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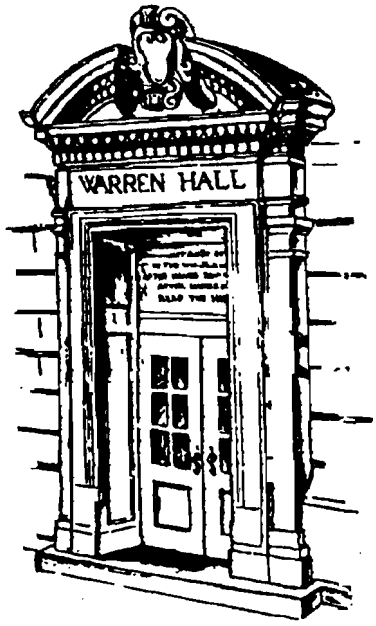

Staff Paper

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U.S. Vegetable Exports To North America: Trends and Constraints To Market Analysis

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U.S. VEGETABLE EXPORTS TO NORTH AMERICA: TRENDS AND CONSTRAINTS TO MARKET ANALYSIS*

Enrique E. Figueroa**

I.) INTRODUCTION

On January 1, 1989, the United States-Canada Free Trade Agreement took affect and January 1, 1994, the North American Free Trade Agreement (NAFTA) went into affect. Much of the U.S. based analyses that took place before and after the signing of both agreements was directed at how U.S. industries would be affected by the accords. However, many researchers defined "affected" in negative terms--i.e., how will competition from Canada and Mexico affect U.S. industry. This approach was particularly true for industries that were/are relatively labor intensive. The U.S. vegetable sector, particularly winter vegetable producers, was one such industry that was very concerned with the potential negative effects of NAFTA (though, as might be expected, they were not particularly concerned about the negative effects of the U.S.-Canada Trade Agreement).

This paper looks at what has occurred with respect to U.S. vegetable exports to Canada and Mexico. In addition, in gathering the data to conduct the analysis for the paper, it became clear that a section of the paper had to be devoted to a discussion concerning the difficulty of obtaining reliable vegetable trade data. The data are not only incomplete across major fresh market vegetables, they are inconsistent across data sources as well as having gaps across time. Of particular concern is the difficulty in finding monthly fresh market vegetable trade data by destination.

The paper first presents a discussion about the 'data problem' followed by a presentation of U.S. export figures--volume and unit value--to the World, Canada, and Mexico. The fresh market vegetables included are: **Asparagus, Broccoli, Cauliflower, Celery, Lettuce, Onions, Potatoes, and Tomatoes.**

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II.) DATA CONSTRAINTS

The primary source of data was the Horticultural Products Review published by the Foreign Agricultural Service (FAS) of the USDA. The title of the serial has been recently changed to World Horticultural Trade and U.S. Export Opportunities. Also, Foreign Agricultural Trade of the United States (FATUS) was used for data from the earlier years, and the U.S. International Trade Commission's report entitled, "Competitive Conditions in the U.S. Market for Asparagus, Broccoli, and Cauliflower," was used for some data on the relevant vegetables. All of the sources above refer to the U.S. Department of Commerce (DOC) as the original source of the data they are reporting (with the exception of Agriculture Canada import data used to report U.S. exports). Therefore, it is unclear whether the DOC, the USDA, or both have responsibility for the incompleteness of the data. Suffice it to say, more than one problem exists with the figures.

Briefly, the following were the areas in which 'data problems' were encountered:

--Missing time periods for certain vegetables, such as carrots and onions. The FATUS publications simply stopped reporting for some years. Efforts to contact both ERS and FAS for assistance in obtaining missing data were unsuccessful.

--Mis-classification and/or re-classification of vegetables, particularly items such as potatoes. On some tables, fresh market potatoes include seed potatoes, while in others seed potatoes are not included. The problem arises when the table(s) do not specify whether seed potatoes are or are not included. For exports to Mexico, seed potato exports are not inconsequential, but more importantly, the unit cost of exports changes dramatically.

--Calendar year versus seasonal year reporting. Again, some publications identify the time period for the data, but others do not and for these sources the inference is that the data are reported on a calendar year basis. Unfortunately, other sources report the same data, but they specifically state that the data are reported on a seasonal basis.

--Several Horticultural Products Review issues simply reported the same data for succeeding months, in some cases full pages were the exact figures as the prior month. When FAS was contacted about the obvious mistake(s), the response was that there was no time to make the corrections. There are issues out in the hands of the public that report incorrect data.

--In 1987, the USDA began using Canadian import data to report U.S. exports to Canada and therefore the U.S. export data series to Canada for some commodities reflects significant changes after 1988.

If the paper accomplishes anything, it is to bring to the attention of interested parties the poor state of our data reporting entities. Clearly, the vegetable industry has a stake in having accurate information from which to base policy decisions. Researchers need to have confidence in the data so that statistical analysis results can be defended. Finally, and most importantly, the credibility of the USDA is at stake with respect to how the vegetable trade sector is treated by the data gathering and reporting organs within the USDA. At a minimum, some responsible entity needs to construct monthly--say 1980 to the present--fresh market vegetable trade data and publish it as a bulletin. Absent of this effort, many important decisions affecting the industry will be based on perhaps misleading information.

Having said all of the above, this paper nonetheless developed a data set which was used to conduct a series of analyses. Where 'data gaps' had to be filled and/or estimated, they are so noted on the appropriate table(s). For the most part, the results are plausible and consistent with the author's knowledge of what took place in the markets. However, the author strongly encourages the reader to scrutinize the results because they are simply the output of, at best, imprecise data and at worse, misleading data.

III.) DESCRIPTION OF MARKETS

This paper includes the majority of the principal fresh market vegetables, but some important vegetables are missing. The two that stand out for their omission are carrots and cucumbers, but data for

them simply were not available. Figures 1 through 16 present U.S. export volumes (metric tons, MT) and export unit price (dollars per MT) for total U.S. exports, exports to Canada, and exports to Mexico. Brief comments will be made regarding specific vegetable markets.

The U.S. **asparagus** export market underwent a structural change in 1987. Prior to 1987, Canada was by far the major importer of fresh market asparagus. Though volume to Canada continued to increase at a modest rate after 1987, total U.S. asparagus export volume more than tripled between 1986 and 1993. Since 1989, the export unit price for U.S. asparagus entering Canada and Mexico has been lower than the price for other export markets and therefore one can infer that the asparagus industry has been successful at developing new markets that pay relatively higher prices than the historical export market--i.e., Canada.

The U.S. **broccoli** market is similar to the asparagus market, but the apparent structural change took place in 1991 rather than in 1987. The U.S. export unit prices for broccoli shipped to the three markets have been fairly similar and moved in tandem.

The U.S. **cauliflower** market also shows signs of a structural change similar to the broccoli market, but the change took place a year earlier, 1990. The 'swings' in the export unit price series for exports to Mexico are likely the result of the low volume of shipments and/or the Mexican market serving as a low priced market. The latter is certainly true for 1990 when 513 MT (mean exports between 1987 and 1990 were 305 MT) were exported to Mexico at a price of $214/MT while the export price to the world was $641/MT.

No changes are discernable in the U.S. **celery** market. Exports grew at a modest steady rate and prices to all markets were similar.

The U.S. **lettuce** market is one where shipments to Mexico clearly grew very significantly over the past five years. For most of the '80s, U.S. lettuce exports to Mexico were less than 1,000 MT per year, but in 1993 exports reached 31,000 MT. Also, during the latter part of the '80s, the disparity between the export price to Mexico and other markets was quite large--at times greater than $200/MT. The Mexican market for U.S. exports of lettuce will continue to grow and may reach 20% of U.S. exports.

The time series data for U.S. **onion** exports to Canada and Mexico had gaps--1983 and 1984--that were filled by econometric estimates on the relationship between total exports and exports to Canada and Mexico. Similarly to lettuce, the Mexican market for U.S. onions grew over the past five years, but the growth rate was more modest.

Exports of U.S. fresh market **potatoes** almost entirely go to the Canadian market. Canada represents 90% of U.S. exports, but over the past four years Mexico has become a more important market--representing nearly 8% of exports.

Finally, the U.S. **tomato** export market is somewhat similar to the lettuce market in that Mexico has become an important destination since 1990.

Table 1 summarizes the eight vegetable export markets. Mean exports and mean export prices are presented for the eight vegetables for two time periods, 1980 to 1986 and 1987 to 1993. In addition, a coefficient of variation is computed for each of the means reported on the table.

The variability in exports to Mexico is generally higher than total or exports to Canada--particularly for the more recent time period. Total and Canadian export variability generally decline from the early to the latter time period. For Mexico, the opposite takes place. The level of variability for export volume is higher than the level of variability for export prices. However, price variability increases in the latter relative to the earlier period (celery and tomatoes are the exceptions). Overall, the magnitudes of both volume and price variability are relatively low.

Lettuce represents the largest volume of exports followed by potatoes, onions, and tomatoes. All export flows increased from the earlier time period to the latter (the only exception was broccoli exports to Mexico). The largest increases in total exports took place with cauliflower (172%), asparagus (145%), and broccoli (135%). With respect to exports to Canada, the largest growth markets were: cauliflower (115%), broccoli (110%), and potatoes (79%). Exports to Mexico grew almost exponentially from the early time period to the latter. In descending order, the growth rates (comparing means) were: lettuce (1,373%), cauliflower (663%), and onions (482%). Though the magnitude of exports to Mexico is relatively small, the growth rates are dramatic.

Comparing mean export prices between the two time periods indicates that export volume growth mirrors price declines. With the exception of asparagus, cauliflower and broccoli, prices stablized or declined, and therefore the largest growth in total exports reflects the competitiveness of prices. Conversely, total tomato exports increased the least and prices increased the most. Some price changes are particularly interesting. For example, world and Canadian cauliflower prices were stable, but Mexican prices declined by 15%. Similarly, world and Canadian celery export prices increased slightly, but Mexican export price declined by 10%. The most dramatic divergence took place in the lettuce market where world export price increased by 43% and the Canadian price increased by 66%. However, the mean Mexican export price declined by 4%.

Given the above brief description of the markets since 1980, the following section presents the results of econometric modeling. The purpose of the regression analysis was to quantify changes in market structure and to estimate price quantity relationships for the various markets.

IV.) ECONOMETRIC ANALYSIS

Though a direct estimate of an export demand elasticity for each vegetable market is not feasible (too few observations), an estimate for price responsiveness by market is feasible. A pooled-time-series model was developed for each market for each time period and was estimated with an OLS or GLS estimator. The structure of the model is:

$$(Q_i)_t = B_0 + B_1*(P_i)_t + B_2*(\text{Trend})_t + B_r*(D_r)_t \qquad (1)$$

where i = asparagus, broccoli, cauliflower, celery, lettuce, onions, potatoes, and tomatoes

t = 1980 to 1986 or 1987 to 1993

r = broccoli, cauliflower, celery, lettuce, onions, potatoes, and tomatoes

Equation (1) is linearized because the variables were transformed to log form. A GLS--first-order-autoregressor--estimator was used if the OLS estimate indicated autocorrelation. The individual

vegetable 'dummy shifters' simply capture a specific affect of the vegetable. Equation (1) was estimated for both the 1980 to 1986 times period as well as the 1987 to 1993 time period and for each market--i.e., total exports, exports to Mexico, and exports to Canada.

