

Endaka and Japanese Employment Adjustment

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Abstract

In this paper, using annual data between 1975 and 1994, we estimate the effects of the fluctuations of the yen on Japanese employment, disaggregated by 15 tradeables (manufacturing) industries. We find significant and substantial effects of the yen appreciation on Japanese employment in the industries exporting a high proportion of their value-added, but surprisingly little impact on employment in the import-competing or low-exporting industries.

We present a simple model that shows that employment is more responsive to exchange rate fluctuations when the Japanese industry in question is more “competitive,” that is, when the monopolistic competitor that comprises the Japanese industry has less ability to set prices. If Japanese exporters face more competitive markets than Japanese import-competing firms, then one prediction of our model is that when the yen appreciates, employment falls by a greater amount for Japanese exporters than for Japanese non-exporters. We show econometrically that this prediction is strongly borne out.

I. Introduction

From 1975 to the end of 1994, the yen has appreciated in nominal terms by 68 percent, from about 310 yen to the dollar to about 100 yen. The appreciation has been especially rapid in the early 1990s; after reaching a recent low against the dollar in April 1990 of about 160 yen, in the next 3.5 years, the yen has appreciated by nearly 38 percent.

The high yen, or endaka, has raised concerns about the deindustrialization of the Japanese economy. It is alleged that the strong yen has made Japan less hospitable to the production of tradeable goods, especially in manufacturing, and that there will be an exodus of the manufacturing industries to cheaper sites offshore. Today, Japan is said to face unprecedented long-term structural challenges similar to the problems faced by the United States prior to the Plaza Accord in 1985.¹

In this paper, using annual data between 1975 and 1994, we estimate the effects of the fluctuations of the yen on Japanese employment, disaggregated by 15 tradeables (manufacturing) industries. We find significant and substantial effects of the yen appreciation on Japanese employment in the industries exporting a high proportion of their value-added, but surprisingly little impact on employment in the import-competing or low-exporting industries.

Recently, in Japan, there has been concern about how the protection of inefficient industries is "driving-out" the efficient industries (Koo, 1994). The argument is as follows:

¹During the 1980s, there were many popular and academic articles written about the long-run consequences on the U.S. economy of the early 1980s overvalued dollar (Lawrence, 1983). For a representative sample of the academic literature, see Marston (1988).

The Japanese yen is overvalued because of the protection of inefficient industries.² The profits and employment in these industries are not responsive to exchange rate fluctuations because government regulations limit new entrants, both domestic and foreign. However, the Japanese exportables sector, which tends to be more efficient, is highly responsive to exchange rate fluctuations because of the severe competition with foreign firms in international markets. Consequently, inefficient industries tend to stay in Japan because of the protection and efficient ones go abroad, in search of lower costs.

This paper is consistent with this "bad industries drive out the good industries" hypothesis. In Section III, we present a simple model that shows that employment is more responsive to exchange rate fluctuations when the Japanese industry in question is more "competitive," that is, when the monopolistic competitor that comprises the Japanese industry has less ability to set prices. If Japanese exporters face more competitive markets than Japanese import-competing firms, then one prediction of our model is that when the yen appreciates, employment falls by a greater amount for Japanese exporters than for Japanese non-exporters. We show in Section V that this prediction is strongly borne out.

There is only one previous paper that has examined the relationship between the level of the real exchange rate and Japanese employment. Brunello (1990) applied the Branson and Love (1988) analysis to show that compared to the United States, Japanese manufacturing

²Protection is like an import tariff. The basic Mundell-Fleming model says that for a given level of the current account surplus, an import tariff appreciates the nominal exchange rate, and if prices are sticky, the real exchange rate.

The secular real yen appreciation can also be explained by the Balassa-Samuelson effect, which says that if tradeables have higher rates of productivity growth than non-tradeables, the Japanese real exchange rate should appreciate.

Even under Balassa-Samuelson, however, that import-competing industries have a lower employment response to exchange rate fluctuations than exportables industries is suggestive of a lower level of competition in the import-competing sector.

employment adjusts much less to real exchange rate fluctuations.³ Brunello examines the period between 1973 and 1986, and aggregates the entire manufacturing sector. If, as we show, there is substantial heterogeneity in the response of different industries within the manufacturing sector to exchange rate changes, then Brunello's finding of small labor adjustment may be misleading.

Several papers have examined the relationship between real exchange rates and employment for the United States (Branson and Love, 1988; Revenga, 1992). Like this paper, these earlier articles have generally found a negative relationship between the appreciation of the exchange rate and employment. One contribution of this paper is to show that the employment response depends significantly on the degree of export orientation of the industry.⁴

More generally, this paper provides another case study of an industrialized country undergoing structural change and employment adjustment after a loss in competitiveness due to a real exchange rate appreciation. This case study, for example, may be applicable to other industrialized countries such as Germany.

This paper is organized as follows. The next Section presents some stylized facts concerning the recent yen appreciation and Japanese employment adjustment. The third Section develops a simple model of monopolistic competition that shows that exchange rate fluctuations should affect the employment of exporting firms by more than that of import-

³Brunello's interpretation of this result is that because of Japanese permanent employment practices, there is more labor hoarding in Japan than in other countries.

⁴Other papers such as Campa and Goldberg (1995) have examined the relationship between external exposure, exchange rates, and private investment.

competing firms. Section IV discusses the data and some econometric issues. Section V presents the estimation results showing that Japanese high-exportables employment is more affected by exchange rate fluctuations than Japanese low-exportables employment.

