# *Insiders and Outsiders in Wage Determination of the Turkish Manufacturing Industry*

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#### *ABSTRACT*

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The ' Insider-Outsider ' model suggests that both internal and external factors to the sectors play an important role in wage determination. The results of our analysis of a panel data set of Turkish two-digit manufacturing industry support this view. The industry wage determination is best seen as a kind of rent sharing in which the real wage is shaped by a mixture of insider forces (including sales per employee, unionization and financial liquidity) and outsider forces (including unemployment and alternative or outside wage).

# *ÖZET*

***Türkiye İmalat Sanayii Ücretlerinin Belirlenmesinde***

***İçeridekiler ve Dışarıdakiler***

‘ İçeridekiler-Dışarıdakiler ’ modeli sektör ücretlerinin belirlenmesinde hem iç hem de dış faktörlerin önemli rol oynadığını ileri sürmektedir. Türkiye imalat sanayii alt sektörlerine ait panel veri setimizin analiz sonuçları bu görüşü desteklemektedir. Buna göre, sanayi ücretlerinin oluşumu, iç faktörlerin ( işçi başına satışlar, sendikalaşma oranı ve finansal likitide ) ve dış faktörlerin ( işsizlik oranı ve alternatif ya da dışarıdaki ücret ) birlikte etkilediği bir çeşit rant paylaşımı olarak görülmektedir.

## *TABLE OF CONTENTS*

## *LIST OF FIGURES*

Page

# *I. INTRODUCTION*

The focus of the study is the labor market for production workers in Turkish manufacturing industry over the eight years from 1988.I to 1995.IV. The average number of people employed in this market is 2,800 thousand, and this represents, approximately, 14% of total employment in the economy in 1995. The share of this group in total employment does not display significant variation with the 14.5% mean, the 0.78% standard deviation, and so the 0.05% coefficient of variation over the sample period. On the other hand, the share of the manufacturing GNP reveals some movement among quarters of the period. Especially, it takes the value of 18% at the third quarter, while around 25% at the other quarters ( The manufacturing GNP share has the 23.2% mean, the 3.70% standard deviation, and so the 0.16% coefficient of variation ). Another remarkable trend in manufacturing industry is concerned with the import and export shares. In 1995, these shares rise to 83% and 87%, respectively. The reason behind our choice of manufacturing industry among other sectors of the economy is not only its high shares in GNP and foreign trade but also the availability of data related to the wage determination concept . For example, in the service sector it is not possible to obtain quarterly data concerning the productivity, employment, hours of work, etc., variables. When the disaggregated manufacturing labor market is employed, the emphasis is placed on three sectors, namely, food- beverages-tobacco, textiles and metals-machinery-vehicles, by 20-30 percent of the total manufacturing employment[1].

[1] See the related data in the Appendix.

There exist different models of industrial wage determination, namely, the competitive model in which insider workers and outsider workers are equal, the efficiency wage model based on the relationship between the wage and productivity, the insider wage setting and the insider - outsider model. The results under the insider - outsider theory are quite different than those under the insider wage setting where there will be a tendency for the productivity gain to be captured in the form of higher wages. In this situation, the incentive for the firm to expand output and employment is much reduced. Similar attitude is valid when there is an increase in the demand for the firm's product. Under insider wage setting, the tendency will be for wages and hence output prices to be pushed up,translating the demand increase into a wage gain as opposed to an employment gain. The theories therefore predict an inverse relation between the number of insiders and the wage rate.

This thesis provides an illustration of the means by which sectoral wage determination is best seen as a kind of rent sharing in which the real wage is shaped by a mixture of insider forces (including sales per employee, unionization and financial liquidity) and outsider forces (including unemployment and alternative or outside wage). In the rent-sharing theory, the employer and the employees join forces to extract from consumers some surplus over and above that required to pay production costs[2]. Despite the fact that the surplus cannot exceed that amount compensating the agents for their efforts in a purely competitive world, more generally, there may be a rent to be divided somehow between those who organize the firm and those who

[2] See presentations of the theory in Shapiro and Stiglitz ( 1984 ), Solow ( 1985 ), Lindbeck and Snower ( 1988 ).

make the product. While workers appropriate a portion of sales, high external unemployment weakens their strength in obtaining higher wages. The general idea is that if the labor market is competitive, the firm will expand output and employment at the given wage when there is a gain in labor productivity. Outside factors, particularly wages paid elsewhere and possibly the overall state of the labor market, will be the key determinants of pay within the firm.

This study attempts to shed light on the determinants of the manufacturing industry wages by using panel data on the industries from the first quarter of 1988 to the last quarter of 1995. In particular, we shall extend the results of Nickell & Wadhwani (1990) and Christofides & Oswald (1992) by focusing on the roles of the addional factors to theirs. Namely, the equilibrium wage rate is likely to be shaped by both the outside rate of pay and unemployment rate, and the insider variables such as unionization, sales per employee and minimum lending rate.

