Exchange Rates and Employment in Turkish Manufacturing

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Abstract

This paper investigates the effects of exchange rate fluctuations on Turkish manufacturing employment and wages using data for a panel of manufacturing industries over the period 1981-1999. The net effect of depreciations was found to be negative for both employment and wages, though the effects on wages were more pronounced. The negative impact of the high dependency of Turkish manufacturing industries on foreign inputs outweighs the positive effect depreciations have on competitiveness.

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1 Introduction

In the last couple of decades, the number of developing countries that prefer more flexible exchange rate regimes has increased substantially. The main explanation for this trend is that exchange rate flexibility eases macroeconomic adjustment to both foreign and domestic shocks. Even so, flexibility comes at a cost: high fluctuations in nominal and real exchange rates may end up distorting the reallocation of resources. Hence, the success of new regimes depends upon the extent to which exchange rates influence factor markets. This paper explores the implications of real exchange rate movements on employment and wages in the Turkish manufacturing industry and the channels through which the effects operate.

With increasing openness to freer international trade, many countries have begun to confront balance of payments problems. Most governments use exchange rate regimes to cope with such difficulties. An undervalued domestic currency increases the competitiveness of domestic firms in international markets, boosts exports and reduces imports. However, higher openness may also lead to increased dependency on foreign inputs in production. Devaluations, in that case, raise costs to firms and reduce the expected benefits of an undervalued currency. The net consequence of exchange rate fluctuations will be determined, then, by which of these two counteracting forces dominate. Furthermore, the extent of external exposure of different industries becomes crucial in determining how resources will be allocated across industries.

In particular, developing countries that open their economies to free trade and that heavily rely on foreign inputs may be affected most from large fluctuations in exchange rates. Turkey is such a country. The share of trade in the Turkish GNP increased from 15 percent in 1980 to 34 percent in 2000. The share of capital and intermediate goods in total imports was over 85 percent while that of imported inputs in total inputs was around 18 percent in the manufacturing sector as of 2000. During the same period, there were significant variations in the Turkish Lira. In particular, it experienced a devaluation of 40 percent in 1980, 1994 and 2001. The major finding of this paper is that devaluations have had a net negative effect on employment and wages. On average, a 10 percent depreciation of the Turkish Lira results in a 1.6 percent decline in manufacturing employment. The wage response to changes in exchange rates is even more pronounced. The exchange rate elasticity of wages is a negative 0.5. Variation across industries is also considerable. The industry most hurt by devaluations is clothing, the industry that generated the most employment growth throughout the 1980s.

While a significant number of studies have been carried out on the effects of exchange rates on overall economic growth and inflation, little research has been conducted to understand how fluctuations affect labor markets, even in developed economies. Among the few studies that have been done in this area is that carried out by Revenga (1992). In this analysis, which evaluated the effects of exchange rate alignment on import competition in the United States, it was determined that exchange rate movements have major implications for employment and wages there: the appreciation of the dollar decreased employment and wages, especially in industries that face stronger competition from imports. Similarly, the assessment of employment response to exchange rates in G-7 countries conducted by Burgess and Knetter (1998) showed that real appreciations led to a decline in employment. This was the case even though differences were found across countries and industries in employment elasticities with respect to exchange rates. Another study of the US manufacturing industry [Campa and Goldberg (2001)] reported a small but significant impact of exchange rates on wages and very small, mostly insignificant effect on employment. They also found that industry response depends on the competitiveness and composition of skill level in that industry and that the importance of exchange rates for wages has been increasing since the mid-1980s - a period when the export markets of US manufacturing were expanding. Finally, Dekle

(1998) found that a fall in foreign prices reduced employment significantly in Japan. He, however, failed to find any difference in the responsiveness of high and low export sectors to exchange rates.

The paper is organized as follows. The first section contains a brief history of the Turkish economy. This is followed by the presentation of a simple model of the labor market. Then, data and estimation issues are discussed. After that, comes the presentation of empirical results, which are followed by the conclusion.