Table 2 presents the estimates of equation (1). First, the total exports equation substantiates a structural change with respect to price responsiveness and estimates a -0.44 price elasticity for the latter time period whereas the earlier time period estimate is not significantly different than zero. However, the trend estimate is almost identical for both time periods and therefore both results infer a change in export pricing rather than exports responding to price changes. The effect--dummy estimates--of individual vegetables during the earlier time period are more pronounced than during the latter time period.

Exports to Mexico changed dramatically between the two time periods. The earlier time period results show a positive relationship between quantities exported and export price, +0.70, while the latter relationship is negative, -2.0 or -0.3. For the 1987-1993 estimates, there is a considerable difference between the OLS and GLS estimate of the price effect as well as on the individual dummy shifters. Indeed, the broccoli, cauliflower, and celery shifters switch signs. These are likely a result of the large changes in the pooled-time-series data between each individual vegetable. However, since the OLS estimates are still unbiased under an autocorrelated error term, the author relies more on the OLS estimates. Therefore, it is clear that the Mexican market changed from a positive price/quantity relationship to a normal negative one. Given the estimates on the trend variable, -0.18 vs. +0.42, for the two time periods respectively, it is clear that the Mexican market during the earlier period was absorbing less product at declining prices.

There are no discernable time period differences in exports to Canada. However, the price elasticity estimate is -0.9 for the earlier period and -0.5 for the latter.

Another interest of the paper was to investigate whether export substitution has taken place between U.S. exports to Canada and to Mexico. A simple model was derived to estimate the elasticity-of-substitution for both time periods. The specifications of the models are:

$$(Q_{mex}/Q_{tot})_t = B_0 + B_1*(P_{mex}/P_{tot})_t + B_r*(D_r)_t \qquad (2)$$

$$(Q_{can}/Q_{tot})_t = B_0 + B_1*(P_t/P_{tot})_t + B_t*(D_r)_t \quad (3)$$

$$(Q_{mex}/Q_{can})_t = B_0 + B_1*(P_{mex}/P_{can})_t + B_t*(D_r)_t \quad (4)$$

Equations (2) and (3) do not estimate an elasticity-of-substitution because Mexican and Canadian exports are a subset of total exports. They are estimated for comparison purposes--primarily for the estimates on the effects of the individual vegetables. Equation (3) will yield an elasticity-of-substitution and is equal to B_1. The equations are estimated for both the 1980-1986 and 1987-1993 time periods.

Table 3 presents the estimates of equations (1), (2), and (3). The reader is directed to compare the estimates on the effects of the individual vegetables between the two time periods. The most obvious differences occur for celery, lettuce, and tomatoes in equation (1). For equation (2), onion exports demonstrate the largest difference between the two time periods. The elasticity-of-substitution estimates in equation (3) for the first time period are 0.67 (OLS) and 0.51 (GLS). For the latter time period the corresponding estimates are -1.55 and -0.33. As mentioned before, the OLS estimates are still unbiased under an autoregressive error term and therefore the author believes the -1.55 estimate to be more accurate. It is clear that U.S. export substitution to Canada and Mexico did not take place during the early '80s, but that it did occur since 1987. The results of equation (3) for the latter time period indicate that as the relative export price--(P_{mex}/P_{can})--between Mexico and Canada in/decreases, then relative export quantities--(Q_{mex}/Q_{can})--de/increased by an elasticity of -1.55. Conversely, during the early '80s, as the relative export price--(P_{mex}/P_{can})--between Mexico and Canada in/decreased, then relative export quantities--(Q_{mex}/Q_{can})--de/increased by an elasticity of +0.60. The elasticity-of-substitution estimate is 'global' for the eight vegetable prices and quantities and therefore may not apply to a specific vegetable. Indeed, comparing the dummy estimates between the two time periods for equation (3) indicates that celery, lettuce, and tomatoes are mostly responsible for the described changes between the two time periods.

V.) SUMMARY AND CONCLUSIONS

Relatively little work has been done in analyzing U.S. fresh market vegetable exports to Canada and Mexico. This paper utilized export data for eight vegetables, **Asparagus, Broccoli, Cauliflower, Celery, Lettuce, Onions, Potatoes, and Tomatoes**, over the 1980 to 1993 time period. Estimates of export price elasticities are presented for the 1980-1986 and 1987-1993 time periods for total U.S. exports, exports to Canada, and exports to Mexico. Also, an elasticity-of-substitution is estimated for exports to Canada and Mexico for both time periods.

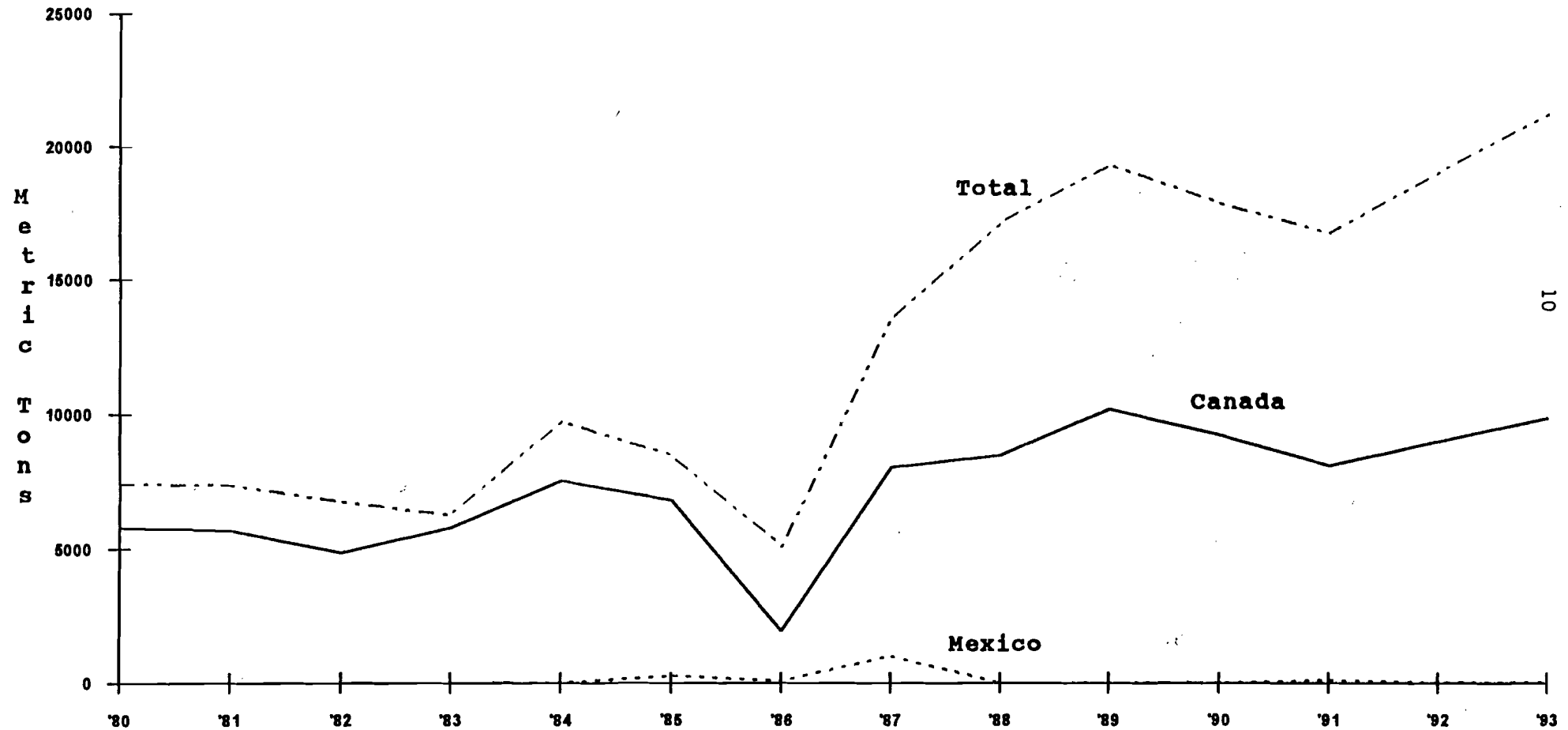
There is clear evidence that exports to Mexico became more price responsive during the latter time period and that export price responsiveness to Canada did not change appreciably between the two time periods. For exports to Mexico during the early '80s, the export price elasticity was +0.7 while for the latter period it is estimated at -2.0. For Canadian exports the comparable estimates were -0.8 and -0.54. The elasticity-of-substitution estimates between Mexican and Canadian exports were: +0.6 and -1.55 for the early and latter time periods, respectively.

The obvious next step is to conduct similar analysis, utilizing monthly rather than annual data. Also, the number of vegetables included in the analysis needs to be expanded to include carrots, cucumbers, and peppers. The use of monthly data will allow for direct price response estimates by individual vegetable, but this approach assumes that exports take place every month--an unlikely situation. Though econometric techniques exist for "missing data" situations, the number of months where no exports take place will determine the reliability of the estimates.

The paper began with commentary regarding the poor state of data availability for this type of research and it closes by strongly encouraging the data gathering and reporting organisms within our government to devote more time and energy to 'fixing' the problem. The problem is the lack of an accessible data base that affords policy makers and researchers a basis for arriving at decisions and deriving reliable inferences.