## *II. THEORETICAL BACKGROUND*

According to the competitive model, an employer is a wage-taker and must set that wage rate which gives workers the market level of utility. There is no scope for bargaining; employees are unable to appropriate any of the returns to an improvement in their firm's prosperity; there are no rents; insider workers and outsider workers are equal.

Objections to this view began with Lester (1952) and Slichter (1950). They argued that uniformity of wages was the exception rather than the rule, and they provided evidence of large pay disparities across similar people and establishments. A later British study, MacKay (1971), also rejected the validity of the competitive model. He found substantial and persistent wage differentials which could not be explained satisfactorily by non-pecuniary factors. He drew a distinction between insiders who are already employed by a plant and outsiders who are non-employees, and argued that an employee's increases in earnings depend more on the plant in which he is employed than on the demand and supply conditions for his particular type of skill. His explanation relies on the idea that employees can obtain a share of product market rents.

Recent developments in insider-outsider theory offer a way to conceptualize these findings.Blanchard and Summers (1986), Lindbeck and Snower (1987) and Gottfries and Horn (1988) suggest that a small group of insiders will tend towards lower employment and higher pay. Blanchard and Summers (1986) formulate an insider wage setting leading to a high level of hysteresis in the economy which implies that the impact of shocks may persist for very long periods even under rational expectations. It may also lead to asymmetric behavior and ratchetting, whereby employment responds less, and wages more, to demand increases than to demand falls as shown by Lindbeck and Snower (1987). We are, therefore, interested in a variety of issues. One issue is that whether insider forces is important in wage determination. It is clear, from existing evidence, that the ' insider ' phenomenon exists. Managers always say that productivity gains and profitability are important determinants of pay settlements.

A number of relevant studies including Krueger and Summers (1987,1988) [3] and Gregory, Lobban and Thomson (1987) conclude that in modern US data there is evidence of large unexplained wage differentials and uncover a positive correlation between pay and profitability per employee. Using establishment as well as industry level data, Nickell and Kong (1988), Blanchflower (1990), and Nickell and Wadhwani (1990) suggest that insider power is important although there is a role for outsider forces as well. Blanchflower (1990) favors the idea that British wage determination may be seen as a kind of rent - sharing in which workers benefit from a portion of profits and high external unemployment weakens workers' bargaining strength. He uses British establishment data from 1984 to show that pay depends upon

[3] Krueger and Summers ( 1987 ) favor the ' rent-sharing ' view for non-union US labor markets. Their reasons include the following. First, they argue that high wages are paid in industries that are concentrated, have high profits, and have relatively small labor shares. Second, high - wage industries appear to reward all types of workers about equally, despite great differences in their personal and job characteristics. Third , and as an example , the US deregulation of airlines provided a natural experiment of relevance to the rent-sharing explanation.

a blend of insider pressure (including the employer's financial performance and oligopolistic position ) and outsider pressure ( including external wages and unemployment ). The broad conclusion from his paper is that the classical competitive model of the labor market does not provide an adequate explanation of wage determination in the United Kingdom. Instead, pay levels are shaped by an intricate blend of internal and external forces. Likewise, Nickell and Wadhwani (1990) investigate insider effect and a variety of its determinants, in particular the extent of unionization and the bargaining structure and they also consider the importance of outside labor market conditions in wage bargaining. At this point, our analyses of wage determination seem to be closer. The model they use to illustrate their theme features union-firm bargaining and is similar in spirit to that proposed by Linbeck and Snower ( 1986 ). They find that insider forces have a significant impact on wage determination. In particular, price and productivity have well - determined effects at the firm level. They also find that outsider factors, in particular the state of the labor market as captured by aggregate unemployment and the proportion of long term unemployed, play an important role in wage determination at the firm level.

Scaramozzino (1991) investigates insider versus outsider factors in wage determination in microeconomic context. His empirical findings confirm the existence of important structural breaks across firms in wage setting. He implies that there is evidence that investment decisions are affected by the bargaining regimes. He concludes that the industry-wide wage level is a crucial determinant of wages at the outside options, but not in the interior regime. Instead, profits per employee are mainly important in the interior regime.

Another microeconomic research belongs to Christofides and Oswald (1992). They document the microeconomic determinants of pay which are lagged profits and the unemployment rate in the employer's geographical area, and they argue that the results are consistent with a family of models that draw on the concept of rent-sharing. The conceptual framework underlying the analysis is one in which rents are divided between the employer and the workers. They imply that prosperity in the product market leads to a large surplus to be divided and so tends to raise the level of pay; high unemployment in the firm's local labor market weakens worker's relative bargaining strength and so tends to depress the wage. They use past profits as an indicator of the firm's financial prosperity and they suggest that real wages are an increasing function of the level of past profits in the employer's industry, and a decreasing function of the level of unemployment in the employer's region. In this respect, our model suggest that real wages are an increasing function of the level of past sales per employee, and a decreasing function of the level of aggregate unemployment.