2 Developments in Turkey

A twenty-year period of import-substitution-based industrialization came to an end in 1979 following a severe payments crisis that had paralyzed the economy in the second half of the 1970s. This forced Turkey to move to an outward-oriented growth strategy characterized by a liberalization of trade and then of the financial system. In January 1980, the Turkish government undertook a major devaluation of the currency, which was followed by a promotion of exports through a variety of tools, including tax rebates, credit subsidies and foreign exchange allocations for the imports of intermediate goods. In 1984, an Import Program was initiated. With this program, quantity restrictions were significantly eliminated (60 percent of 1983 imports were liberalized) and tariffs for the majority of imports were reduced by 20 percent (Baysan and Blitzer, 1990). As of 1988, major trade liberalization had already been established. In 1989, the government moved to financial liberalization by allowing real exchange rates to appreciate and by fully liberalizing capital accounts. The new policies aimed to increase inflows of funds into the domestic economy in order to ease the financing of public deficit.

Turkish manufacturing witnessed a rapid growth in exports and imports after 1980. Both the value of the dollar value and the volume of manufacturing exports rose dramatically. The export-output ratio rose from less than 10 percent in 1981 to over 27 percent in 1999. The volume of imports, on the other hand, rose by 9 percent per annum. The share of imports in the total domestic sales of manufacturing industry increased from 14 percent in 1981 to 28 percent in 1999. This had the consequence of making the Turkish manufacturing industry the most important sector in Turkish foreign trade. While Turkish manufacturing became more open over the years, the decomposition of imports did not change significantly: capital and intermediate goods constituted more than 85 percent of total imports in year 2000. Hence, Turkey was still dependent on foreign inputs for production.[1]

Opening the economy to free trade was a response to the exchange rate shortage of the late 1970s. The fixed exchange rate regime was replaced with a more flexible one after a sharp devaluation of the Lira in 1980. Throughout the early years of liberalization, the value of the currency was targeted to serve as a major tool for promoting exports and discouraging imports. In 1989, the Turkish Lira became convertible and transactions on the Interbank spot market were allowed, albeit under the supervision of the Central Bank.

The Lira appreciated significantly until 1994, at which time mounting external debt produced a crisis, resulting in the devaluation of the currency once again. Policies after the crisis, however, did not change the downward trend of the exchange rate. [2]

During the same period, larger fluctuations were observed in the growth of employment. Prior to 1980, the expansion of the economy, buttressed by an import-substitution regime, was guaranteed by domestic demand and greater employment. In the 1970s, manufacturing employment grew 4.5 percent annually. The suppression of wages and growing textiles and clothing apparel

[1]The tables in the appendix provide a more detailed picture of these developments.

[2]At the end of 1999, Turkey implemented a new stabilization program and adopted a crawling peg policy for exchange rates. The program ended with yet another major crisis and eventually the Lira was allowed to float freely.

industries, the leading export sectors of 1980s, kept employment growth at a high level initially.

The renewed increase in real wages in the late 1980s gave rise to a dramatic decline in employment in the 1990s - reaching an average annual growth rate of less than 2.6 percent. Large fluctuations in the growth of employment (coefficient of variation = 2.7) have been observed since then. [3] Given its large population, high population growth rate, and the rapid dissolution of its agriculture sector, employment became the most important problem of the Turkish economy over the last decade.

The presence of substantial employment and wide exchange rate fluctuations in an increasingly open economy that relies heavily on imported inputs and that is experiencing significant demographic transition requires a model to assess the importance of exchange rates on resource allocation. In the next section, a simple model for the manufacturing industry that attempts to address some of these issues is described.

3 The Model

Standard models used extensively in the literature to examine the effects of exchange rates on labor markets assume that product demand is a function of exchange rates. The firm that is either selling its product in export markets or competing with imports on the domestic market is affected by exchange rate fluctuations. An appreciation of domestic currency reduces the competitiveness of the firm against its foreign rivals and thus causes it to reduce its demand for labor. This, in turn, results in a decline in real wages given a labor supply that is exchange rate inelastic. The model by Campa and Goldberg (2001) provides an improvement to these models in that they take the effect of exchange rates via imported inputs into account as well. Considering the high

[3] See the table in the Appendix.

dependency of developing countries on foreign inputs, a model that incorporates the effects of exchange rates on the cost of production is more realistic than examining the effects of exchange rate fluctuations on labor markets in these economies. Therefore, the model I present here decomposes the influence of exchange rates on labor market into a "revenue channel" and a "cost channel" similar to, albeit simpler than, the one presented in Campa and Goldberg (2001).