Figure 1

U.S. Exports of Fresh Market Asparagus, Metric Tons



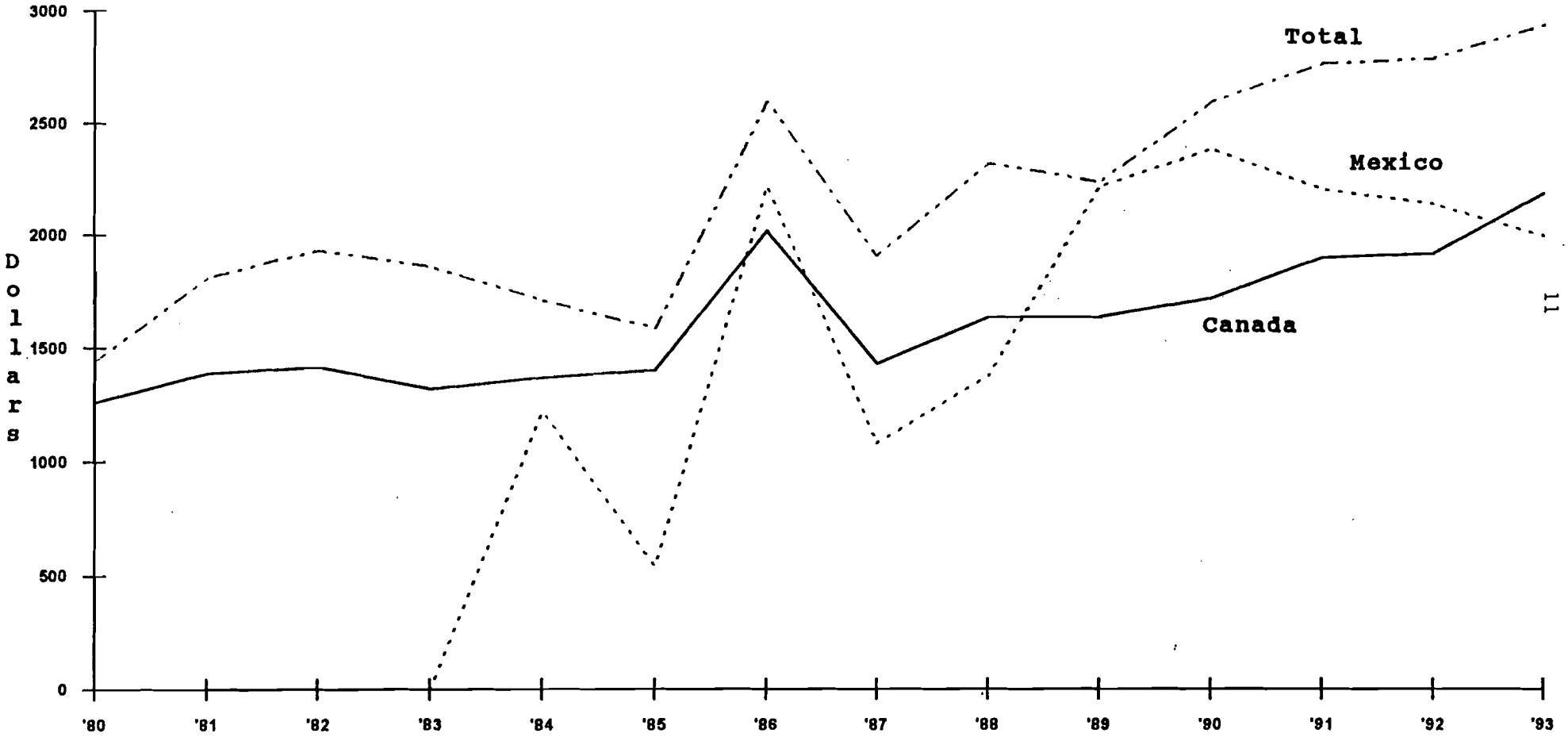
Source: Foreign Agricultural Trade of the United States, USDA/FAS/Circular Series/FHORT, various issues; World Horticultural Trade & U.S. Export Opportunities, USDA/FAS/Circular Series/FHORT, various issues; Horticultural Products Review, USDA/FAS/Circular Series/FHORT, various issues; Competitive Conditions in the U.S. Market for Asparagus, Broccoli, and Cauliflower, U.S. International Trade Commission, November 1988.

* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 2

U.S. Export Unit Price for Fresh Market Asparagus, Dollars per Metric Ton



Source: Foreign Agricultural Trade of the United States, USDA/FAS/Circular Series/FHORT, various issues; World Horticultural Trade & U.S. Export Opportunities, USDA/FAS/Circular Series/FHORT, various issues; Horticultural Products Review, USDA/FAS/Circular Series/FHORT, various issues; Competitive Conditions in the U.S. Market for Asparagus, Broccoli, and Cauliflower, U.S. International Trade Commission, November 1988.

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Figure 3

U.S. Exports of Fresh Market Broccoli, Metric Tons

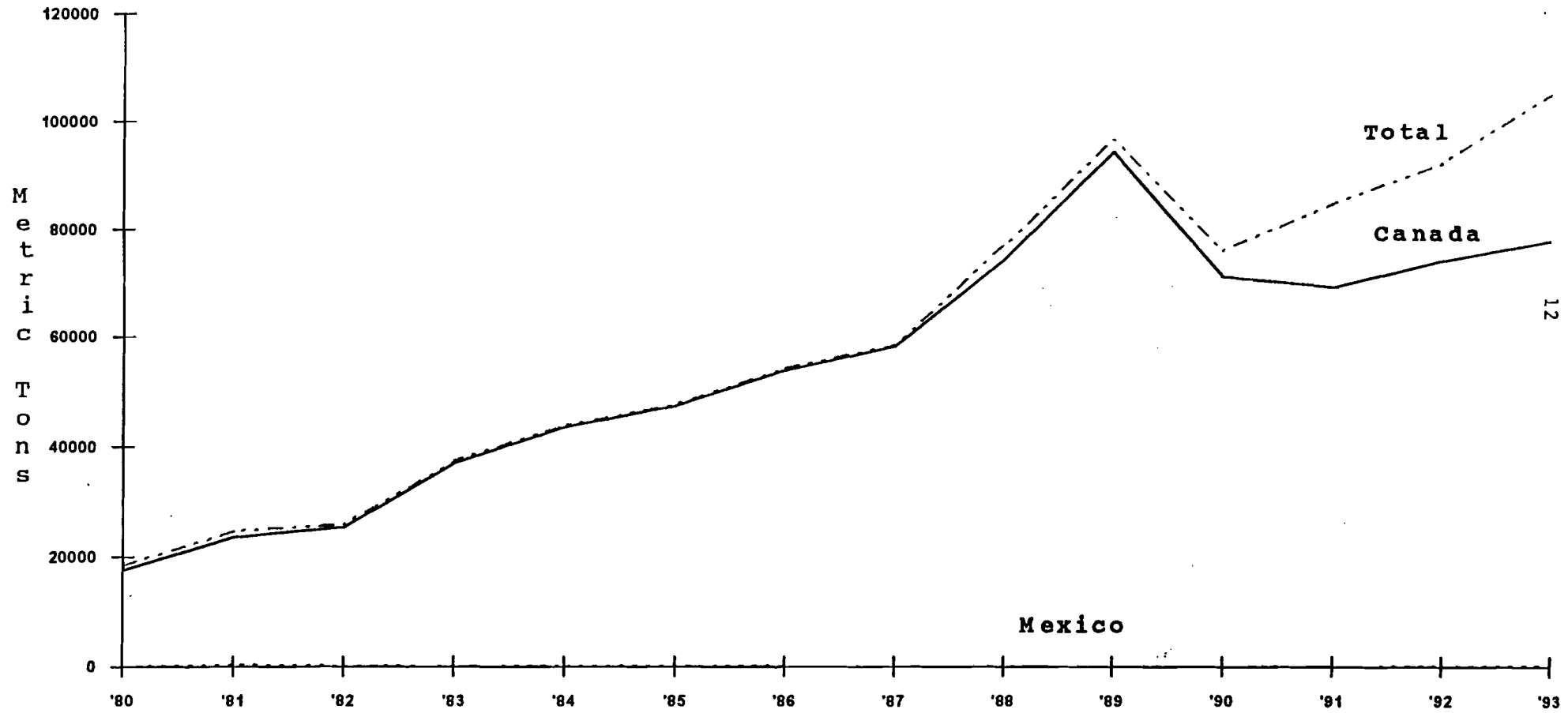

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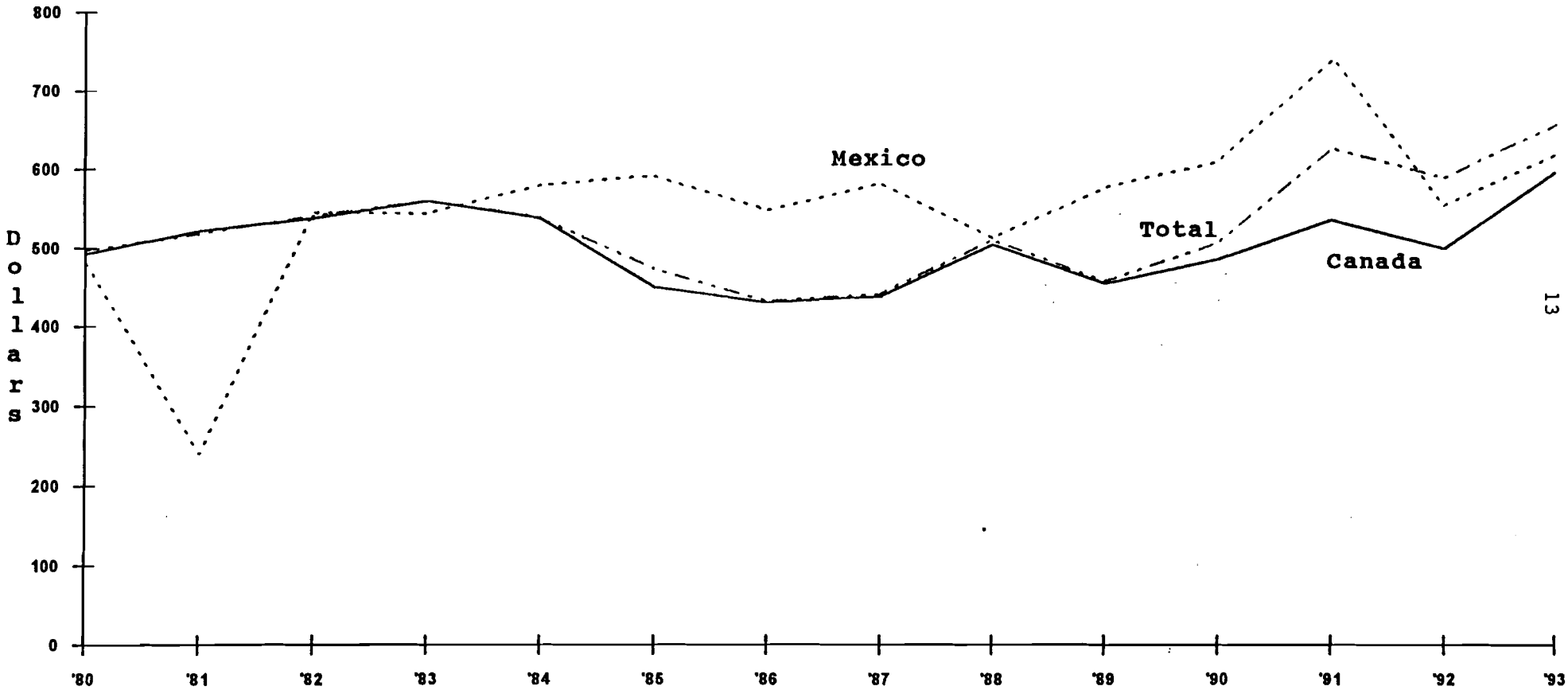
Figure 4

