	Week Ending	Hours
January 4	697	July 7	757
11	772	14	730
18	924	21	785
25	863	28	764
		August 4	746
February 3	850	11	726
10	845	18	758
17	793	25	720
24	866	September 1	766
March 3	861	8	688
10	879	15	826
17	910	22	782
24	821	29	931
31	788	October 6	568
April 7	887	13	748
14	856	20	808
21	861	27	802
28	789	November 3	746
May 5	854	10	826
12	787	17	761
19	778	24	845
26	792	December 1	895
June 2	768	8	948
9	768	15	1,198
16	767	22	952
23	768	29	602
30	775		
		Total	42,026

Table B.3 Thousands of I.L.A. Hours Worked Per Week, 1965

Week Ending		Hours	Week Ending		Hours
January	5	637	July	6	663
	12	610		13	721
	19	56		20	718
	26	70		27	680
February	2	64	August	3	806
	9	56		10	740
	16	679		17	713
	23	1,198		24	727
March	2	1,232		31	793
	9	1,172	September	7	795
	16	1,076		14	916
	23	994		21	880
	30	985		28	836
April	6	1,038	October	5	852
	13	953		12	757
	20	816		19	844
	27	984		26	828
May	4	901	November	2	774
	11	863		9	892
	18	834		16	833
	25	814		23	874
June	1	725		30	860
	8	846	December	7	898
	15	861		14	858
	22	735		21	924
	29	708		28	736
			Total		40,853

Table B.4 Thousands of I.L.A. Hours Worked Per Week, 1966

Week Ending		Hours	Week Ending		Hours
January	4	771	July	3	845
	11	806		10	727
	18	839		17	847
	25	848		24	797
February	1	814		31	828
	8	972	August	7	783
	15	870		14	793
	22	835		21	818
March	1	907		28	775
	8	960	September	4	774
	15	948		11	713
	22	938		18	793
	27	602		25	789
April	3	868	October	2	843
	10	698		9	841
	17	950		16	772
	24	899		23	822
May	1	889		30	893
	8	833	November	6	808
	15	831		13	717
	22	859		20	905
	29	831		27	733
June	5	738	December	4	858
	12	858		11	809
	19	846		18	844
	26	802		25	814
				31	673
			Total		43,651

Table B.5 Thousands of I.L.A. Hours Worked Per Week, 1967

Week Ending		Hours	Week Ending		Hours
January	8	766	July	2	756
	15	840		9	635
	22	843		16	754
	29	824		23	675
February	5	803		30	742
	12	810	August	6	696
	19	835		13	700
	26	821		20	717
March	5	878		27	735
	12	881	September	3	740
	19	917		10	599
	26	857		17	698
April	2	944		24	678
	9	860	October	1	758
	16	762		8	680
	23	812		15	672
	30	835		22	640
May	7	812		29	489
	14	784	November	5	634
	21	747		12	883
	28	724		19	849
June	4	667		26	745
	11	769	December	3	813
	18	764		10	811
	25	733		17	839
				24	772
				31	676
			Total Hours		39,700

Table B.6 Thousands of I.L.A. Hours Worked Per Week, 1968

Week Ending		Hours
January	7	704
	14	748
	21	863
	28	881
February	4	853
	11	821
	18	742
	25	749
March	3	802
	10	815
	17	819
	24	55
	31	482
April	7	1,003
	14	766
	21	916
	28	867
May	5	806
	12	800
	19	695
	26	751
June	2	699
	9	575
	16	879
	23	748
	30	772
July	7	643
	14	793
	21	762
	28	799
August	4	821
	11	795
	18	740
	25	787
September	1	820
	8	689
	15	876
	22	947
	29	1,037
October	6	356
	13	565
	20	620
	27	710
November	3	633
	10	669
	17	720
	24	786
December	1	755
	8	878
	15	916
	22	738
	29	34
Total Hours:		38,522

Table B.7 Thousands of I.L.A. Hours Worked Per Week, 1969

Week Ending		Hours	Week Ending		Hours
January	5	41	July	6	614
	12	41		13	712
	19	36		20	720
	26	37		27	644
February	2	40	August	3	755
	9	44		10	726
	16	240		17	684
	23	937		24	678
March	2	957		31	705
	9	977	September	7	606
	16	970		14	721
	23	997		21	665
	30	926		28	671
April	6	701	October	5	661
	13	927		12	675
	20	909		19	583
	27	920		26	627
May	4	870	November	2	667
	11	815		9	665
	18	813		16	659
	25	779		23	652
June	1	675		30	583
	8	719	December	7	691
	15	756		14	649
	22	664		21	721
	29	728		28	490
			Total		33,767

Table B.8 Thousands of I.L.A. Hours Worked Per Week, 1970

Week Ending		Hours	Week Ending		Hours
January	4	620	July	5	527
	11	687		12	616
	18	671		19	599
	25	711		26	570
February	1	727	August	2	612
	8	655		9	566
	15	620		16	595
	22	706		23	596
March	1	594		30	588
	8	686	September	6	568
	15	728		13	552
	22	701		20	569
	29	615		27	595
April	5	678	October	4	601
	12	648		11	589
	19	636		18	552
	26	636		25	614
May	3	657	November	1	632
	10	634		8	563
	17	592		15	573
	24	626		22	642
	31	572		29	478
June	7	572	December	6	582
	14	625		13	454
	21	607		20	688
	28	659		27	489
			Total		31,898

Table B.9 Thousands of I.L.A. Hours Worked Per Week, 1971

Week Ending		Hours	Week Ending		Hours
January	3	512	July	4	575
	10	656		11	498
	17	576		18	585
	24	588		25	580
	31	611	August	1	575
February	7	632		8	634
	14	566		15	633
	21	553		22	646
	28	591		29	621
March	7	571	September	5	769
	14	595		12	670
	21	576		19	790
	28	541		26	825
April	4	573	October	3	509
	11	553		10	28
	18	594		17	25
	25	558		24	16
May	2	577		31	28
	9	559	November	7	31
	16	563		14	19
	23	532		21	32
	30	554		28	34
June	6	494	December	5	458
	13	570		12	574
	20	548		19	559
	27	588		26	451
			Total		26,024

Table B.10 Thousands of I.L.A. Hours Worked Per Week, 1972

Week Ending		Hours	Week Ending		Hours
January	2	458	July	2	569
	9	610		9	404
	16	604		16	478
	23	609		23	527
	30	663		30	484
February	6	605	August	6	507
	13	643		13	456
	20	645		20	465
	27	495		27	490
March	5	567	September	3	476
	12	552		10	404
	19	539		17	453
	26	508		24	489
April	2	418	October	1	475
	9	533		8	506
	16	516		15	465
	23	510		22	500
	30	478		29	430
May	7	489	November	5	500
	14	490		12	427
	21	465		19	464
	28	479		26	409
June	4	451	December	3	466
	11	484		10	467
	18	512		17	485
	25	425		24	474
				31	433
			Total		26,477