Assume that good i is produced using the following constant returns to scale Cobb-Douglas production function:

$$Q_{it} = A_{it} L_{it}^{\alpha} M_{it}^{\beta} K_{it}^{(1-\alpha-\beta)} \tag{1}$$

where Q_{it} is output and A_{it} is technology in i^{th} industry at time t. The factor inputs, labor, imported inputs and other inputs are denoted by L, M and K, respectively. Furthermore, suppose that the firm is a price taker in factor markets and let w denote the wage rate and r be the price of other inputs. The price of imported inputs is $s = \prod_{k=1}^{K} e_k^{\varpi_k^i} s^*$ where e_k is the exchange rate vis-a-vis k^{th} country, s^* is foreign price of imported input, ϖ_k^i is the share of country k in total imported inputs of industry i.

The firm is monopolistically competitive in product market and faces a global demand curve:

$$Q_{it} = \left[\frac{p_{it}}{z_{it} * u_{it}} \right]^{-\frac{1}{\mu}} D(Y_t^d, Y_t^f) \tag{2}$$

where p is the domestic price and $z = \prod_{j=1}^{J} e_j^{\nu_j^i o_i}$ is a weighted average of foreign prices with v_j^i being the trade weight of country j and o_i being the openness parameter of industry i. The firm faces higher competition if the parameter μ is lower. $D(.)$ is the demand shifter that is a function of total domestic income, Y^d, and income of trading partners of the home country, Y^f. Finally, u_{it} is identically and independently distributed taste shocks.

For a profit maximizing firm, the (logarithm of) optimal labor demand is then given by:

$$\begin{aligned} log(L^*_{it}) &= log(\phi) - \kappa log(A_{it}) + \frac{1}{\mu} log(z_{it}) + \frac{1}{\mu} log(u_{it}) + \\ &\quad + \kappa\alpha log(w_{it}) + \kappa\beta log(s_{it}) + \kappa\gamma log(r_{it}) + log(D_{it}) \end{aligned} \quad (3)$$

where ϕ is a constant and $\kappa = (\mu - 1)/\mu$. Thus the labor demand of a particular firm is affected by exchange rates through two channels: while depreciation of domestic currency causes a shift in the demand the firm faces and has a positive effect on labor demand, it may also cause an increase in the costs of production and shifts firm's supply and its demand for labor downwards. Therefore the net effect of exchange rates on labor demand depends on both, the exchange rate elasticity of product demand and the share of imported inputs in production. Notice that the responsiveness of labor demand to exchange rate is also affected by the market structure. The more elastic the product demand the firm is facing, the higher will be the effect.

In the presence of adjustment costs, the firm's labor demand at any point in time is likely to be off its optimal level. Following Nickell (1986), the labor demand at time t is assumed to follow a partial adjustment path:

$$log(L_{it}) = blog(L_{i,t-1}) + clog(L^*_{it}) \quad (4)$$

where the value of b is increasing in adjustment cost. Substituting the expression in Eq. [3] in Eq. [4] the labor demand of a firm at any point in time will be:

$$\begin{aligned} log(L_{it}) &= blog(L_{i,t-1}) + clog(\phi) - c\kappa log(A_{it}) + c\frac{1}{\mu} log(z_{it}) + \\ &\quad + c\frac{1}{\mu} log(u_{it}) + c\kappa\alpha log(w_{it}) + \\ &\quad + c\kappa\beta log(s_{it}) + c\kappa\gamma log(r_{it}) + clog(D_{it}) \end{aligned} \quad (5)$$

To close the model for labor market, a labor supply equation has to be introduced. There is a sizable literature on the determination of labor supply.