U.S. Export Unit Price for Fresh Market Broccoli, Dollars per Metric Ton



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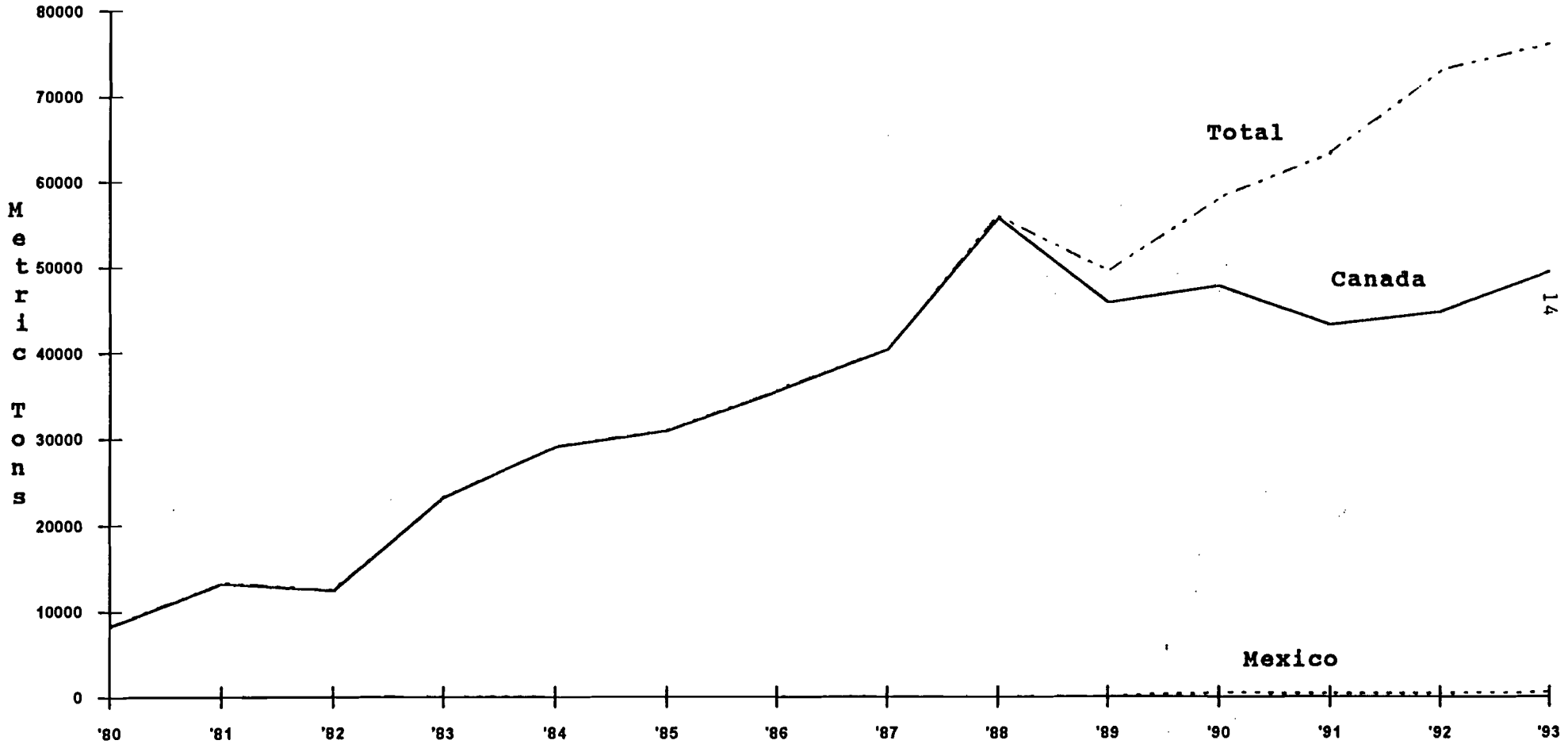
* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 5

U.S. Exports of Fresh Market Cauliflower, Metric Tons



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U.S. Export Unit Price for Fresh Market Cauliflower, Dollars per Metric Ton

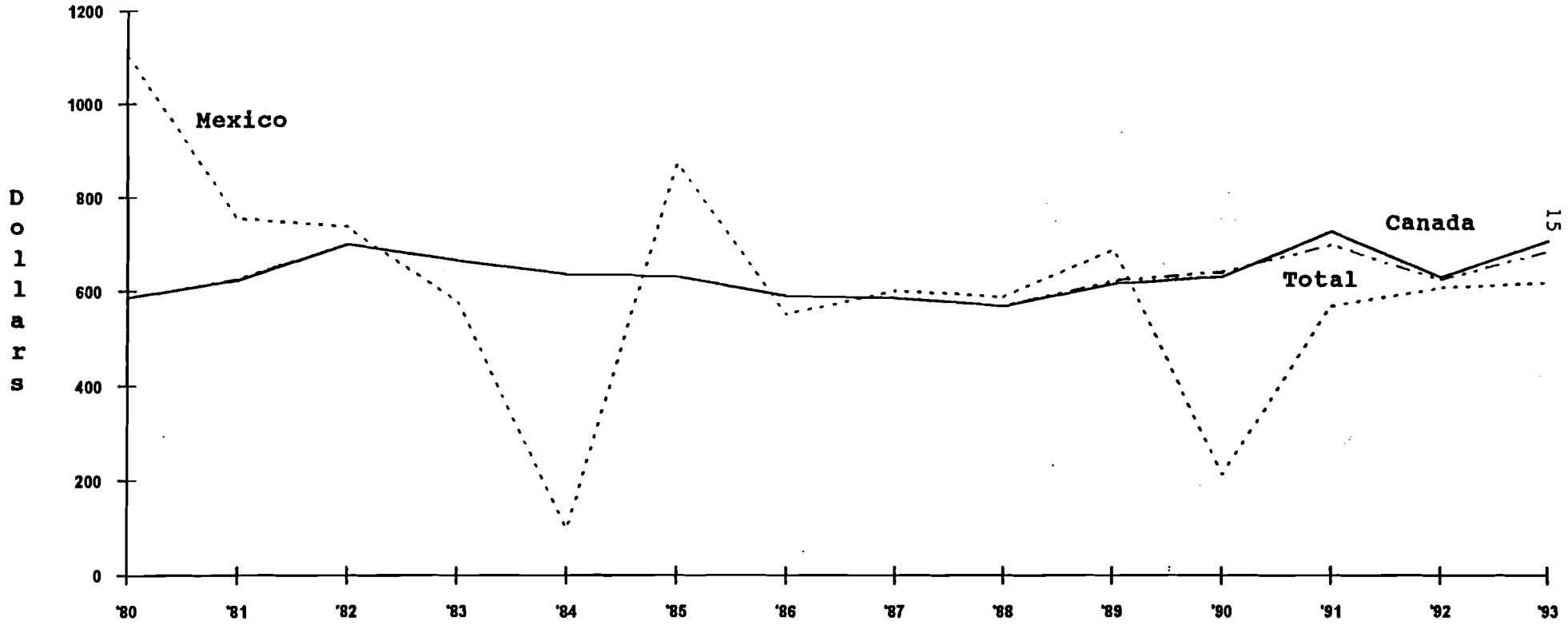

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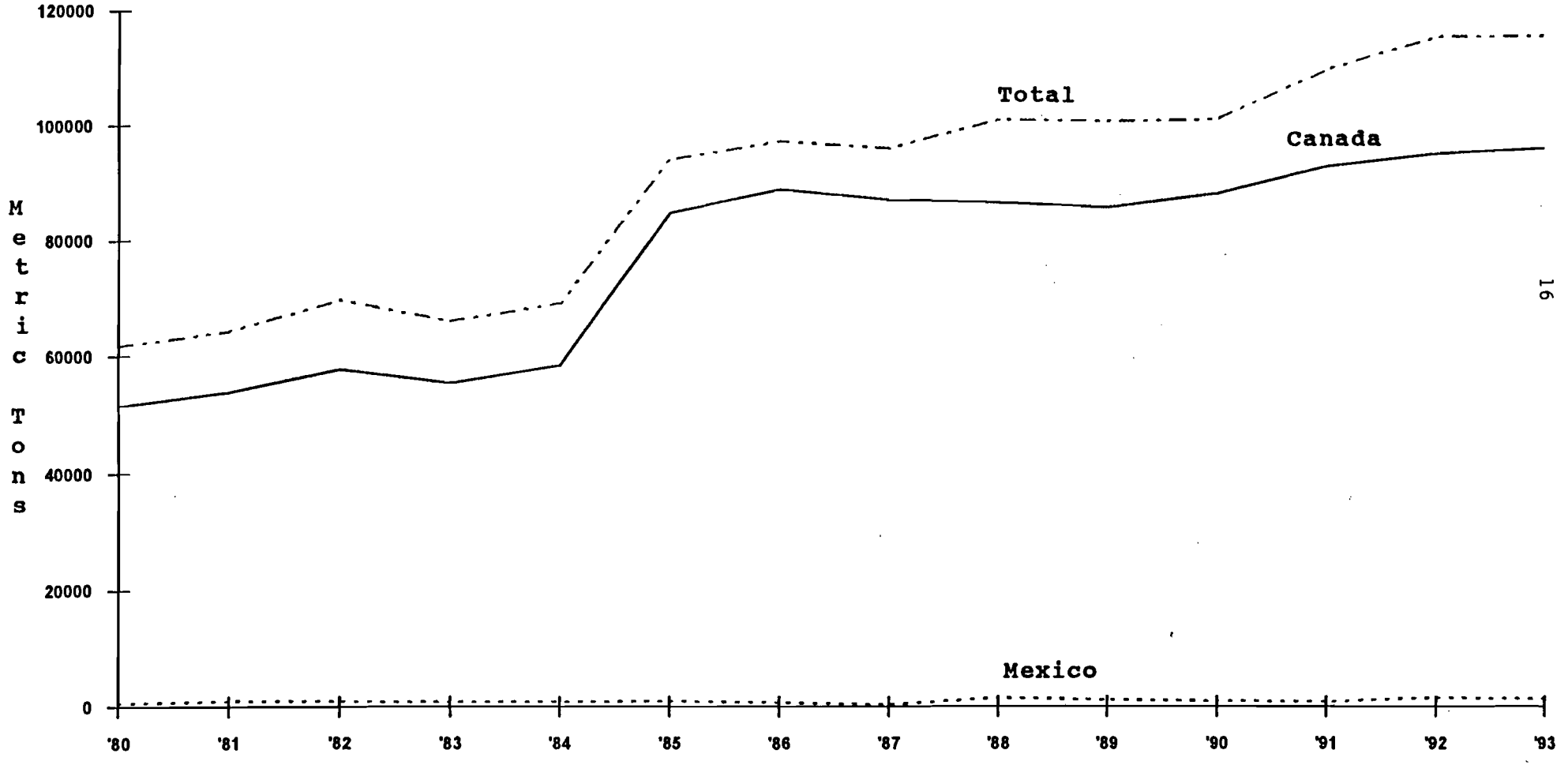
Figure 7

U.S. Exports of Fresh Market Celery, Metric Tons



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* 1993 figures are tentative.