Nickell and Kong (1992) consider various union and non-union models of wage behavior which imply that wages are a convex combination of internal and external factors. They conclude that the importance of insider forces is directly related to both union power and the degree of monopoly in the product market, and the state of the aggregate labor market is also important.

As an extension of Nickell and Wadhwani (1990), Nickell, Vainiomaki and Wadhwani (1994) focus on the role of market power in wage determination. They set out a theoretical framework based on union bargaining, looking particularly at the role of market structure. They find a positive effect of product market power on wages which is enhanced in large firms but is not influenced by union status. While firm-specific factors influence wages, they suggest that the size of those effects is not influenced by union status, firm size or product market power. Forslund (1994) adresses the issue of the influence of firm-level performance on wages using a data base with information on individual firms in Swedish manufacturing [4].

A recent paper related to the test of the insider-outsider hypothesis belogs to Denise J. Doiron ( 1995 ). In his paper, models of union wage and employment contracts are developed and estimated based on union preferences in which both membership and employment matter. An insider-outsider model in which the union does not care for employment in excess of membership is estimated and compared with more general models in which the union places some weight on membership growth. Another recent research into this issue belongs to Blachflower, Oswald and Sanfey ( 1996 ). They suggest a new test for rent-sharing in the U.S. labor market. Using an unbalanced panel from the manufacturing sector, their paper show that a rise in a sector's profitability leads after some years to an increase in the long-run level of wages in that sector. When firms become more prosperous, workers eventually receive some of the gains. This is the central prediction of noncompetitive theories in which rents are divided between firms and employees.

[4] In his paper, Forslund points out that facilitating an assessment of the link between firm performance and wage setting, the theoretical framework of Nickell and Wadhwani ( 1990 ) is also well suited to testing an implication of recent ' insider-outsider ' theories of unemployment.

## *III. THE MODEL OF WAGE-SETTING*

Research on unionized labor markets has yielded two leading models of wage and employment determination. According to the first model, the union determines the wage, and the employer chooses the level of employment that maximizes his profits subject to the union wage. This model is called the Monopoly Model by Oswald (1985). In the second model, the levels of wage and employment are chosen by the union and employer so that the outcome lies on their contract curve. Oswald (1985) calls this model the Efficient Bargaining Model. If the union is indifferent to marginal changes in employment, then the outcomes of the two models coincide and there is no reason to choose between them. In this work, I have used the monopoly union model[5] so that I could avoid the difficulties of finding Turkish data about unemployment benefits, strike funds and possibly earnings while on strike, hiring and firing costs (e.g. training costs and severance payments), bargaining power of the sides, mismatch ratios between jobs and employees. For example, Scaramozzino ( 1991) characterises the Nash bargain between the firm and the union as follows:

$$\max_{W,N} [\, U ( W,N ) - U_0 \,]^{\alpha} [\Pi ( W,N ) - \Pi_0 \,]^{1-\alpha} \text{ subject to}$$

$$U ( W,N ) > U^0 ( u^I, W_a, b ),$$

$$\Pi ( W,N ) > \Pi^0 ( u^I, W_a, z ),$$

where $U_0$ and $\Pi_0$ are the union and firm's status quo for their utility and profits, $U^0$

[5] See Martinello ( 1989 ) for his exposition of the monopoly union model.

and $\Pi^0$ are their outside options ( $U^0 = f(s)$ and $\Pi^0 = f(K)$, s is strike funds plus possibly earnings while on strike and K is the capital input ), $u^I$ is the industry-specific unemployment rate, $W_a$ is a measure of the relevant alternative wage, b is unemployment benefits and z is hiring and firing costs; $\alpha$ reflects the relative bargaining strength of the union.

Let the employer's production function be f ( L ), where L is the labor input and f ( L) is nondecreasing, twice differentiable, and strictly concave. The employer maximizes profits

$$f(L) - wL,$$

where w is the wage , and the output price is set equal to one . Profit maximization implies $f_L = w$, which is inverted to yield the employer's labor-demand function.

Assume that a union utility function, $U(w, L; w_a, m)$, can be specified for the union where $w_a$ is alternative wage and m is union membership rate. In the monopoly model, the union's utility is maximized subject to the employer's labor-demand function. The model's maximization problem can be written

$\max_{w,L} [\, U(w, L; w_a, m) : w = f_L \,]$, and the first order conditions are

$$U_L / U_w = - f_{LL}$$

$$w = f_L.$$

The second equation shows that the employer chooses the level of employment that maximizes profits given the union wage. The term $-U_L / U_w$ is the slope of the union's indifference curve and $f_{LL}$ is the slope of the employer's demand-for-labor curve.