Most of the research is based on micro-foundations of the market, particularly on the changes in the demographic characteristics. Since the emphasis in this paper is on the effects of exchange rates and the interaction of demographics and exchange rates is likely to be negligible, a simple labor supply scheme is assumed. Specifically, labor supply is assumed to be an increasing function of wages and decreasing function of aggregate demand.

$$log(L_t) = \eta_0 + \eta_1 log(w_t) + \eta_2 log(Y_t^d) \tag{6}$$

The equilibrium employment level is then determined by equating labor demand to labor supply. The solution of the system will provide equations for employment level and wages:

$$\begin{aligned} log(L_{it}) &= \delta_0 + \delta_1 log(w) + \delta_2 log(z_{it}) + \delta_3 log(s_{it}) + \delta_4 log(r_{it}) + \\ &\quad + \delta_5 log(D_{it}) + \delta_6 log(L_{i,t-1}) + \delta_7 log(A_{it}) + \delta_8 log(u_{it}) \end{aligned} \tag{7}$$

and

$$\begin{aligned} log(w_{it}) &= \theta_0 + \theta_1 log(w) + \theta_2 log(z_{it}) + \theta_3 log(s_{it}) + \theta_4 log(r_{it}) + \\ &\quad + \theta_5 log(D_{it} + \theta_6 log(L_{i,t-1}) + \theta_7 log(A_{it}) + \theta_8 log(u_{it}) \end{aligned} \tag{8}$$

Notice that z_{it} is a function of openness of the industry to foreign trade and s_{it} is a function of the share of imported inputs in production. Therefore, in the empirical specification, exchange rates are interacted with trade variables, export-output ratio and import penetration to control for "revenue channel" effects and with imported input use to control for "cost channel" effects.

Assuming that product-demand elasticity is a function of the export orientation of a firm and the degree of import penetration in the industry in which the firm operates, these results suggest that depreciation increases the demand for the firm's product and, consequently, its demand for labor. On the other hand, depreciation has a negative effect on the labor demand of a firm if that firm relies heavily on imported inputs. Moreover, the response of labor demand to a change in exchange rate depends on the competitive structure of the market. Since the theory hints at two counteracting forces, the determination of the net effect becomes an empirical question.

The next section provides a description of the data that go into estimation and addresses estimation issues before presenting the results.

4 Data and Estimation

The manufacturing data used in this paper have been obtained from the Annual Manufacturing Industry Surveys between 1980 and 2000 conducted by the State Institute of Statistics. The Survey includes all private establishments employing 10 or more persons. There are 27 three-digit ISIC Rev.2 industries in the sample. [4] Trade data for each industry have been obtained from World Bank Trade and Production Database for the period 1981-1999. The database also provides information about trading partners.

The model described above does not specify the unit of employment. Therefore, both the number of persons employed and the total hours worked for each three-digit industry are used in the estimation. Wages are obtained by dividing total payments to total employees while real wages are computed by dividing wages by the consumer price index.

The exchange rate series used in the analysis is industry-specific export and import exchange rates calculated using the formula described in Section 3. The formula requires information about the exchange rates and trade shares of all trading partners. Due to lack of data, only two aggregate entities are used in the calculation. Europe and the Euro (prior to the introduction of Euro, the German Mark) are considered as the single partner and common currency, respectively, for all European partners. The rest of the world and the US dol-

[4]Industry 353, refineries, are excluded from the analysis because there are only one or two privately owned ones in the sample.

lar are taken as the second partner and its common currency. Trade shares are updated for each year to allow for changes in trading partners. The construction of industry-specific exchange rates are crucial for empirical analysis because industry-specific exchange rates demonstrate considerable variation across industries, as shown in Figure 1 for selected industries.

The regressions introduce exchange rates interacted with trade variables. The model suggests three distinct channels. The first two, export-output ratio, exports divided by total output, and import-penetration, imports divided by total domestic sales, are to control the sensitivity of product demand to trade. The third variable interacted with exchange rates is imported input share and calculated as suggested by Campa and Goldberg (1997) using the Input-Output Table in 1990:

$$ImpInp_{it} = \frac{\sum m_t^j p_{90}^j q_{j,90}^i}{(\sum m_t^j p_{90}^j q_{j,90}^i) + p_t^n q_{n,t}^i} \tag{9}$$

where i represents the output sector, j represents input sector, m_t^j is the share of imports in a new supply of commodity j at time t, $p_{90}^j q_{j,90}^i$ is the value of resources from industry j that was used in production of commodity i at time t and $p_t^n q_{n,t}^i$ is real wage bill in industry i. The latter interaction term controls the effect of exchange rate through the "cost channel." In estimation, however, only two, export-output ratio and imported input shares, are used. High correlation between the industry-specific import penetration rates and imported input shares prevented identification of these two channels independently. Furthermore, to prevent simultaneity between exchange rates and trade variables, lagged values of export-output and imported input shares are used.