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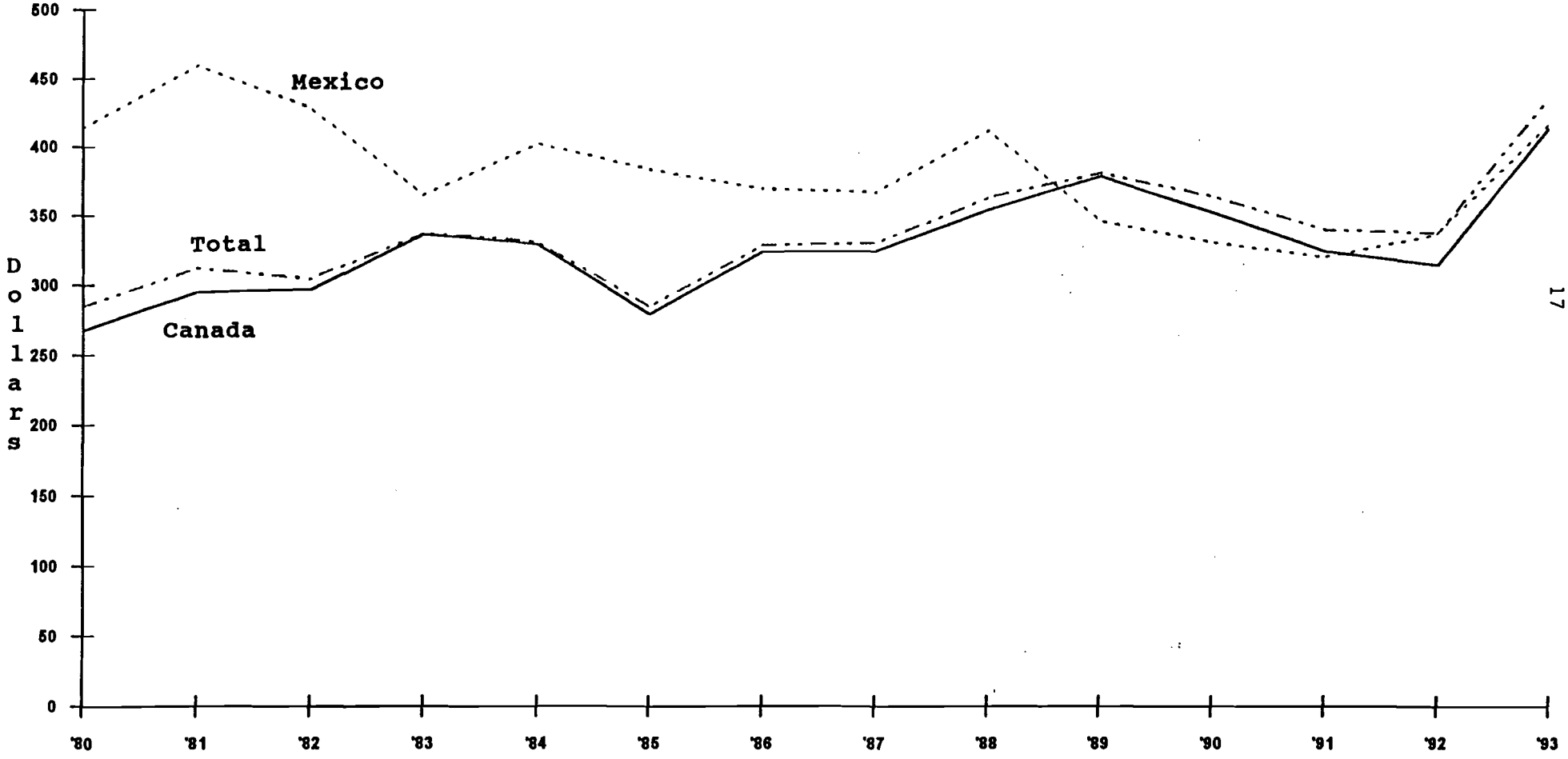
Figure 8

U.S. Export Unit Price for Fresh Market Celery, Dollars per Metric Ton



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** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 9