From the first-order condition of this maximization problem we obtain the wage equation. Then the industry wage equation is

$$W = F\ (\ f(L), L, w_a, m) \text{ or}$$

$W = F(f(L), u, w_a, m)$ where u is unemployment rate, and $F_1$, $F_3 > 0$, $F_2 < 0$ and $F_4 < 0$ or $> 0$.

As is seen, the wage equation is shaped by a mixture of the factors that are internal to the sector ( productivity, union membership rate ) and those that are external to the sector ( alternative wage and unemployment rate ). The expected signs are given above.

Productivity is the key to real wage gains in the economy as a whole, and also the differential growth of productivity across industries has a significant effect on the wage structure. Productivity is a proxy for the size of the rent to be divided between the two parties - the higher the productivity, the more the firm is able to pay, the higher the wage. This is also consistent with a more institutional model in which firms with high rents are expected to pay higher wages [6].

[6] See Akerlof ( 1984 ) for his efficieny wage view on this point.

While productivity is keyed to the demand side of the firm's labor, alternative wage is contained in the supply side. The logic of the search model points to wage-wage comparisons as the central criterion for both the employer and the worker. The wage increase for experienced workers is meant to keep them from quitting- presumably by keeping their pay favorable relative to the wage offers they would obtain if they were to quit and shop the job market. The firm would like to tell its workers that they have just as much reason to stick with it this year as they had last year. By revealed preference, the experienced workers did find it worth sticking with the firm previously, and they should be persuaded by clear evidence that they have no reason to change their minds currently.

Although pure insider view predicts that unemployment has no impact, insider-outsider view allows unemployment to affect wages. According to this view, aggregate and industrial unemployment both have a downward pressure on wages.

The predicted sign of the union membership is ambigious. A positive correlation between ( decentralized ) union power and the size of the insider effect is intuitively plausible, and has found some empirical support in studies on U.K. data [7]. On the other hand, some authors argue that a fall in membership will raise wage demands as the reduced number of insiders act to appropriate rents rather than to expand employment for outsiders [8].

[7] Nickell and Kong ( 1988 ) support this view in their investigation into the power of insiders in wage determination.

[8] Blanchard and Summers ( 1986 ), and Lindbeck and Snower ( 1986 ) conform this view.

# *IV. THE MODEL SPECIFICATION*

This study examines wage, productivity, alternative or outside wage, unemployment rate, union membership rate and financial liquidity data [9] for a panel of 9 two-digit manufacturing industries over the period 1988.I and 1995.IV: food-beverages-tobacco, textiles, wood products, paper products and printing, chemicals-petroleum products, non-metallic minerals, metals, metals-machinery-vehicles, and other industries. The data concern sum of the public and private sectors. Although we are aware of the importance of the distinction between public and private sectors, we could not obtain all the data separately; so we use the total data. The data definitions and sources are given in the Appendix.

For the wage variable, we use average hourly earnings for production workers in each industry, and we use average hourly earnings of the other eight industries, weighted by their hours worked, for the excluded industry's alternative wage. For this model, we assume perfectly substitutable movement between sectors [10]. All wage variables are deflated by the Consumer Price Index. Figure 1 shows that the real wages in all industries except the metal industry behave similarly during the sample

[9] Because of bankruptcy costs, firms may be constrained in the amount which they can borrow. If we incorporate this factor into our model, we find that wages are lower, the greater the risk of bankruptcy.Since bankruptcy risk is declining in the level of the firm's liquidity, this suggest that a liquidity variable should be added to our set of insider variables ( See Wadhwani (1987) ).

[10] We also estimated the model by using the total industrial wage per employee ( manufacturing, mining and electricity-gas-water) as the alternative wage variable. However, in this case become insignificant.

period. This correlation occurs because each industry's wages are set by the same collective agreement.

As measures of productivity, we use industrial sales from production per employee deflated by industrial implicit price deflator. Industrial sales belong to about 500 private establishments that are the members of Istanbul Chamber of Industry. Since the State Institute of Statistics does not publish quarterly two-digit industrial sales for both public and private sectors, we take the Istanbul Chamber of Industry data. To capture cyclical fluctuations in demand, we use the aggregate unemployment rate for people 12 years old and over.