Before discussing the results, a few econometric issues have to be addressed. The short time dimension of the data did not allow industry specific estimates of exchange rate elasticities of employment and wages. Therefore, a panel of 27 industries was formed. Because shocks to product demand and technological changes could be industry specific, individual effects are included in the estimation. Moreover, the employment equation includes a lagged employment variable on the right hand side, giving the estimation a dynamic nature. To deal with inconsistency in dynamic panel models, the employment equation is estimated using Arellano-Bond (1991) type GMM.

Part of the uncertainty in the model is due to shocks to demand. The models with imperfect competition between domestic and foreign firms suggest that foreign prices and domestic prices are determined simultaneously. In that case, z_{it} and u_{it} would be correlated. Since the model in the paper assumes that firms take foreign prices as given and because Turkey is a small country that cannot influence world prices, z_{it} is assumed to be exogenous.

The regressions also include prices of two other inputs, real interest rates and oil prices. Real interest rates are calculated using one-month deposit rates adjusted for inflation. Oil prices are obtained from State Institute of Statistics. The effects of these variables on labor demand depend on the substitutability and complementarity of these inputs. If they are substitutes (complements), an increase in the price of that input will increase (decrease) the demand for labor. Domestic demand is measured as real Turkish GNP, and foreign demand is approximated with OECD GNP.

5 Results

All regressions are estimated in first differences of logarithmic values and include industry-specific dummies. Except for real interest rate, all regressors are also expressed in first differences of their logarithms. The employment equations are estimated using generalized method of moments and wage equations are estimated using generalized least squares.

The model suggests that firms with more market power may respond differently to changes in exchange rates. Therefore, the sample is split into two groups based on the median of the industry price-over-cost markup margins.

Estimation is repeated for each group separately. High-markup industries are beverages, tobacco, printing and publishing, manufacture of furniture, industrial and other chemicals, rubber products, manufacture of mineral products including cement industry, metal products machinery, electrical machinery, scientific equipment and other manufacturing industries.

Table 1 presents joint estimation results for all industries in the sample. The coefficients of interest are the ones in front of the interaction terms of exchange rates with export-output ratio and imported input ratio. The F-test indicates that exchange rates have a significant explanatory power with respect to industry employment. The coefficient of exchange rates interacted with imported inputs has expected negative sign and statistically significant. As an industry relies more on imported inputs, an appreciation of domestic currency increases competitiveness of that industry and stimulates employment. Nonetheless, the coefficient of the export output ratio has a reverse sign, however insignificant it is. The results do not change in any significant way when one uses total hours instead of number of workers to measure employment.

The effect of exchange rates on wages is similar but more pronounced than the effects on employment. Depreciation of the Lira significantly reduces wages, especially in industries that use imported inputs extensively.

The rest of the regressors are consistently significant for all specifications. While oil prices are negatively related, interest rates are positively related to employment. The results imply that capital and labor are substitutes for Turkish firms. An increase in foreign income also stimulates employment, but changes in local demand have smaller coefficients and no significant effect on either employment or wages.

To calculate industry-specific net elasticity of employment and wages to exchange rates, pooled coefficient estimates and sample averages of industry specific export-output ratios and imported input shares were used. The estimates and constructed significance levels are presented in Table 2. The exchange rate elasticities of both employment and wages are consistently negative for all industries though they vary considerably across industries. The average exchange rate elasticity of employment indicates that a 10 percent depreciation of the Lira decreases employment by 1.6 percent. The response of wages is much stronger. On average, a similar 10 percent depreciation reduces wages by 5.2 percent.