U.S. Exports of Fresh Market Lettuce, Metric Tons

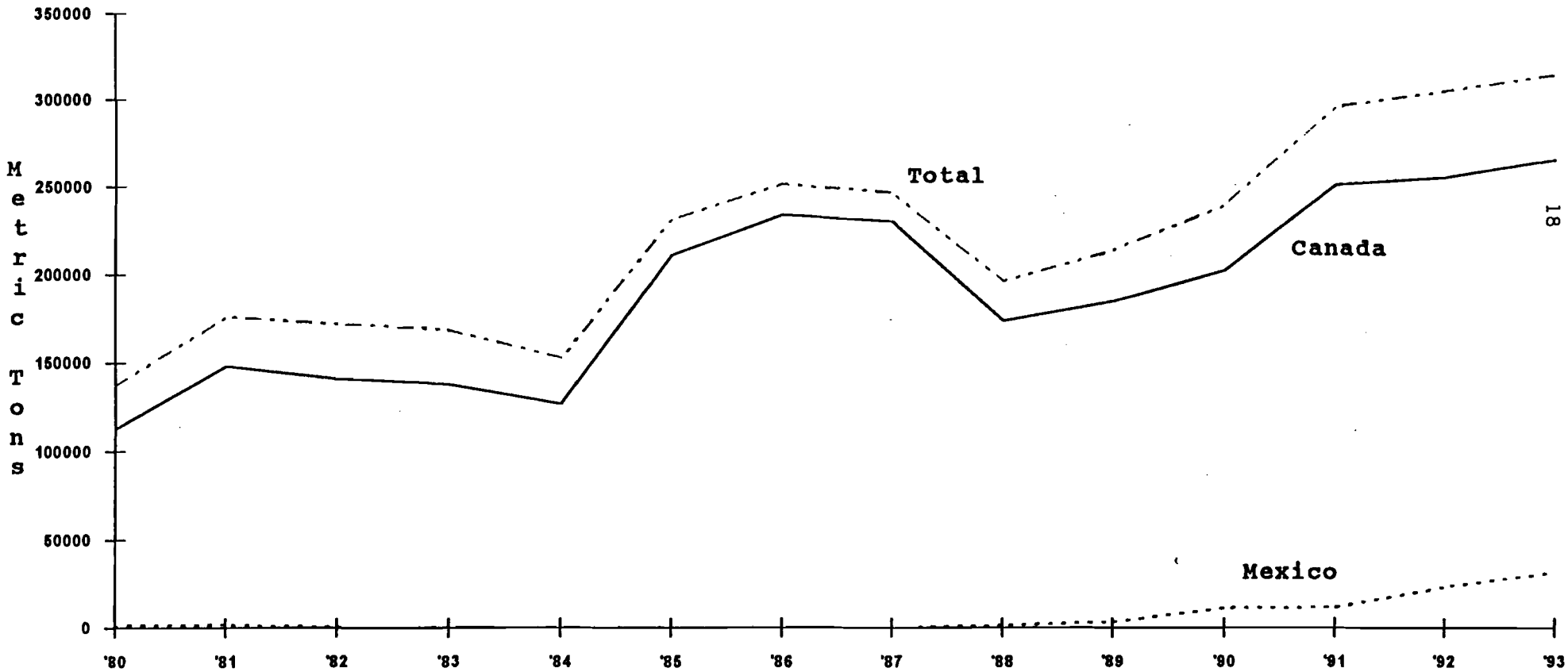

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Figure 10

U.S. Export Unit Price for Fresh Market Lettuce,

Dollars per Metric Ton

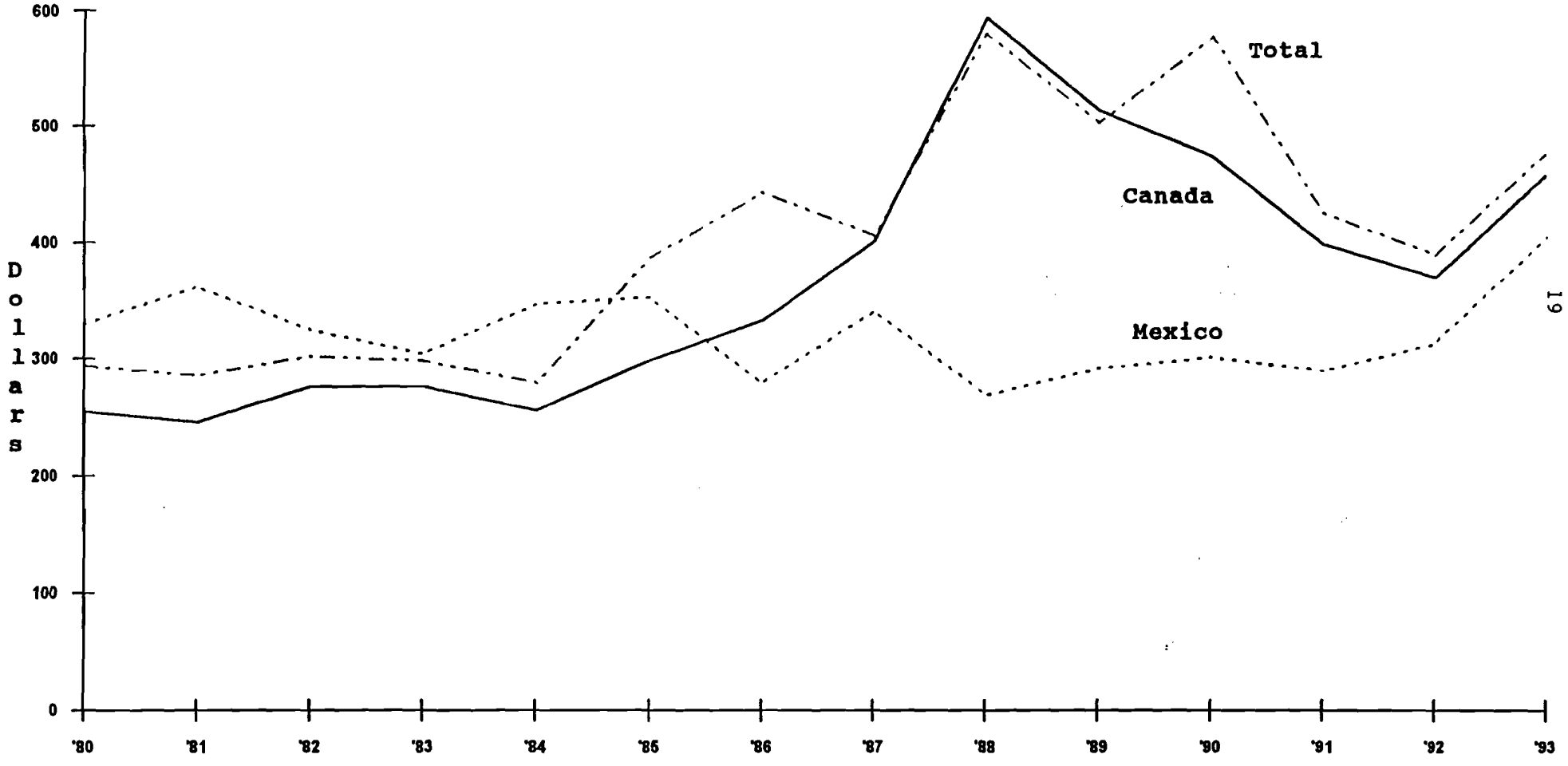

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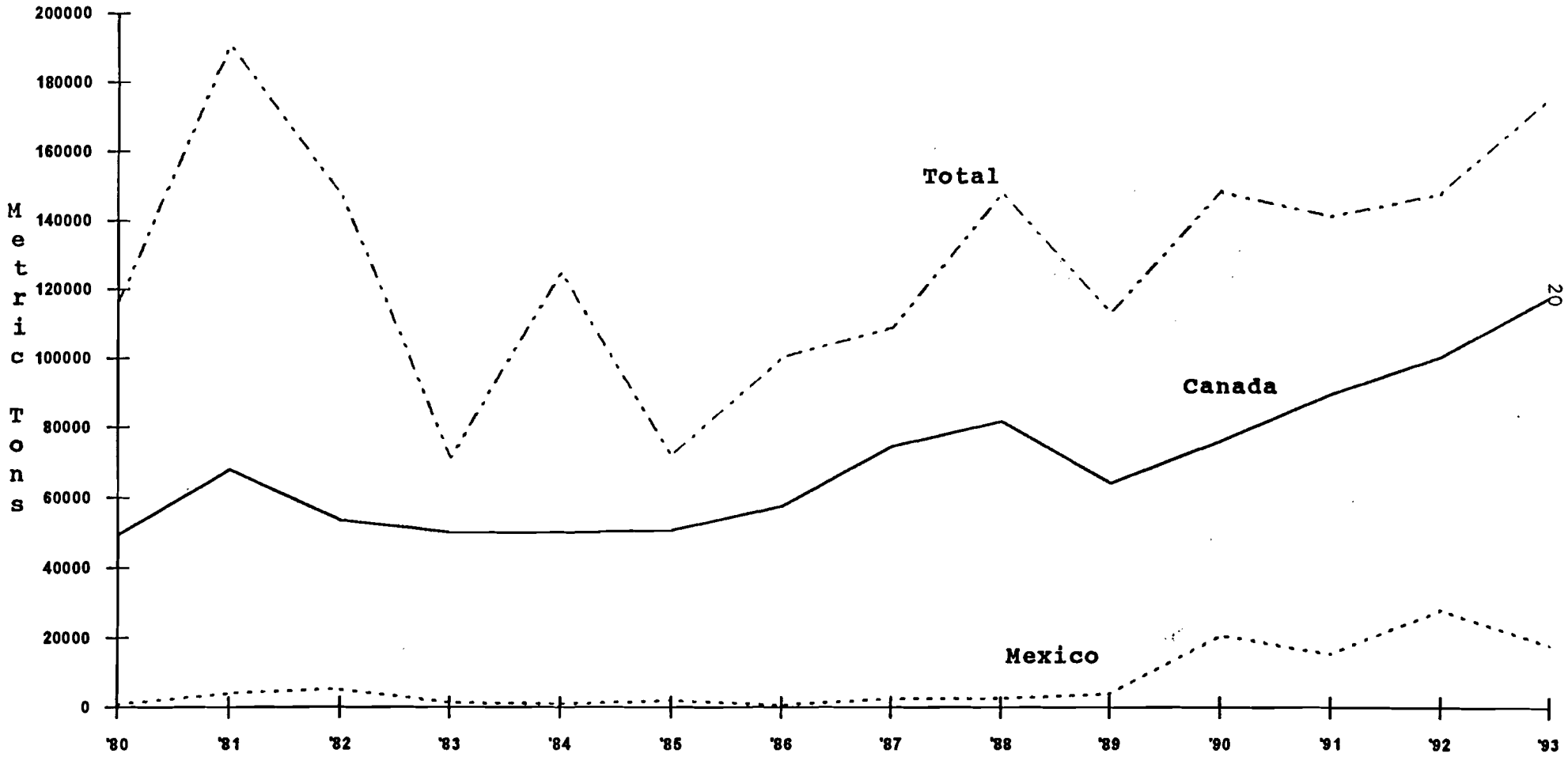
Figure 11

U.S. Exports of Fresh Market Onions, Metric tons



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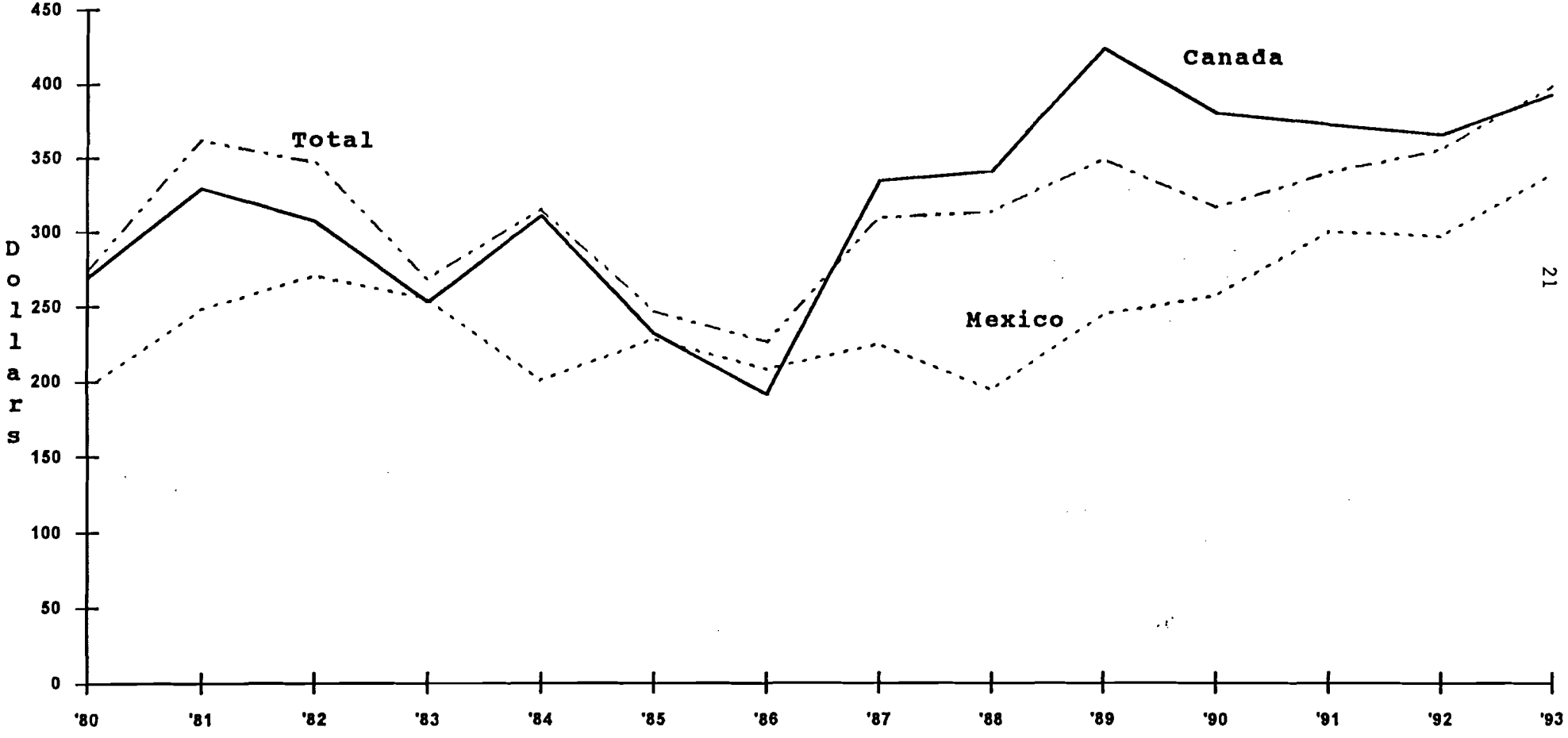
* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 12

U.S. Export Unit Price for Fresh Market Onions, Dollars per Metric Ton



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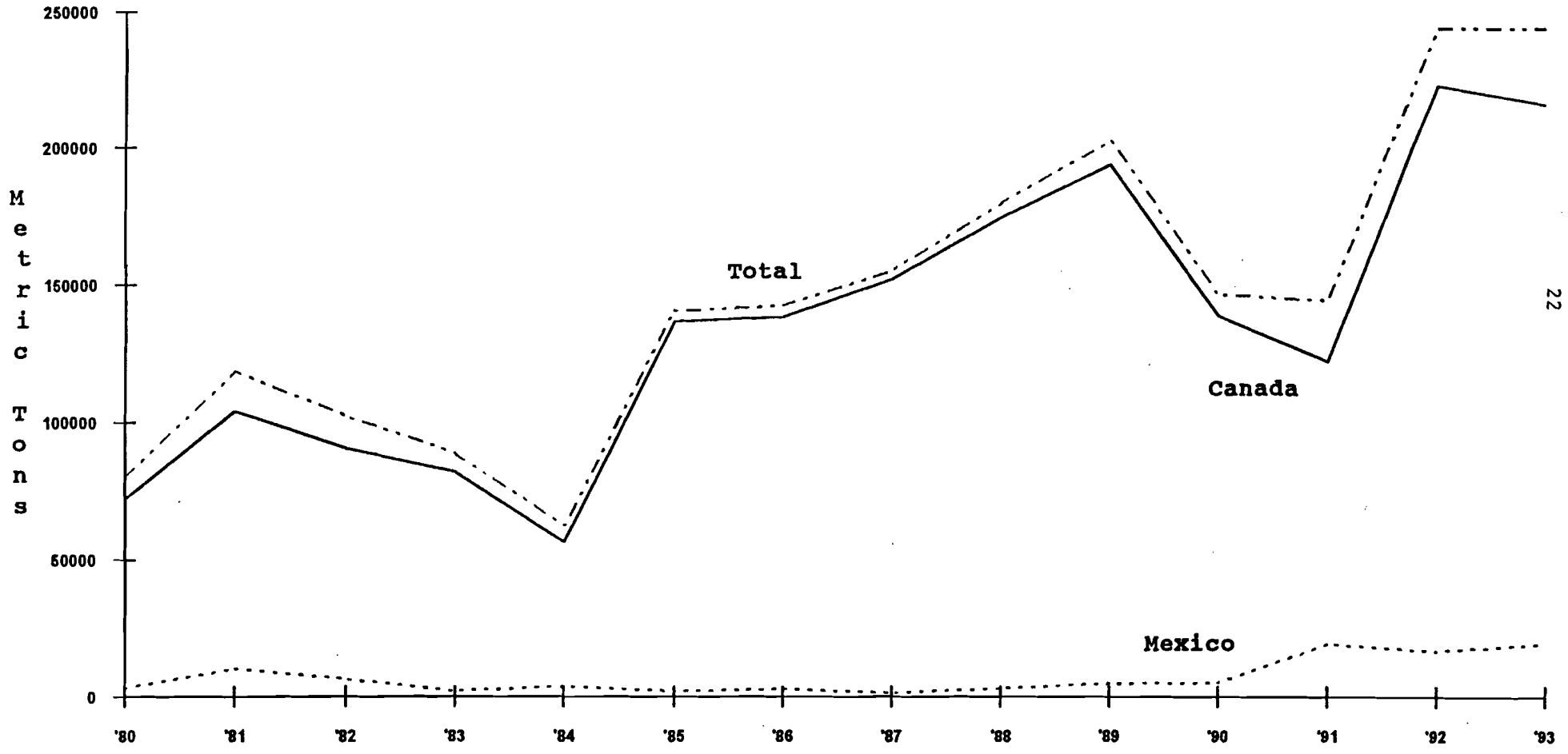
* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 13