The liquidity term includes the minimum lending rate and for this variable we use the Treasury bill rates. For the unionization variable, we adjust union membership rates for the two-digit manufacturing industries. The Ministry of Labor and Social Security publishes the unionization rates regarding to work forces. Therefore, we pursue the following process to find the unionization rates belonging to the subsectors of manufacturing industry:

| | |
|---|---|
| 04 Food ind. + 05 Sugar ind. | → 31 Food-beverages-tobacco ind. |
| 06 Textile ind.+07 Leather ind. | → 32 Textile wearing apparel and leather ind |
| 08 Wood ind. | → 33 Wood products ind. |
| 09 Paper products ind. + 10 Printing ind | → 34 Paper products and printing ind. |
| 03 Petroleum-chemicals-rubber ind. | → 35 Petroleum-chemicals-rubber ind. |
| 12 Non- metallic mineral products ind. | → 36 Non- metallic mineral products ind. |

| | |
|---|---|
| 13 Metal ind. | → 37 Metal ind. |
| Total manufacturing ind. | → 38 Metals-mach.-vehicles ind., 39 Other ind. |

We present the mean, the standard deviation and the coefficient of variation of the variables on the next page.

Summary Statistics

| | Wages | | | Sales (000 TL) | | | Uni.rate (%) | | | Alt.wag | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | St.dev | Cf.var | Mean | St.dev | Cf.var | Mean | St.dev | Cf.var | Mean | St.dev | Cf.var |
| Food | 9.13 | 2.74 | 0.30 | 22.06 | 4.63 | 0.21 | 93.48 | 7.48 | 0.08 | 10.94 | 2.84 | 0.26 |
| Textile | 7.46 | 1.72 | 0.23 | 21.59 | 2.81 | 0.13 | 75.67 | 9.84 | 0.13 | 11.80 | 3.30 | 0.28 |
| Wood | 7.98 | 2.23 | 0.28 | 12.24 | 3.92 | 0.32 | 39.62 | 4.75 | 0.12 | 10.63 | 2.76 | 0.26 |
| Paper | 11.17 | 2.79 | 0.25 | 39.08 | 10.55 | 0.27 | 43.32 | 7.80 | 0.18 | 10.57 | 2.75 | 0.26 |
| Chemicals | 15.20 | 4.26 | 0.28 | 84.98 | 11.05 | 0.13 | 67.38 | 6.74 | 0.10 | 10.12 | 2.63 | 0.26 |
| Minerals | 11.25 | 3.26 | 0.29 | 28.54 | 8.28 | 0.29 | 57.49 | 6.32 | 0.11 | 10.53 | 2.74 | 0.26 |
| Metal | 16.40 | 6.72 | 0.41 | 63.46 | 19.67 | 0.31 | 73.24 | 5.13 | 0.07 | 9.97 | 2.59 | 0.26 |
| Machinery | 11.48 | 3.21 | 0.28 | 74.79 | 24.68 | 0.33 | 73.60 | 6.73 | 0.09 | 10.36 | 2.80 | 0.27 |
| Other | 7.61 | 1.52 | 0.20 | 42.05 | 10.09 | 0.24 | 73.60 | 6.73 | 0.09 | 10.59 | 2.86 | 0.27 |
| Total | 10.58 | 2.80 | 0.26 | 42.87 | 8.31 | 0.19 | 73.60 | 6.73 | 0.09 | | | |

Unemployment rate ( % ) : Mean: 7.96 St.dev: 0.56 Cf.var: 0.07
Interest rate ( % ) : Mean: 68.15 St.dev: 21.13 Cf.var: 0.31

## *V. ESTIMATION RESULTS*

Once we incorporate all the generalizations and the data information given in the model specification part, and use the log-linear approximation to the wage equation, our empirical model can be written

$$\ln W = \mu_0 + \mu_1 \ln ( S / L ) + \mu_2 \ln W_a + \mu_3 \ln M + \mu_4 \ln U + \mu_5 \ln I + \varepsilon$$

where $W$ = Hourly earnings of production workers

$S / L$ = Sales per employee

$W_a$ = Alternative wage or outside wage for production workers

$M$ = Union membership rate

$U$ = Aggregate unemployment rate

$I$ = Minimum lending rate.

The quartely analysis is based on the above equation with the following modifications:

$$\ln W = \mu_0 + \mu_1 \ln ( S / L )_{-1} + \mu_2 ( W_a )_{-1} + \mu_3 \ln M + \mu_4 \ln U + \mu_5 I + \mu_6 L_{-1} + \mu_7 D_M + \varepsilon$$

where $D_M$ is the metal industry time-dummy variable. The logarithm of industrial real wages is regressed on the logarithm of one lagged sales per employee, one lagged alternative wage, one lagged and current interest rates, the logarithms of both unionization rate and unemployment rate [11]. Since there is a striking upward movement in real wages related to the metal industry during the last three quarters of

1990, a dummy variable should be included in the regression[12]. The regression is estimated by using pooled cross-section time-series quarterly data on 9 two-digit manufacturing industries for the 1988.I - 1995.IV period. The OLS method is applied to the model on panel data and the estimates of the parameters of wage equation are presented in the Table C.1 in the Appendix.