II. Stylized Facts

In this Section, we show that the relationship between the yen appreciation and Japanese high-export employment growth differs by sub-period. We attribute this varied response of high-export employment to the influence of other factors, such as the pattern in Japanese aggregate output growth.

Table 1 summarizes the levels and the changes in employment for each of the 2-digit industries. Among the manufacturing industries, we define low-exportables as those industries exporting less than 10 percent of their value-added, and high-exportables as those exporting more than 10 percent in 1985.⁵ The Table shows that while close to 60 percent of the workforce in 1994 is in services, employment in the low-exportables sector is sizable, and is greater than that in the high-exportables sector.

Figure 1 shows two measures of the real effective exchange rate for Japan. The FRB measure weights the currencies of the G-10 countries by the multilateral trade shares, while the JP-Morgan index uses weights that reflect Japan's bilateral trade with the 17 industrialized and 22 emerging nations in 1990. The JP-Morgan index shows a lower trend rate of

⁵As it is well-known, the industry classifications in the Japanese labor statistics do not correspond exactly to the classifications in the customs (trade) data. To the extent possible, we tried to match each "principal commodity" in the Japanese Foreign Trade Statistics (Ministry of Finance, various issues) to an industry classification in the Japanese labor statistics. Principal commodity classes are detailed to the level of "passenger motor cars," but not the level of "four-wheel drive vehicles." Value-added by industry is from the Census of Manufactures (Ministry of International Trade and Industry, various issues).

appreciation for the yen than does the FRB index, probably because the currencies of Japan's emerging market trading partners have on average depreciated less against the yen than did the U.S. dollar and the major European currencies. Both measures, however, show that the yen has appreciated at a rate far above trend between 1985 and 1988 and 1990 and 1994.

Following McKinnon (1995), we call the two endaka episodes, endaka I and endaka II.

Table 2 shows that productivity in food processing, a representative low-export industry, is about 1/3 the productivity in the machinery and transport equipment industries, representatives of the high-export sector. Price differentials between the United States and Japan also appear to be higher for the food processing industries, which is partly related to the differences in tariff rates and other forms of protection in the two industries.

Figures 2(a) to 2(c) depict the percentage changes in employment in tradeables (manufacturing) and in services, and within manufacturing, in the high-export and low-export industries. On average, between 1975-94, growth in the services sector surpassed that in tradeables, and high-exportables grew faster than low-exportables; the same pattern is evident during endaka I, 1985-88. During endaka II, however, a different pattern surprisingly emerges; *low-export goods grew faster than high-export goods*.

Figure 2(d) examines more closely, the employment changes in the food processing and electrical machinery industries. While employment in the electrical machinery industry grew more strongly during endaka I, during endaka II, that in the food processing sector grew much more strongly.

How can we explain the differing patterns in Japanese high-exportables employment growth in the two sub-periods? The two endaka episodes coincided with recessions both in

Japan and abroad, but the recession in the mid-1980s was much shallower and was followed by strong Japanese growth. As of December 1994, there was not yet a recovery from the early 1990s recession. If the income elasticity of demand for high-exportables is greater than that for low-exportables, then the observed differential growth rates of employment in the high- and low-exportables sectors during the two episodes may simply be a result of differences in these income elasticities, rather than differences in the real exchange rate elasticities.

In Section V, we control for the domestic and foreign fluctuations in aggregate demand and other variables that may affect demand at the industry level, to isolate the impact of exchange rate fluctuations. After introducing these controls, we find that during the 1975-1994 period, on average, Japanese high-exportables employment responded more negatively to exchange rate fluctuations than low-exportables employment.

III. The Model

The following simple model illustrates the relationship between the changes in the real exchange rate and employment at the industry level.⁶

Assume that each Japanese tradeable (manufacturing) goods industry is monopolistically competitive and that a representative firm in the Japanese industry faces the following global product demand curve:

⁶The model is standard as in Goldberg (1993) and Sheets (1993). The idea that the exchange rate impact on the domestic economy depends on the degree of imperfect competition is not new, and is reflected in the voluminous literature on “currency pass-through” as in Froot and Klemperer (1989), and Marston (1990).

$$Q_i^D = \left(\frac{p_i}{Z_i * (1 + u_i)} \right)^{-\alpha} D(O^J, O^F)$$

where u_i is a random variable reflecting taste shocks, p_i is the price of good i charged by the Japanese firm, and Z_i is a weighted-average of the foreign prices of good i , expressed in terms of yen, or

$$Z_i = s_i^1 e^1 p_i^1 + \dots + s_i^j e^j p_i^j + \dots + s_i^N e^N p_i^N.$$

p_i^j is the price of good i in country j , e^j is the nominal exchange rate between the yen and country j 's currency, and s_i^j is the share of country j 's trade in Japan's total trade in good i . That is, the demand for good i depends on the ratio of the price charged by the Japanese firm to a weighted-average of those charged by Japan's trading partners.

$D(.,.)$ is a demand shift variable that is function of Japan's aggregate output, O^J , and the aggregate outputs of Japan's trading partners, O^F , and α is the price elasticity of world demand for Japan's production of good i . The higher the α , the more competitive the industry, and the lower the markup over costs.

Assume that the production function for good i in Japan is,

$$Q_i^S = A_i * L_i^\beta,$$

where A_i summarizes the technology, and other factors of production exogenously supplied to the firm. For a Japanese profit maximizing firm, optimal labor demand is equal to,

$$L_i = B_i * \left(\frac{w_i}{u_i * Z_i * D(.,.)} \right)^{\Theta}, \quad (1)$$

where B_i is a function of A_i and the parameters, w_i is the real wage in the industry, and $\Theta = [\alpha * (\beta - 1) - \beta] / \alpha < 0$, with $|d\Theta / d\alpha| = |\beta / \alpha^2| > 0$. That is, the "responsiveness" of employment, L_i with respect to a change, say in w_i , is larger the more elastic is the demand, or the more competitive the industry.