To test whether industry structure affects the results, the equations are estimated for high and low price-over-cost margin industries separately. As reported in Table 3, for high markup industries the coefficients have now expected signs. However, the export orientation still does not affect either employment or wages significantly. Furthermore, the F-tests indicate that the net effect of exchange rates is insignificant for all specifications. For low markup industries, despite individual coefficients of exchange rates being insignificant in the employment equation, the F-test indicates that they are jointly significant. Exchange rates are found to significantly affect wages in low-markup industries through the usage of imported inputs, as before. Already facing high competition, these firms seem to be less prone to exchange rate fluctuations.

6 Conclusion

In this paper, I examined the effects of exchange rate movements on employment and wages in Turkish manufacturing industry. Theoretically, the shift in an industry's demand for labor due to a change in exchange rates depends on the external exposure of that industry. Exchange rates are expected to affect the labor demand through two channels. While devaluation increases the demand for products of that industry, thus providing a competitive edge to domestic firms either in foreign markets or competing foreign products in domestic market, it may also diminish the competitiveness of the industry to the extent that it uses foreign inputs. Eventually which factor will play a dominant role becomes an empirical question. This paper tests whether increases in the value of domestic currency had positive or negative outcomes on employment and wages in Turkey. The main finding of this paper is that devaluation of the Turkish Lira hurts both employment and wages in Turkey significantly. The elasticity of both employment and wages also shows significant variation across industries as their external exposure varies. Furthermore, wages are found to be more sensitive to movements in exchange rates than employment. Considering the high dependence of Turkish production on foreign inputs, the results should not be surprising.

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Appendix

Table A.1: Foreign Trade Ratios in Manufacturing Industry, (%)

	Export-Output Ratio		Import Penetration		Share of Imported Inputs	
	1981	***1999***	***1981***	***1999***	***1981***	***1999***
Food	7.92	18.04	6.25	8.39	3.22	7.07
Beverage	0.35	2.02	0.18	0.74	3.89	8.50
Tobacco	41.72	4.14	1.06	10.81	2.90	9.29
Textiles	27.35	47.83	4.15	22.77	2.41	11.10
Clothing	56.33	92.27	3.22	32.46	3.09	17.01
Leather	1.29	26.74	2.09	41.25	4.38	16.48
Footwear	1.11	20.86	0.21	16.26	3.23	22.74
Wood	1.94	10.78	1.40	16.33	1.69	8.57
Furniture	11.64	16.79	7.80	18.12	3.08	12.78
Paper	1.04	11.11	9.93	44.03	7.44	24.13
Printing	1.20	1.92	2.12	4.90	6.77	24.40
Chemicals	3.05	23.15	38.49	68.70	15.22	24.57
Other Chemicals	1.37	8.73	8.07	28.77	15.22	24.57
Misc. Prod. of Petroleum	1.01	0.77	0.43	5.38	5.44	9.47
Rubber	1.59	39.49	5.34	31.82	5.30	15.30
Plastics	5.24	10.67	1.55	17.69	13.79	25.73
Pottery	0.97	20.01	0.26	8.89	11.02	16.79
Glass and Products	13.14	34.38	4.00	21.28	8.75	10.40
Other non-metallic	0.49	14.22	3.21	5.67	14.87	17.36
Iron & steel	3.57	27.38	16.11	25.03	15.17	19.82
Non-ferr. Metals	4.01	22.36	17.70	42.93	14.76	29.14
Fabricated Metal	3.88	20.86	18.55	38.97	10.68	19.39
Machinery	1.48	25.42	48.18	68.01	18.47	29.05
Electrical Machinery	2.56	31.61	36.04	57.27	17.07	31.48
Motor Vehicles	2.84	33.36	34.03	48.68	16.59	25.45
Prof & scientific equip.	3.95	13.17	81.32	69.42	15.43	34.59
Others	7.48	77.43	2.90	72.82	15.43	34.59
Manufacturing	9.34	27.47	14.03	28.51	9.25	17.81

Table A.2: Composition of Trade, (%)