According to the estimates, the elasticity of hourly earnings with respect to lagged sales per employee is 0.362, with respect to union membership it is -0.284. The effect of lagged alternative wage seems to be important with the value of 0.066. In other words, an increase of 1 percent in lagged alternative wage pushes up real wages by approximately 7 percent. As is seen, the signs are consistent with our expectations. As insider factors, sales per employee and unionization have, respectively, positive and negative effects, and as an outsider factor, alternative wage has a positive effect on sectoral wages. For the negative effect of unionization, it can be said that it favors the view proposed by Blanchard and Summers (1986 ) and Lindbeck and Snower (1986 ) mentioned in the theoretical part. It can be added that the unionization rates are published by the Ministry of Labor and Social Security. In their records, union membership continues even if employees stop working. This sometimes yields sectoral unionization rates over 100%.

[11] In determining the lag length of the variables, Akaike and Schwarz criteria are used. The regressions are run over the same interval, 1988.I - 1995.4, using up to four lags. When they are compared with respect to their AIC and Schwarz values, these criteria result in the selection of the model regresses wages on one lagged sales per employee and alternative wages, one lagged and current interest rates,current unionization rates and unemployment rates.The AIC and Schwarz values of the final model are 644.502 and 672.738, respectively.

[12] This jump in real wages is caused by the public sector wage increases(The data is in the Appendix)

On the other hand, the coefficients of unemployment rate and minimum lending rate are not significant at the 95% confidence level. While current minimum lending rate is unimportant, the lagged one is significant at the confidence level, but with the small effect of 0.002. The value of D.W., 0.62, implies a serial positive correlation in the disturbance term.

We should indicate that there is one important thing we have not taken into account so far; that is the sector effect. We use sectoral data in the estimations, so we should control for wage differences across sectors related to various unobserved variables. This is achieved by including sector-specific dummies which will control for all wage differences due to time-invariant unobserved variables. OLS estimates of the manufacturing wage model are reproduced with sectoral dummies, Fixed Effects Model, in the Table C.2 in the Appendix [13].

[13] i. We use the F statistic in order to test the hypothesis that the sector effects are the same. Sums of squared residuals of the two regressions are 13.032 and 4.761, respectively. We have 9 sector dummies and 31 observations for each sector. The $F_{calculated}$ statistic is 57.11 and this value exceeds $F_{table} = 1.94$ at 5 % significance level and 2.51at 1% significance level. Therefore, while determining sectoral wages, the fixed effect model is more appropriate.

ii. We also test the random effect to see sector-specific constant terms as randomly distributed across sectors. We apply the LM test devised by Breusch and Pagan ( 1980 ) for the random effects model based on the OLS residuals. Then we carry out the specification test devised by Hausman ( 1978 ) for the random effect versus the fixed effect model. The chi - squared statistic is 744.490 with 7 degrees of freedom and probability of zero. So, the results favor the fixed effect model which is reported in the Appendix.

As we see in the results, significance of the variables increase. The unemployment rate and the minimum lending rate become meaningful in expected signs, - 0.291 and -0.002, respectively. In other words, one percent increase of unemployment rate and of minimum lending rate cause almost 0.3 and 0.2 percent of decrease in real wages.

The table also reveals an interesting change such that significance of the sales variable decreases while significance of the alternative wage variable increases. The elasticity of real wages with respect to lagged sales becomes 0.145 and the response of the real wages to one unit change in lagged alternative wages becomes 0.082. Since the sector dummies are statistically significant at some confidence levels, we can conclude that the nine manufacturing subsectors' wage functions have statistically the different intercepts. Also the value of correlation coefficient raises to 0.89 and the D.W. takes the 1.52 value that is between the upper and lower limits. When we plot the residuals obtained from the regression of wages on lagged productivity, lagged alternative wage, unemployment rate, union membership rate, lagged and current minimum lending rate, sector dummies and metal time dummy, we cannot see any sign of particular relation, as in Figure 2.a.

Actually, a visual examination of residuals can also provide useful information about heteroscedasticity. If we plot the residuals against the fitted values of the dependent variable, as in Figure 3.a in the Appendix, we do not observe any systematic pattern indicating heteroscedasticity problem.We also carry out White's test in looking for the heteroscedastic residuals. The chi-squared statistic given by White's test is 80.539, with 152 degrees of freedom. Since the 5 percent and 1 percent critical values exceed the test statistic, we cannot reject the hypothesis of homoscedasticity. Therefore, we can conclude that our estimation results are devoid of the effects of heteroscedasticity.