To calculate Z_i , we need estimates of the prices of good i in each of Japan's trading partners. These prices are likely to be correlated with u_i ; a positive shock to the demand for good i produced in Japan, say, arising from an international supply disturbance, is also likely to raise the prices of good i produced in Japan's trading partners.⁷

To reduce the simultaneity problems arising from this source, we assume that Z_i for all i is approximately proportional to the trade-weighted sum of the cpis of Japan's trading partners, or to:

$$X * (\sigma^1 * e^1 * cpi^1 + \dots + \sigma^N * e^N * cpi^N) = \frac{X * cpi^J}{q}, \quad (2)$$

where X is a constant of proportionality, cpi^J is Japan's consumer price index, and σ^j is the share of country j in Japan's trade in all goods. q_t is the real exchange rate, the ratio of Japan's cpi to a weighted-average of those of Japan's trading partners.⁸ Simultaneity problems are reduced, since both $\ln q_t$ and $\ln cpi_t^J$ are determined by macroeconomic

⁷Revena (1991) instruments foreign prices by foreign cost indices at the industry level in an attempt to reduce the simultaneity biases.

⁸Empirically, q corresponds to Japan's Real Effective Exchange Rate, as depicted in Figure 1.

factors and are likely to be orthogonal to the unobserved components of the employment variation.⁹

Express $\ln(D(.,.))$ as $K*\ln O^J + M*\ln O^F$. Using (2) to substitute for Z_i in (1), and taking natural logarithms, we arrive at,

$$\ln L_{it} = \ln B_{it} + \Theta * \ln w_{it} + \Gamma * \ln O_t^J + \Omega * O_t^F + \Phi * \ln q_t - \Phi * \ln cpi_t^J + u_{it}, \quad (3)$$

as our estimating equation, where $\Gamma = 1/\alpha * K * \Theta$, $\Omega = 1/\alpha * M * \Theta$, $\Phi = \Theta * X$, and we have inserted time-subscripts to denote variables which vary over time. Note that the equation predicts that Φ is negative, and will be higher in absolute value for Japanese firms in more competitive industries. Therefore, a rise (an appreciation) in the real exchange rate should lower employment in the high-export industry by more than that in the low-export industry.¹⁰

Technology and other Fixed-effects.

In (3), $\ln B_{it}$ is unobserved and the ordinary least squares estimation of (3) will subsume $\ln B_{it}$ in the error-term. This may potentially result in simultaneity biases, since the real-exchange rate will be correlated with technological progress in models such as the Balassa-Samuelson.

⁹Goldberg (1991), Campa and Goldberg (1995), and Sheets (1993) all regress industry-level variables on aggregate real effective exchange rate indices. In their work and in ours, there is no longer any cross-section variation in foreign prices. We show empirically in Section V that the time-variation in q is usually sufficient to estimate (3) precisely.

¹⁰From (3), a rise in Japan's cpi , holding q constant, raises employment in industry i . This is because with a constant q , the Japanese cpi increase must be matched by foreign price increases, raising the demand for Japan's production of good i , and raising employment.

To reduce the potential bias arising from this source, we assume that $\ln B_{it}$ can be decomposed into,

$$C + \alpha t + \ln v_i + \epsilon_{it} \quad (4)$$

or a constant, time-trend, industry fixed-effects, and a white-noise error. t captures technological growth and other trends common to all industries, and $\ln v_i$ captures inter-industry differences in technological levels and other fixed-effects.

When (4) is substituted for $\ln B_{it}$ in (3), equation (3) is estimated with a trend term and industry dummies.

IV. Data and Estimation

Data

To estimate (3), we need industry level data on employment, and wages, and time-series data on foreign output, Japanese output, the real exchange rate, and the Japanese consumer price index.

Data on employment are taken from the annual December issues of the Labor Force Survey (Japanese Prime Minister's Office), and those on wages (base plus bonuses) are from the Monthly Labor Surveys (Prime Minister's Office).

As a measure of the level of foreign output, we use the index of world output constructed by the IMF (International Financial Statistics). As a measure of the level of Japanese aggregate output, we take GDP. The CPI is from the Japan Statistical Yearbook

(Prime Minister's Office), and we use the JP-Morgan index as our measure of the real exchange rate.

Time-series Properties.

For all the time-series variables, Augmented Dickey-Fuller tests could not reject the null of non-stationarity for the levels, but could reject non-stationarity for the first-differences.¹¹ For each individual industry, we also could not detect cointegration between employment and the right-hand side variables in equation (3).¹²

For most individual industries, the null of non-stationarity could not be rejected for $\ln L_{it}$ and $\ln w_{it}$, although non-stationarity could be rejected for their first-differences. Residual-based tests of non-stationarity, however, have very low power in time-series of our length (20) (Campbell and Perron, 1991). To obtain more power, we exploited the panel structure of our data, and applied the panel unit root tests derived by Levin and Lin (1992). Using the critical values given in Levin and Lin, Table 5, the null of non-stationarity could now be rejected for both $\ln L_{it}$ and $\ln w_{it}$.¹³

Because of the inconclusive nature of the unit root tests for the industry level data, to assure stationarity of the variables, below we estimate (3) on the first-differences of all of the variables, or¹⁴

¹¹A trend term and up to four lags were included.

¹²We applied the Engel and Granger (1987) two-step procedure.