	Share of Manufacturing in Total		Share of Capital and Intermediate Goods in Total	
	Exports	***Imports***	***Exports***	***Imports***
1980	36.6	59.1	54.2	93.1
1981	48.8	59.0	55.8	93.9
1982	60.0	55.9	60.4	95.8
1983	64.0	61.1	57.9	95.8
1984	72.2	62.5	53.1	91.1
1985	76.0	65.7	58.8	87.7
1986	72.3	78.1	53.6	97.1
1987	79.3	75.1	53.0	92.3
1988	76.9	77.4	56.4	96.9
1989	78.9	75.0	53.1	88.6
1990	79.9	73.9	48.9	89.6
1991	78.6	81.0	49.4	91.2
1992	83.5	81.3	46.7	87.0
1993	83.4	84.0	46.4	96.2
1994	85.7	81.8	49.4	92.7
1995	88.2	83.2	45.2	88.6
1996	87.7	83.3	46.7	89.3
1997	88.1	84.2	46.8	87.1
1998	88.5	86.9	46.2	88.4
1999	89.3	85.3	47.5	87.0
2000	91.2	82.5	49.4	20.8

Table A.3: Average Changes in Employment and Wages, (%)

	Employment Share in 1999	Average Change in Employment	Share of Total Hours Worked in 1999	Average Change in Total Hours worked	Average Change in Wages
Food	11.49	2.81	11.03	3.06	4.28
Beverage	0.82	0.58	0.61	1.24	7.58
Tobacco	0.23	3.69	0.19	2.02	7.47
Textiles	13.80	3.34	14.95	4.62	3.45
Clothing	5.81	10.57	6.33	10.87	12.82
Leather	0.42	1.08	0.46	1.05	0.55
Footwear	0.56	4.57	0.62	4.72	2.76
Wood	0.75	2.17	0.84	2.95	2.76
Furniture	1.00	8.01	1.10	8.48	10.89
Paper	0.82	3.75	0.80	4.35	3.20
Printing	0.90	2.18	0.77	1.59	7.22
Chemicals	0.73	-0.60	0.77	1.28	2.39
Other Chemicals	2.41	3.37	1.40	1.67	9.20
Misc. Prod. of Petroleum	0.33	3.11	0.23	2.88	3.61
Rubber	0.88	0.64	0.83	0.73	5.21
Plastics	2.01	4.31	2.00	4.83	7.70
Pottery	0.83	3.05	0.97	4.40	4.82
Glass and Products	1.03	1.22	1.11	2.70	6.62
Other non-metallic	3.89	2.68	4.00	3.03	4.56
Iron & steel	2.48	3.34	2.61	3.79	5.19
Non-ferr. Metals	0.71	0.24	0.73	1.21	1.05
Fabricated Metal	4.74	2.48	4.80	2.58	5.51
Machinery	4.03	1.32	3.77	1.68	3.38
Electrical Machinery	5.39	4.00	5.06	4.04	8.82
Motor Vehicles	5.82	3.65	5.48	3.95	7.97
Prof & scientific equip.	0.70	8.32	0.66	8.18	17.36
Others	0.79	3.81	0.77	3.96	6.88
Manufacturing		3.36		3.96	5.49

Table 1: Estimation Results for All Industries

	All Industries		
	Employment	Man-hours	Wages
Expout*Δe	-0.0025	-0.0024	-0.0032
	(0.0017)	(0.0013)	(0.0021)
Impimp*Δe	-0.0085	-0.0056	-0.0340
	(0.0038)*	(0.0023)*	(0.0042)**
Δ oil price	-0.2890	-0.1368	0.0462
	(0.1028)**	(0.0721)	(0.0792)
Δ real int. rate	0.0018	0.0011	-0.0032
	(0.0004)**	(0.0004)*	(0.0005)**
Δ gnp	-0.2754	0.2875	0.4066
	(0.3135)	(0.2719)	(0.2626)
Δ oecdgnp	2.3737	1.7206	-1.9417
	(0.8281)**	(0.6975)*	(0.7809)*
Lagged employment	-0.3224	-0.0751	0.1888
	(0.1031)**	(0.0484)	(0.0558)**
Joint test of significance	14.04**	16.03**	81.10**
Observations	459	460	486
Number of ind	27	28	27