In addition, we try to allow the slopes to differ across the industries as well. So, we regress the real wages on the explanatory variables by using the products of sector dummies and those variables. In the new regression, except for the alternative wage variable, only one sector's coefficient appears significant among the variables set. In this situation, we test whether the variables in the dummy product form are jointly significant. Once we test them, we find the sales per employee, interest rate and alternative wage variables jointly significant. The current and lagged interest rate, unemployment rate and unionization rate varibles do not seem to be jointly significant in the dummy product form. Instead, they enter the equation with one value belonging to the all sectors. While lagged interest rates have a positive effect on wages, current interest rates, unemployment rates and unionization rates have negative effects consistent with the theoretical model. Yet, for the sales per employee variable in the dummy product form, despite of the jointly significance situation few sectors' coefficients appear to be significant,namely, wood products, paper products and printing, metals-machinery-vehicles. However, the alternative wage variable seems to be significant for all the sectors presented in Table C.3 in the Appendix [14].

[14] We use the F statistic in order to determine the favorable model among the models of fixed effects and those with sector-specific variable dummies. Sums of squared residuals of the two regressions are 4.761 and 3.997, respectively. We have 16 and 32 variables for the first and second models. The $F_{calculated}$ statistic is 2.95 and this value exceeds $F_{table} = 1.67$ at 5 % significance level and 2.04 at 1% significance level. Therefore, the fixed effect model with sector - specific variable dummies is favored.

When we plot the residuals across observations, and against fitted values of the wage variable, there is no sign for the heteroscedasticity problem ( See Figures 2.b and 3.b in the Appendix ). We carry out White's test for heteroscedasticity and obtain the chi-squared test statistic as 181.127 with 560 degrees of freedom. This value does not exceed the critical values at 5 and 1 percent levels, so we can say that the residuals in the regression are homoscedastic.

We also consider the possibility of gaining an efficiency in the model by estimating the sectoral equations jointly as a generalized regression, Seemingly Unrelated Regression Model ( SURE ). Since we have 9 sectors and 31 observations for each sector, we do not have the problem of degrees of freedom, so we can apply the SURE Model. To see how much efficiency is gained by using generalized least squares instead of ordinary least squares, we present the results of the SURE model in the Table C.4 in the Appendix.

A striking improvement is observed in the sales variable, namely, six sectors' coefficients appear to be significant in expected sign, except for the textiles sector, whereas only two sectors' are significant in the ordinary least squares model. For the other variables, only one or two sectors' coefficients are significant except for the alternative wage variable , i.e. chemicals, metals, non-metallic minerals and other industries. Alternative wages are significant for all the sectors similar to the previous model. The correlation coefficients take the value between 0.68 and 0.92, and the D.W. values change between 1.32 and 2.35 for the nine manufacturing sectors.

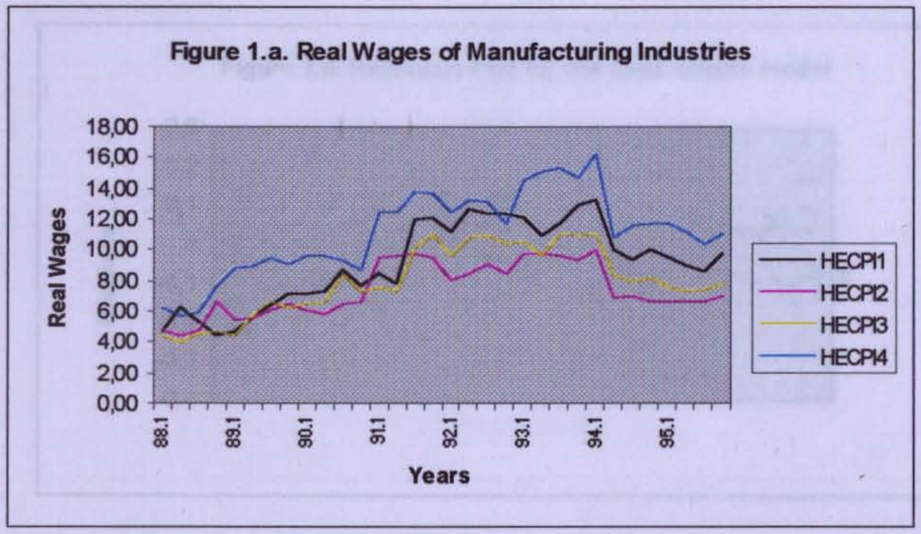
To summarise, we find some results supporting the insider-outsider view in determining manufacturing industry's wages. Sales per employee ( which is the productivity proxy ), unionization rate, and minimum lending rate ( which is the financial liquidity proxy ) enter the wage equation as the insider variables. Sales per employee enters the equation positively at convential significance levels. The minimum lending rate and unionization rate variables have depressing effects on wages. The alternative wage is a significantly positive factor, while unemployment rate is a significantly negative factor in wage determination as the outsider variables. These results support the existence of a kind of rent-sharing in which the real wage is shaped by a mixture of insider forces and outsider forces.