¹³We did not apply unit root tests to the unionization rates, since unionization rates are by construction stationary, bounded by 0 and 1.

¹⁴We also estimated (3)' in levels, but we could not obtain significant t-statistics for many of the
(continued...)

$$\Delta \ln L_{it} = \alpha + \Theta * \Delta \ln w_{it} + \Gamma * \Delta \ln O_t^J + \Omega * \Delta \ln O_t^F + \Phi * \Delta \ln q_t - \Phi * \Delta \ln cpi_t + z_i + \omega_{it} \quad (3)'$$

where $z_i = \Delta \ln v_i$, $\omega_{it} = \Delta u_{it} + \Delta \epsilon_{it}$.

In the first-differenced version of (3) above, or (3)', the trend term drops out. The dummy variables now represent inter-industry differences not in technology levels, but in technology growth rates, and possibly other fixed "growth" effects.

Instrumenting for the real wage.

In estimating (3)', we first assume that the firm takes $\Delta \ln w(i, t)$ as exogenous. However, depending on the wage setting process, $\Delta \ln w(i, t)$ may be correlated with the error-term. For example, when there is a positive demand shock for good i , the union representing workers producing good i may become more aggressive, bidding up wages.¹⁵ In our second specification, we use the unionization rate (union members/total workers) as an instrument for $\Delta \ln w_{it}$, since previous authors have shown that union organizing activity is positively correlated with real wage increases (Bronars and Deere, 1993).¹⁶

¹⁴ (...continued)

individual coefficient estimates, although the equation R^2 were typically high. The coefficient estimates were also unstable, in that their signs and magnitudes varied greatly, depending on the specification.

¹⁵We assume that the union and the firm decide on both the base wage and the bonus ex ante. The firm therefore maximizes profits subject to the sum of the negotiated base wage and bonuses, which is our measure of real wages. Weitzman (1984) has argued that because of profit-sharing, bonuses in Japan are determined as a share of corporate profits. What therefore affects the firm's optimal choice of labor (and output) will be only the base wage. Bonuses are determined as a residual.

Despite the possible existence of profit-sharing in Japan, we do not think the practice is quantitatively important. Profit-sharing firms should hire more labor than non-profit sharing firms, but we do not find that compared to Western firms, Japanese firms hire more labor.

¹⁶The unionization rates are obtained from the Labor Union Basic Surveys (Ministry of Labor). If in addition to raising the real wage, unions attempt to direct influence employment, then the unionization rate will not
(continued...)

V. The Results

In this Section, we test whether the elasticity of employment to a change in the real exchange rate is higher for the high-export industries. We interact the real exchange rate with a dummy variable that assumes a value of one when the industry is in the high-export category and test whether the coefficient on this variable is significantly negative.¹⁷

The mid-1970s and early 1980s witnessed sharp oil price increases that may have impacted different industries differently. For example, if in some industries, energy and labor are complements, then a rise in oil prices may have lowered labor demand in these sectors. To control for the oil price effects, in all specifications, we included the change in log real oil prices, which is the natural logarithm of the yen oil price divided by the Japanese GDP deflator. The results including the variable $\Delta\text{Log}(\text{ROil})$ are depicted in the Tables below, although dropping this variable made little difference to the other coefficient estimates.

Three lags of $\Delta\text{Log}(\text{Real Exchange Rate})$ and two lags of $\Delta\text{Log}(\text{Foreign Output})$ are included as regressors. The $\Delta\text{Log}(\text{ROil})$ and $\Delta\text{Log}(\text{Industry Wages})$ are unlagged. We estimated Equation (3)', after imposing the model's constraint that the coefficients on

¹⁶ (...continued)

be an appropriate instrument. Ito (1992, p. 246) argues that since Japanese wage negotiations occur annually, wages are more flexible, enabling Japanese firms to offer stable employment. This suggests that in Japan, unions influence employment, not directly, but through wages. In Section V, we test whether the unionization rate is a valid instrument.

¹⁷ An increase in government spending that falls disproportionately on non-traded goods may also appreciate the real exchange rate (Froot and Rogoff, 1994). If $\omega_{i,t}$ is also correlated with government spending, then the coefficient estimates on the real exchange rates will be biased (Glick and Hutchison, 1990).

In Japan, the changes in the real exchange rate appear not to be correlated with the changes in real government spending, ΔG . A regression of ΔQ_t on ΔG , and a time-trend, resulted in a coefficient estimate on ΔG of -0.30, with a t-statistic of -0.15. Therefore, in our first-differenced specification, the coefficient estimates should not be biased from this source.

$\Delta \text{Log}(\text{Real Exchange Rate})$ and $\Delta \text{Log}(\text{CPI})$ are equal, but opposite in sign. We also imposed the dynamic constraint that the lagged effects of all of the explanatory variables are equal to their contemporaneous effects.¹⁸

Table 3(a) depicts the results from the ordinary least squares estimates, and from the two-stage least squares estimates, when the real wage is instrumented. The second and fourth columns include the industry dummy variables (fixed-effects estimates) for the different industry growth trends, and columns two and four also instrument industry wages by the unionization rates. Since unionization rates are available for only 10 of the industries, the sample size is reduced to 200 in these specifications.¹⁹

The Table shows that for low-exportables employment, an exchange rate appreciation raises employment, but the coefficient is usually significant at the 10 percent level. For all specifications, an exchange rate appreciation has a statistically significant negative impact on employment in the high-exportables sector. On average, relative to low-exportables employment, a 10 percent appreciation in Japan's real effective exchange rate lowers high-exportables employment by between 1.7 and 3.6 percent.

The growth in foreign output appears to have no impact, while Japanese output growth has a strong positive effect on employment in all specifications except the fourth.