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%

Table 2: Industry Specific Elasticities

	Employment		Man-hours		Wages	
Food	-0.0924	*	-0.0725	*	-0.2491	*
Beverage	-0.0605	**	-0.0411	*	-0.2262	*
Tobacco	-0.0765	*	-0.0570	*	-0.2366	*
Textiles	-0.1337	**	-0.1102	*	-0.3068	*
Clothing	-0.2761	**	-0.2337	**	-0.5719	*
Leather	-0.1325	*	-0.0957	*	-0.4393	*
Footwear	-0.1774	*	-0.1307	*	-0.5634	*
Wood	-0.0633	*	-0.0477	*	-0.1908	*
Furniture	-0.1007	*	-0.0776	*	-0.2847	*
Paper	-0.1291	**	-0.0884	*	-0.4772	*
Printing	-0.1159	**	-0.0769	**	-0.4535	*
Chemicals	-0.2037	*	-0.1451	*	-0.6966	*
Other Chemicals	-0.1770	**	-0.1203	*	-0.6628	*
Misc. Petr. Prod.	-0.0575	**	-0.0379	**	-0.2267	*
Rubber	-0.1172	*	-0.0884	*	-0.3510	*
Plastics	-0.1755	**	-0.1194	*	-0.6559	*
Pottery	-0.1302	*	-0.0906	*	-0.4672	*
Glass and Prod.	-0.1416	*	-0.1099	*	-0.3935	*
Other non-metal	-0.1480	**	-0.1018	*	-0.5426	*
Iron & steel	-0.2009	*	-0.1456	*	-0.6622	*
Non-ferr. Metals	-0.2090	*	-0.1460	*	-0.7436	*
Fabricated Metal	-0.1624	*	-0.1147	*	-0.5656	*
Machinery	-0.2218	**	-0.1530	*	-0.8089	*
Elec. Machinery	-0.2205	*	-0.1547	*	-0.7774	*
Motor Vehicles	-0.1772	**	-0.1218	*	-0.6503	*
Scientific equip.	-0.2487	*	-0.1756	*	-0.8664	*
Others	-0.2908	*	-0.2146	*	-0.9198	*
Average	**-0.1570**		**-0.1137**		**-0.5181**	

* significant at 5%; ** significant at 1%

Table 3a: Estimation Results for High Price-over-markup Industries

	High Price-over-markup industries		
	Employment	Man-hours	Wages
Expout*Δe	0.0027	0.0017	-0.0017
	(0.0041)	(0.0029)	(0.0047)
Impimp*Δe	-0.0122	-0.0057	-0.0399
	(0.0059)*	(0.0025)*	(0.0067)**
Δ oil price	-0.0596	-0.0037	0.0192
	(0.1016)	(0.0959)	(0.1205)
Δ real int. rate	0.0008	0.0001	-0.0026
	(0.0005)	(0.0006)	(0.0007)**
Δ gnp	0.1179	0.4835	0.1235
	(0.3919)	(0.4386)	(0.4000)
Δ oecdgnp	0.6173	0.8058	-1.5911
	(1.0503)	(1.2428)	(1.1898)
Lagged employment	-0.1160	-0.1152	0.1339
	(0.0751)	(0.0705)	(0.0859)
Observations	221	222	234
Number of ind	13	14	13

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%

Table 3b: Estimation Results for Low Price-over-markup Industries

	Low Price-over-markup industries		
	Employment	Man-hours	Wages
Expout*Δe	-0.0020	-0.0014	-0.0034
	(0.0018)	(0.0017)	(0.0024)
Impimp*Δe	-0.0090	-0.0075	-0.0294
	(0.0052)	(0.0049)	(0.0058)**
Δ oil price	-0.4879	-0.2827	0.0669
	(0.1287)**	(0.0977)**	(0.1065)
Δ real int. rate	0.0025	0.0019	-0.0036
	(0.0004)**	(0.0006)**	(0.0007)**
Δ gnp	-0.5719	0.1096	0.6463
	(0.4208)	(0.3221)	(0.3525)
Δ oecdgnp	3.328	2.5058	-2.0361
	(0.9134)**	(0.7852)**	(1.0495)
Lagged employment	-0.3974	-0.0444	0.2261
	(0.0758)**	(0.0515)	(0.0739)**
Observations	238	238	252
Number of ind	14	14	14

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%

Figure 1: Industry Specific Exchange Rates, 1981-1999