U.S. Exports of Fresh Market Potatoes, Metric Tons



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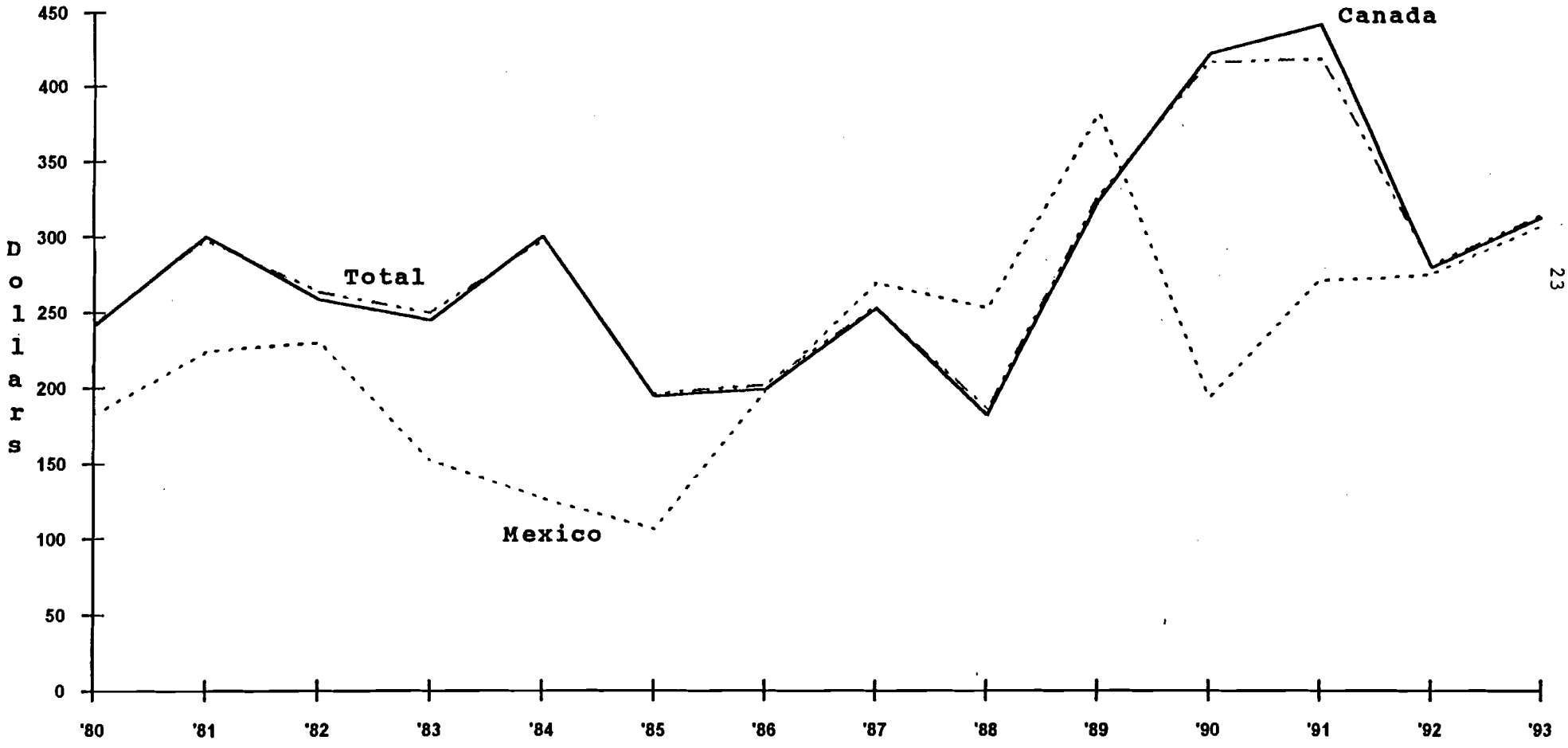
ource: Foreign Agricultural Trade of the United States, USDA/FAS/Circular Series/FHORT, various issues; World Horticultural Trade & U.S. Export Opportunities, USDA/FAS/Circular Series/FHORT, various issues; Horticultural Products Review, USDA/FAS/Circular Series/FHORT, various issues.

* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

U.S. Export Unit Price for Fresh Market Potatoes, Dollars per Metric Ton



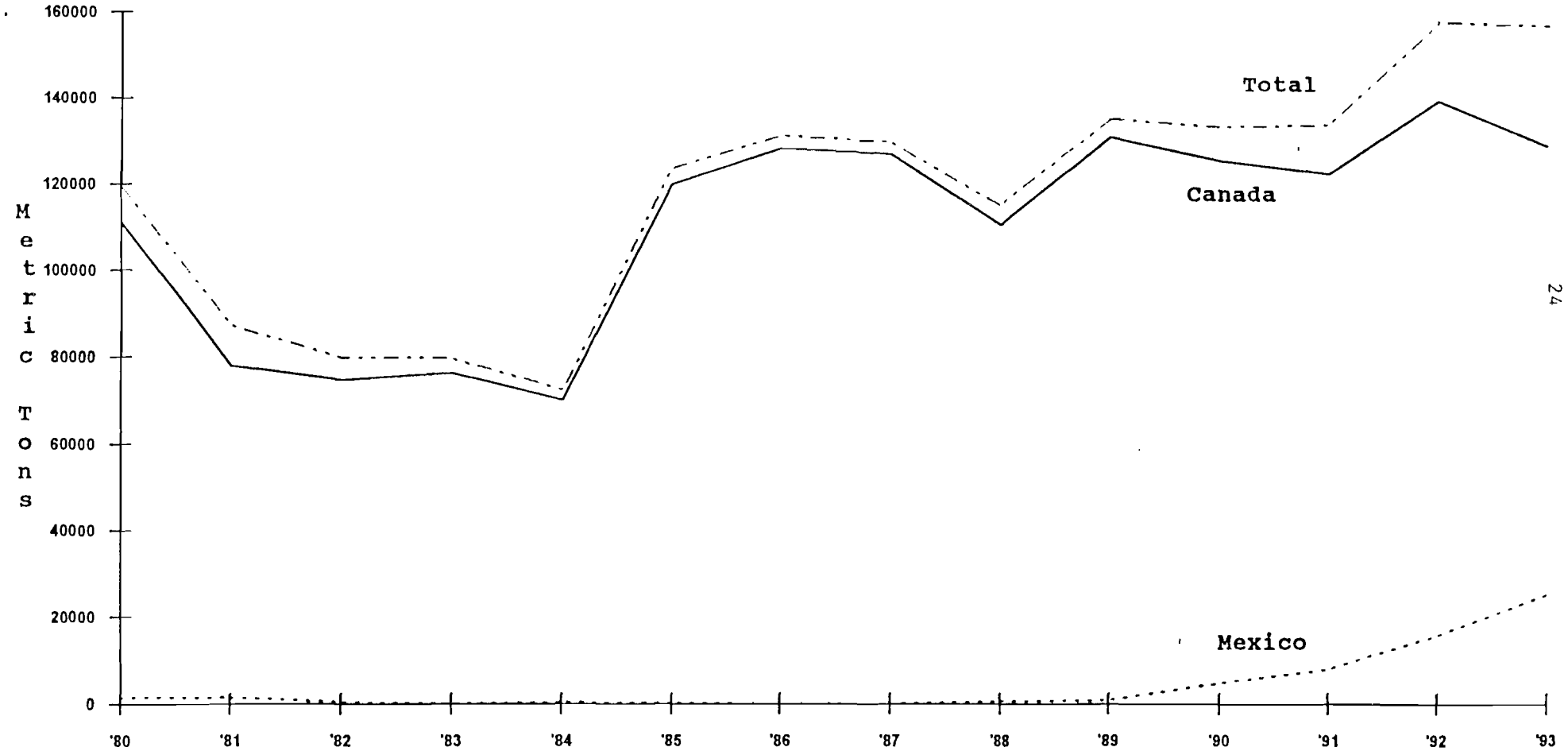
Source: Foreign Agricultural Trade of the United States, USDA/FAS/Circular Series/FHORT, various issues; World Horticultural Trade & U.S. Export Opportunities, USDA/FAS/Circular Series/FHORT, various issues; Horticultural Products Review, USDA/FAS/Circular Series/FHORT, various issues.

* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 15

U.S. Exports of Fresh Market Tomatoes, Metric Tons



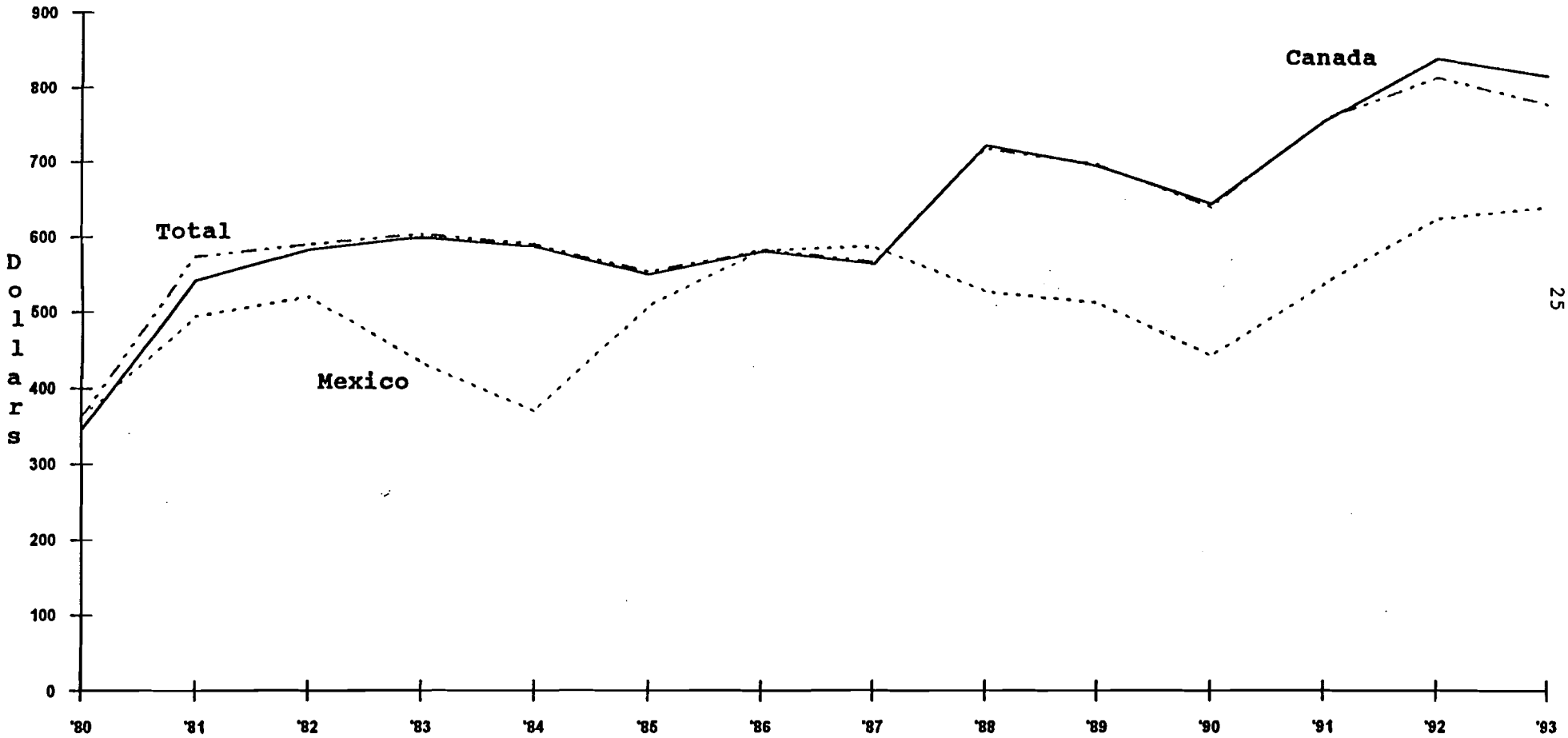
Source: Foreign Agricultural Trade of the United States, USDA/FAS/Circular Series/FHORT, various issues; World Horticultural Trade & U.S. Export Opportunities, USDA/FAS/Circular Series/FHORT, various issues; Horticultural Products Review, USDA/FAS/Circular Series/FHORT, various issues.

* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Figure 16

U.S. Export Unit Price for Fresh Market Tomatoes, Dollars per Metric Ton



Source: Foreign Agricultural Trade of the United States, USDA/FAS/Circular Series/FHORT, various issues; World Horticultural Trade & U.S. Export Opportunities, USDA/FAS/Circular Series/FHORT, various issues; Horticultural Products Review, USDA/FAS/Circular Series/FHORT, various issues.

* 1993 figures are tentative.

** Beginning with 1987, Canadian figures change to reflect Canadian import data rather that USDA export data.

Table 1

Mean U.S. Export Volumes and Mean Unit Export Price for Various Fresh Market Vegetables

VEGETABLE EXPORT MARKET	MEAN EXPORT VOLUME, mt				MEAN EXPORT UNIT PRICE, $/mt			
	1980 - 1986		1987 - 1993		1980 - 1986		1987 - 1993	
	Mean	c.v.	Mean	c.v.	Mean	c.v.	Mean	c.v.
ASPARAGUS								
To World	7294	.206	17842	.137	1843	.200	2507	.147
To Canada	5480	.324	8965	.093	1450	.175	1773	.141
To Mexico	59	1.74	185	2.01	567	1.51	1914	.257
BROCCOLI								
To World	36032	.370	84556	.185	508	.088	542	.156
To Canada	35443	.383	74366	.147	504	.097	502	.106
To Mexico	176	.519	133	.514	504	.241	600	.120
CAULIFLOWER								
To World	21872	.482	59533	.213	633	.065	632	.077
To Canada	21768	.484	46773	.106	632	.064	637	.094
To Mexico	40	.710	305	.786	656	.524	555	.279
CELERY								
To World	74537	.195	105638	.076	312	.070	365	.099
To Canada	64302	.240	90135	.048	304	.086	352	.101
To Mexico	902	.161	1157	.350	403	.085	362	.108
LETTUCE								
To World	184054	.225	258611	.182	326	.191	465	.141
To Canada	158566	.285	222979	.165	276	.109	458	.170
To Mexico	803	.762	11832	.991	328	.090	315	.145
ONION								
To World	117384	.362	140456	.163	291	.176	340	.093
To Canada	53962	.125	86155	.211	270	.183	372	.082
To Mexico	2220	.803	12923	.778	229	.128	265	.189
POTATO								
To World	104949	.289	187996	.230	250	.163	314	.269
To Canada	97069	.321	174172	.222	248	.171	317	.290
To Mexico	4450	.687	10070	.804	174	.272	279	.204
TOMATO								
To World	98853	.248	137097	.112	550	.152	710	.121
To Canada	93883	.262	126012	.070	540	.164	719	.135
To Mexico	584	1.05	7857	1.19	466	.175	552	.126

Table 2... Pooled-Time-Series-Cross-Sectional Estimates* of U.S. Vegetable Export Volume as Function of Export Unit Price

Export Market	Intercept	Price	Trend	Dummy-Shifters for Each Vegetable (Excluding Asparagus)							Regression Statistics		
				Bro	Cau	Cel	Let	Oni	Pot	Tom	R^2	D-W	*Rho*
Total:													
1980-1986	9.90	-0.17	0.07	1.33	0.81	2.02	2.93	2.42	2.30	2.39	.93	1.08	
	(4.50)**	(0.59)	(3.54)	(3.27)	(2.34)	(3.73)	(4.50)	(4.29)	(3.79)	(6.16)			
	8.91	-0.05	0.07	1.72	1.26	2.34	3.28	2.66	2.67	2.55	.88	1.91	0.37
	(3.66)	(0.17)	(1.80)	(3.48)	(2.93)	(3.77)	(5.42)	(4.05)	(3.81)	(5.75)			(2.72)+
1987-1993	12.4	-0.44	0.08	0.87	0.59	0.93	1.92	1.18	1.41	1.48	.99	1.99	
	(14.7)	(3.92)	(9.65)	(4.79)	(3.57)	(4.17)	(9.72)	(5.08)	(5.79)	(9.76)			
To Mexico:													
1980-1986	0.55	0.66	-0.15	1.00	-0.84	2.85	2.66	3.89	4.87	1.74	.91	2.06	
	(1.38)	(9.25)	(2.76)	(2.10)	(1.82)	(6.06)	(5.74)	(8.58)	(10.9)	(3.67)			
	0.64	0.74	-0.22	0.85	-1.07	2.67	2.36	3.79	4.75	1.35	.95	2.11	-0.28
	(1.85)	(11.9)	(4.39)	(2.27)	(3.01)	(7.22)	(6.48)	(10.7)	(13.7)	(3.61)			(2.05)
1987-1993	14.0	-2.03	0.48	-1.56	-1.58	-0.38	0.96	1.06	0.93	1.31	.85	1.13	
	(2.90)	(3.05)	(7.05)	(1.72)	(1.61)	(0.31)	(0.74)	(0.76)	(0.68)	(1.37)			
	1.56	-0.32	0.36	1.18	1.98	3.24	5.34	5.35	5.19	4.90	.92	1.99	0.24
	(0.51)	(0.75)	(5.38)	(1.73)	(2.70)	(3.76)	(5.84)	(5.55)	(5.42)	(6.84)			(1.72)
To Canada:													
1980-1986	13.8	-0.77	0.08	1.06	0.70	1.32	2.13	1.06	1.54	2.12	.94	0.94	
	(6.40)	(2.59)	(4.27)	(3.04)	(2.41)	(2.70)	(4.15)	(2.02)	(2.82)	(6.12)			
	15.4	-0.99	0.03	1.21	1.12	1.25	2.10	0.77	1.38	2.15	.86	1.52	0.50
	(6.44)	(3.15)	(0.72)	(2.54)	(2.50)	(2.16)	(3.47)	(1.19)	(2.08)	(5.21)			(4.01)
1987-1993	12.6	-0.54	0.05	1.43	1.10	1.43	2.47	1.40	2.00	2.15	.99	1.74	
	(15.9)	(4.92)	(6.09)	(9.48)	(8.68)	(7.65)	(15.4)	(7.74)	(9.88)	(18.7)			

* -- Estimates in Double-Log Form
** - t-Statistic in Parentheses
+ -- Estimated with Rho Transformed Variables

Table 3... Pooled-Time-Series-Cross-Sectional Estimates* of Elasticity-of-Substitution for Selected U.S. Fresh Market Vegetable Exports

Ratio of Export Volumes	Elasticity of Substitution	Intercept	Dummy-Shifters for Each Vegetable (Minus Aspargus)							Regression Statistics		
			Bro	Cau	Cel	Let	Oni	Pot	Tom	R^2	D-W	*Rho*
Q_{Mex}/Q_{Tot}:												
1980-1986	0.64	-4.03	-1.31	-2.46	-0.55	-1.62	0.01	0.98	-1.57	.77	1.45	
	(7.64)**	(7.78)	(2.09)	(4.18)	(0.86)	(2.59)	(0.02)	(1.62)	(2.54)			
	0.51	-4.42	-0.95	-2.45	-0.10	-1.54	0.45	1.26	-1.65	.64	1.77	.32
	(5.37)	(6.76)	(1.10)	(2.95)	(0.11)	(1.78)	(0.53)	(1.48)	(1.93)			(2.36)+
1987-1993	-1.52	-6.19	-0.21	-0.05	1.59	1.75	3.03	2.75	1.80	.57	0.73	
	(2.03)	(11.86)	(0.28)	(0.07)	(2.27)	(2.60)	(4.52)	(4.02)	(2.68)			
	-0.21	-6.72	0.34	1.70	2.38	3.80	4.25	3.89	3.90	.71	1.94	.41
	(0.51)	(14.2)	(0.52)	(2.58)	(3.59)	(5.74)	(6.47)	(5.91)	(5.93)			(3.15)
Q_{Can}/Q_{Tot}:												
1980-1986	-0.22	-0.39	0.36	0.38	0.23	0.19	-0.36	0.30	0.33	.73	1.75	
	(0.49)	(3.24)	(2.82)	(2.88)	(1.84)	(2.20)	(3.32)	(2.31)	(2.63)			
1987-1993	-0.17	-0.74	0.61	0.52	0.58	0.59	0.26	0.67	0.66	.83	0.55	
	(0.51)	(6.03)	(5.62)	(3.94)	(4.89)	(4.80)	(1.66)	(5.13)	(5.00)			
	-0.32	-0.91	0.63	0.50	0.70	0.71	0.41	0.79	0.77	.58	1.70	.69
	(1.24)	(7.27)	(4.60)	(3.25)	(4.82)	(4.80)	(2.53)	(5.18)	(4.89)			(6.40)
Q_{Mex}/Q_{Can}:												
1980-1986	0.67	-3.72	-1.60	-2.74	-0.73	-1.87	0.39	0.77	-1.83	.77	1.39	
	(7.69)	(7.15)	(2.52)	(4.59)	(1.12)	(2.91)	(0.62)	(1.25)	(2.92)			
	0.51	-4.09	-1.28	-2.80	-0.29	-1.86	0.74	0.98	-2.03	.61	1.70	.39
	(5.12)	(5.78)	(1.34)	(3.01)	(0.30)	(1.93)	(0.78)	(1.03)	(2.13)			(2.95)
1987-1993	-1.55	-4.98	-1.18	-1.05	0.60	0.71	2.17	1.61	0.65	.56	0.67	
	(2.10)	(10.2)	(1.70)	(1.47)	(0.87)	(0.94)	(2.88)	(2.31)	(0.89)			
	-0.33	-5.95	-0.20	1.29	1.81	3.24	3.97	3.24	3.30	.66	2.00	.45
	(0.82)	(11.8)	(0.28)	(1.77)	(2.54)	(4.38)	(5.43)	(4.51)	(4.49)			(3.48)

* -- Estimates in Double-Log Form
** - t-Statistic in Parentheses
+ -- Estimated with *Rho* Transformed Variables

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