¹⁸That is, if v_t is the coefficient on $\Delta \text{Log}(X_t)$ and v_{t-1} is the coefficient on $\Delta \text{Log}(X_{t-1})$, then $v_t = v_{t-i}$ for $i=1,2$. This constraint was imposed to conserve on degrees of freedom.

¹⁹The unionization rates were missing for the food, apparel, lumber, ceramics, and precision machinery industries.

There appears to be no difference in domestic output elasticities between the high- and low-export sectors.

Contrary to the predictions of the model, employment and industry real wages are positively correlated, even when wages are instrumented by the unionization rate and fixed-effects are introduced. To test the validity of the instrument, we performed the Generalized Method of Moments (GMM) error-orthogonality test that involves regressing the two-stage least squares residuals on the unionization rate; N times the R^2 from this regression, where N equals the degrees of freedom from the original equation asymptotically follows a Chi-squared distribution. We obtained a $\chi^2(177)$ of 0.020, which is insignificant at any level, suggesting that the unionization rate is an appropriate instrument.²⁰

One interpretation of the above results is that Japan underwent structural change in the early 1990s, so that during endaka II, high-(low-) exportables became more (less) responsive to exchange rate fluctuations. To examine this possibility, for specification (2), we performed a Chow-test to test whether the relationship between $\Delta \text{Log}(\text{Industry Employment})$ and the explanatory variables in Table 3(a) changed in 1990. The $F[22,256]$ statistic was 0.41, which is not significant at the 5-percent level; the null hypothesis of no structural change during endaka II could not be rejected.

To an extent, defining a high-exportables industry as that exporting more than 10 percent of its value-added in 1985 is arbitrary. We therefore re-estimated (3)', now defining a "medium-exportables industry" as that exporting more than 3-percent of its value-added in

²⁰Or alternatively, the test has little power.

1985. We now have the two categories and dummy variables: 1) low-exportables and 2) medium-exportables and above.²¹

Compared to the results in Table 3(a), the results depicted in Table 3(b) are somewhat less satisfactory. The $\Delta\text{Log}(\text{Real Exchange Rate}) \cdot \text{MH}$ is still negative and significant, but now at only around the 10 percent level in the two instrumental variables specifications.

In specifications (1) and (2), except for $\Delta\text{Log}(\text{ROil})$, the coefficient estimates for the other variables are similar to those reported in Table 3(a). In specification (4), none of the coefficient estimates are significant at the 5-percent level.

Taken together, the results in Tables 3(a) and 3(b) imply that on average, during the 1975-94 period, employment in Japanese high-exportables were more impacted by exchange rate fluctuations than employment in low-exportables.

VI. Conclusion

Conventional wisdom says that when the exchange rate appreciates, within the manufacturing (tradeables) sector, employment in inefficient industries should decline by more than that in efficient industries, since efficient industries are better able to cut non-labor costs. Since high-exporting industries tend to be more efficient than low-exporting (import-competing) industries, a currency appreciation should reallocate labor from the low- to the high-exporting sectors.

In this paper, we showed that among the Japanese tradeables industries, high-exportables tend to respond more negatively to an exchange rate appreciation than low-

²¹In specifications (1) and (2), only food, textiles, apparel, pulp, and publishing remain in the low-exportables category. In specifications (3) and (4), only textiles, pulp, and publishing remain.

exportables. One interpretation of this lack of appropriate structural adjustment is that Japanese high-exportables face more competitive markets than Japanese low-exportables.

The analysis so far has ignored the role of imported inputs. If high-exportables have a higher import content, then as Sheets (1993) shows, an appreciation induced fall in the price of imported inputs may cause a substitution away from labor, a domestic non-tradeable input, which may explain our result. However, even with imported inputs, our basic conclusion that the yen appreciation has hurt employment in the more efficient Japanese industries still holds.

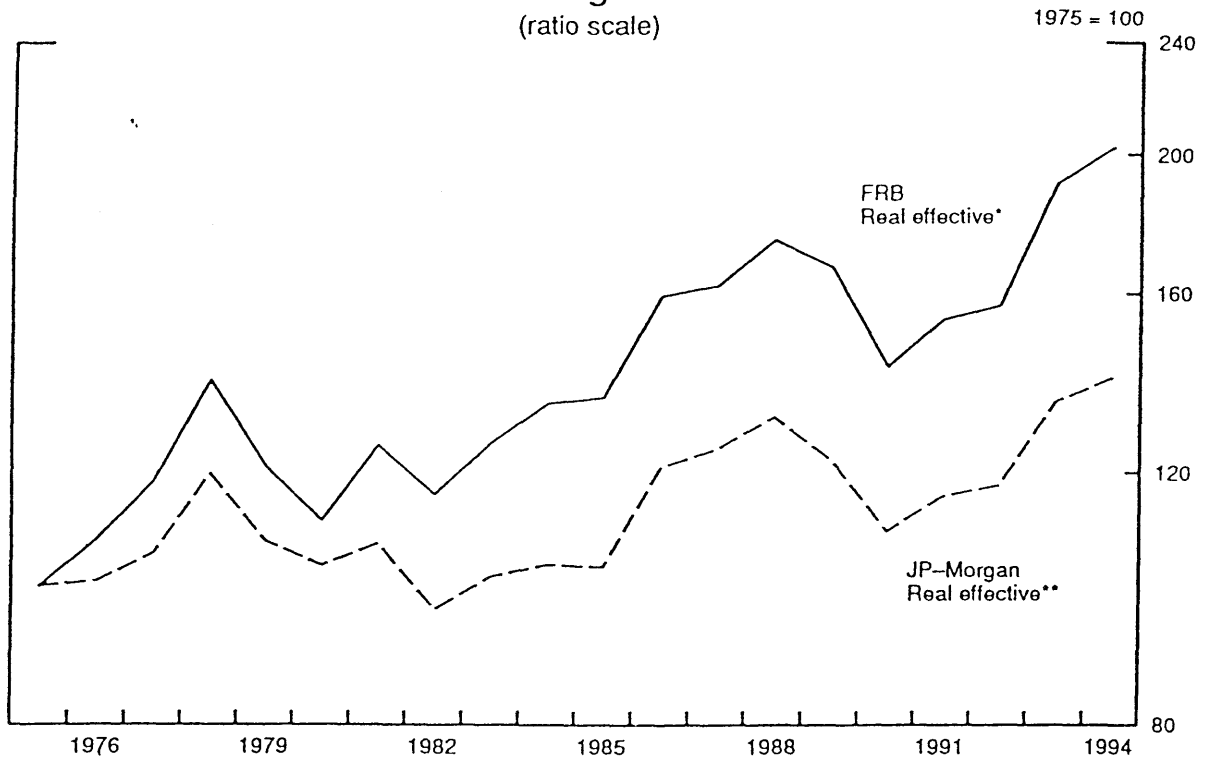
Table 1: Growth of Employment By Industry

	(1) 3/	(2)	(3)	(4)
Low-Exportables 1/	17.11			
Food	4.21	15.17	30.53	50.33
Textiles	1.18	-33.00	-27.30	-51.30
Apparel	1.48	4.74	16.48	22.01
Lumber	0.38	-35.20	-17.80	-46.70
Pulp	0.83	-11.50	5.57	-6.57
Publishing	1.66	5.64	33.56	41.09
Chemicals	2.07	-20.50	7.69	-14.40
Ceramics	1.35	-12.40	3.20	-9.63
Iron and Steel	1.26	-19.10	-20.30	-35.50
Non-ferrous Metals	0.70	-7.19	1.80	-5.51
Fabricated Metals	1.99	-9.33	10.21	-0.08
High-Exportables 2/	16.44			
General Machinery	3.60	-4.81	14.22	8.72
Electrical Machinery	7.70	36.72	19.85	63.86
Transport Equipment	4.11	-3.01	6.89	3.68
Precision Machinery	1.02	38.22	-12.80	20.58
Mining	0.14	-37.60	-45.20	-65.80
Construction	7.11	-33.20	19.94	-20.10
Services	59.20			
Electricity	1.15	3.04	9.26	12.58
Transportation	11.37	22.81	15.77	42.18
Wholesale and Retailing	17.65	13.82	36.69	55.59
Other Services	29.04	44.67	45.58	110.60

- (1): Percentage of Workforce, 1994.
(2): Growth of Employment, 1975-1984.
(3): Growth of Employment, 1985-1994.
(4): Growth of Employment, 1975-1994.

- 1/ Exports/Value-Added<10%
2/ Exports/Value-Added>=10%
3/ Excludes agriculture, plastic and rubber products, and finance and real estate.

Figure 1
Exchange Rates
(ratio scale)



* G-10 currencies, cpi-adjusted, multilateral trade weights.
** 39 currencies, cpi-adjusted, bilateral trade weights.

Table 2
Productivity Levels, Price Levels, and Tariff Rates

	Productivity Level (US =100)	Price Level (US =100)	Tariff Rates (percent)
Low-Export Intensity (0-10%) Food Products	36	194	8
High Export Intensity (more than 10%) Machinery and Transport Equipment	97	117	4

Sources: Hooper and Vrankovich (1994); McKinsey Global Institute (1991); Sazanami, Urata, and Kawai (1995).

Figure 2(a)



Figure 2(b)



Figure 2(c)



Figure 2(d)

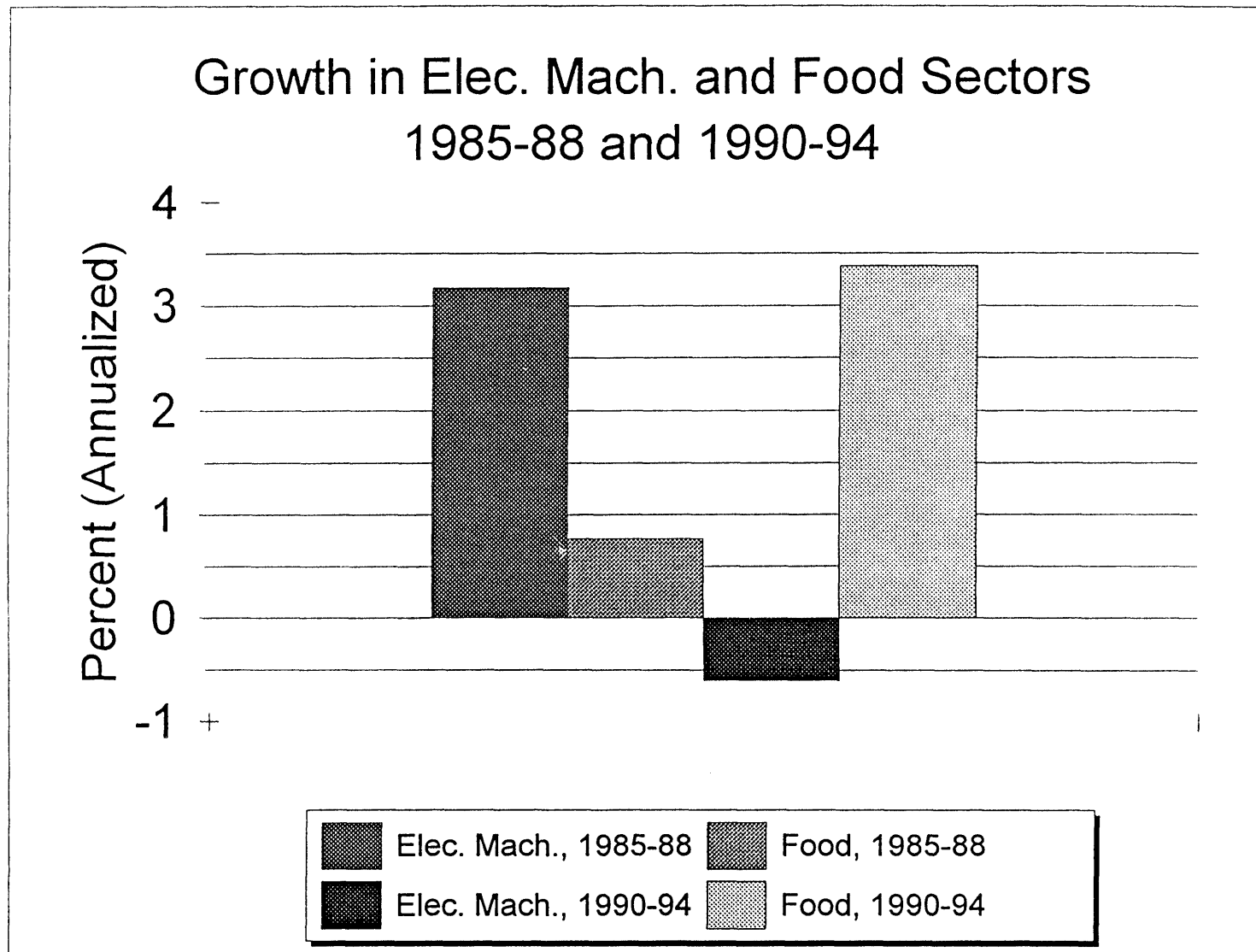


Table 3(a): Impact of Real Exchange Rate Appreciation on High-Exportables Employment. {First-Difference Estimates}

Dependent Variable: $\Delta \text{Log}(\text{Industry Employment})$

Explanatory Variables:	(1)	(2) ^{2/}	(3) ^{3/}	(4) ^{4/}
$\Sigma \Delta \text{Log}(\text{Real Exchange Rate})$	0.360 (1.70)	0.360 (1.72)	0.130 (0.45)	0.110 (0.26)
$\Sigma \Delta \text{Log}(\text{Real Exchange Rate}) * \text{DH}$ 1/	-0.330 (-2.76)	-0.270 (-2.60)	-0.360 (-2.70)	-0.170 (-2.14)
$\Sigma \Delta \text{Log}(\text{Foreign Output})$	-0.033 (-1.32)	-0.033 (-1.32)	-0.045 (-1.52)	-0.045 (-0.38)
$\Sigma \Delta \text{Log}(\text{Foreign Output}) * \text{DH}$	0.040 (0.71)	0.026 (0.34)	0.028 (0.30)	0.059 (0.52)
$\Sigma \Delta \text{Log}(\text{Japan Output})$	1.840 (1.83)	2.100 (1.95)	4.740 (2.52)	0.170 (-0.03)
$\Sigma \Delta \text{Log}(\text{Japan Output}) * \text{DH}$	-0.930 (-0.47)	-1.490 (-0.69)	-0.410 (-0.15)	1.130 (0.10)
$\Delta \text{Log}(\text{ROIL})$	-0.057 (-0.81)	-0.060 (-0.85)	-0.100 (-1.19)	-0.340 (0.17)
$\Delta \text{Log}(\text{ROIL}) * \text{DH}$	0.079 (0.70)	0.770 (0.67)	0.083 (0.58)	0.047 (0.010)
$\Delta \text{Log}(\text{Industry Wages})$	0.560 (2.77)	0.590 (2.88)	0.610 (2.52)	0.380 (2.17)
$\Delta \text{Log}(\text{Industry Wages}) * \text{DH}$	-0.620 (-1.88)	-0.620 (-1.88)	-0.670 (-1.73)	-0.900 (-0.95)
Number of Observations:	300	300	200	200
R-squared:	0.14	0.09	0.15	0.14

Notes: T-statistics in parentheses. Constant term, Constant*DH, and Industry Dummy Variables are not depicted. Three lags of the Real Exchange Rate, and two lags of Foreign Output, and Japanese Output are included. Industry Wages and the Real Oil Prices are unlagged. The coefficients on all the lagged terms are constrained to be equal.

1/ (DH=1) if industry is in the high-exportables category.

2/Industry dummy variables are included.

3/Industry wages are instrumented by the industry unionization rates.

4/Industry dummy variables are included and industry wages are instrumented.

Table 3(b): Impact of Real Exchange Rate Appreciation on Medium-Exportables Employment. {First-Difference Estimates}

Dependent Variable: $\Delta \text{Log}(\text{Industry Employment})$

Explanatory Variables:	(1)	(2)2/	(3)3/	(4)4/
$\Sigma \Delta \text{Log}(\text{Real Exchange Rate})$	0.450 (1.86)	0.420 (1.74)	1.410 (0.27)	0.720 (0.20)
$\Sigma \Delta \text{Log}(\text{Real Exchange Rate}) * \text{MH}$ 1/	-0.460 (-2.30)	-0.360 (-2.99)	-1.810 (-1.67)	-0.960 (-1.63)
$\Sigma \Delta \text{Log}(\text{Foreign Output})$	-0.033 (-1.26)	-0.026 (-0.95)	-0.0037 (-0.09)	-0.002 (-0.11)
$\Sigma \Delta \text{Log}(\text{Foreign Output}) * \text{MH}$	0.055 (0.19)	0.020 (0.40)	0.052 (0.46)	0.042 (1.09)
$\Sigma \Delta \text{Log}(\text{Japan Output})$	1.98 (1.81)	3.74 (2.75)	-16.78 (-0.23)	-0.016 (-0.011)
$\Sigma \Delta \text{Log}(\text{Japan Output}) * \text{MH}$	-1.00 (-0.69)	-3.41 (-1.83)	21.54 (0.24)	0.580 (0.25)
$\Delta \text{Log}(\text{ROIL})$	-0.230 (-2.38)	-0.280 (-2.79)	-0.550 (-0.33)	-0.760 (-0.33)
$\Delta \text{Log}(\text{ROIL}) * \text{MH}$	0.250 (2.10)	0.290 (2.41)	0.660 (0.24)	-0.031 (-0.58)
$\Delta \text{Log}(\text{Industry Wages})$	1.140 (4.20)	1.300 (4.67)	1.710 (0.36)	0.580 (0.29)
$\Delta \text{Log}(\text{Industry Wages}) * \text{MH}$	-1.160 (-3.50)	-1.320 (-3.92)	-2.020 (-0.32)	-0.760 (-0.33)
Number of Observations:	300	300	200	200
R-squared:	0.09	0.09	0.05	0.04

Notes: T-statistics in parentheses. Constant term, Constant*MH, and Industry Dummy Variables are not depicted. Three lags of the Real Exchange Rate, and two lags of Foreign Output, and Japanese Output are included. Industry Wages and the Real Oil Prices are unlagged. The coefficients on all the lagged terms are constrained to be equal.

1/ (MH=1) if industry is in the medium-exportables category and above.

2/Industry dummy variables are included.

3/Industry wages are instrumented by the industry unionization rates.

4/Industry dummy variables are included and industry wages are instrumented.

References

- Branson, W. and J. Love (1988). "Dollar Appreciation and Manufacturing Employment and Output," NBER Working Paper, No. 1972.
- Bronars, S. and D. Deere (1993). "Union Organizing Activity, Firm Growth, and the Business Cycle," American Economic Review.
- Brunello, G. (1990). "Real Exchange Rate Variability and Japanese Industrial Employment," Journal of the Japanese and International Economies.
- Campa, J. and L. Goldberg (1995). "Investment in Manufacturing, Exchange Rates, and External Exposure," Journal of International Economics.
- Campbell, J. and P. Perron (1991). "Pitfalls and Opportunities: What Macroeconomists Should Know About Unit Roots," NBER Macroeconomics Annual.
- Engel, C. and C. Granger (1987). "Co-Integration and Error Correction: Representation, Estimation, Testing," Econometrica, 35, 1987.
- Froot, K. and P. Klemperer (1989). "Exchange Rates Pass-through when Market Share Matters," American Economic Review.
- Glick, R. and M. Hutchison (1990). "Does Exchange Rate Appreciation 'Deindustrialize' The Open Economy? A Critique of U.S. Evidence," Economic Inquiry.
- Goldberg, L. (1993). "Exchange Rates and Investment in United States Industry," Review of Economics and Statistics.
- Hooper, P. and E. Vrankovich (1994), "International Comparisons of the Levels of Labor Costs in Manufacturing," manuscript, Federal Reserve Board.
- International Monetary Fund, various annual issues, International Financial Statistics.
- Ito, T. (1992). The Japanese Economy, MIT Press.
- Koo, R. (1994). Good Yen Appreciation, Bad Yen Appreciation. (Yoi Endaka Warui Endaka). Tokyo: PHP Publishers.
- Lawrence, R. (1983). "Is Trade Deindustrializing America? A Medium-term Perspective," Brookings Papers on Economic Activity.

- Levin, A. and C. Lin (1992). "Unit Roots in Panel Data: Asymptotic and Finite Sample Results," mimeo., University of California, San Diego.
- Marston, R. (1988). Misalignment of Exchange Rates: Effects on Trade and Industry. (University of Chicago Press).
- Marston, R. (1990). "Pricing to Market in Japanese Manufacturing," Journal of International Economics.
- McKinsey Global Institute (1991). "Productivity Trends in Japan, Germany, and in the United States," processed.
- McKinnon, R. (1995). "Endaka Fukyo and U.S. Trade Policies," mimeo., Stanford University.
- Ministry of Finance, Government of Japan (various annual issues). Foreign Trade Statistics.
- Ministry of International Trade and Industry (various annual issues). Census of Manufacturers.
- Ministry of Labor (various annual issues). Labor Union Basic Survey.
- Prime Minister's Office (various annual issues), Labor Force Survey.
- Prime Minister's Office (various annual issues), Monthly Labor Survey.
- Prime Minister's Office (various annual issues), Japan Statistical Yearbook.
- Revenga, A. (1992). "Exporting Jobs: The Impact of Import Competition on Employment and Wages in U.S. Manufacturing," Quarterly Journal of Economics.
- Sazanami, Urata, and H. Kawai (1995). "Measuring the Costs of Protection in Japan," Washington, D.C.: Institute for International Economics.
- Sheets, N. (1993). "The Exchange Rate and Profit in Developed Economies: An Intersectoral Analysis," mimeo., Board of Governors of the Federal Reserve System.
- Weitzman, M. (1984). The Share Economy. Harvard University Press.