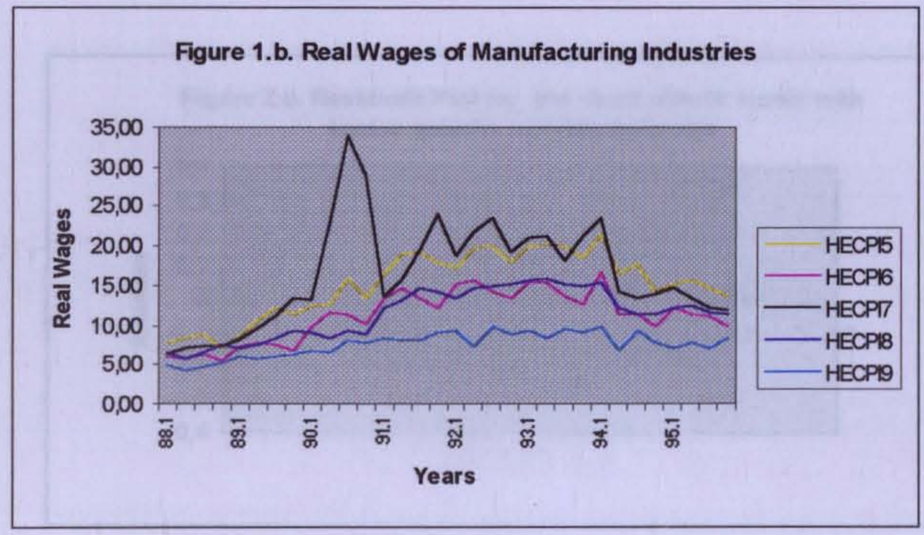
## *VI. CONCLUSIONS*

The purpose of this study has been to investigate the importance of insider and outsider factors in wage determination. We have developed a theoretical framework based on the monopoly model which indicates that the wage outcome is a weighted sum of that wage which will just ensure the employment of the 'insiders' and the wage which will attract and retain workers in the face of outside competition for their services.

We have presented some evidence on the behavior of hourly earnings of blue-collar workers in Turkish manufacturing industry and offered a model of their determination. According to the model, both internal and external pressures affect real wages. First, pay depends upon a sector's productivity measured by sales per employee. The results suggest that real wages are an increasing function of the level of past sales in the employer's industry. Second, pay also depends upon minimum lending rate and unionization rate as other insider factors. Current minimum lending rate depresses real wages, whereas its lagged value has a positive effect on wages. Since unionization has a negative effect on real wages, we can say that an increase in membership rate reduces the membership effect on wages. Third, pay moves with factors such as the level of unemployment and the going wage in other subsectors of the manufacturing industry. The empirical findings suggest that unemployment rate has a downward pressure on real wages. Industry wages follow outside wages quite closely in the two-digit manufacturing industry.

These results, when taken together, appear to favor the idea that wage determination concerning the Turkish manufacturing industry may be seen as a kind of rent-sharing in which high productivity and alternative wage increase wages while high external unemployment, unionization rate and minimum lending rate decrease wages. Our findings are compatible with arguments expressed in Nickell and Wadhwani ( 1990 ) and Christofides and Oswald ( 1992 ).




$HECPI_i$ : Real wages in each industry

**Figure 2.a. Residuals Plot for the fixed effects model**

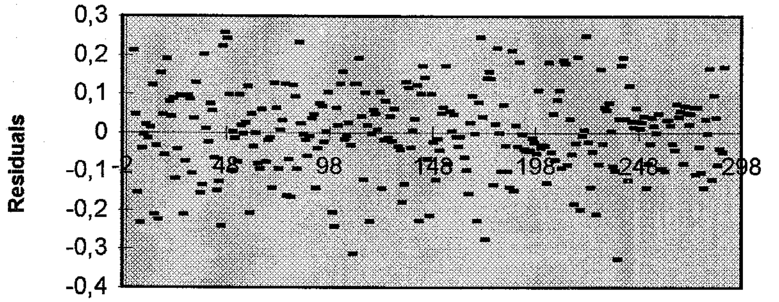



**Figure 2.b. Residuals Plot for the fixed effects model with sector-specific variable dummies**

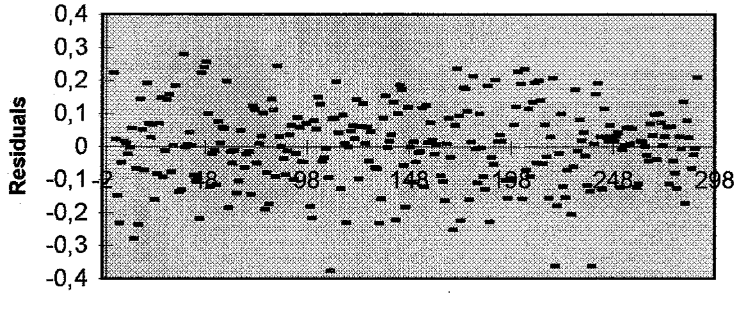


Figure 3.a. Residuals vs. Fitted Values of Real Wages Plot for the fixed effects model

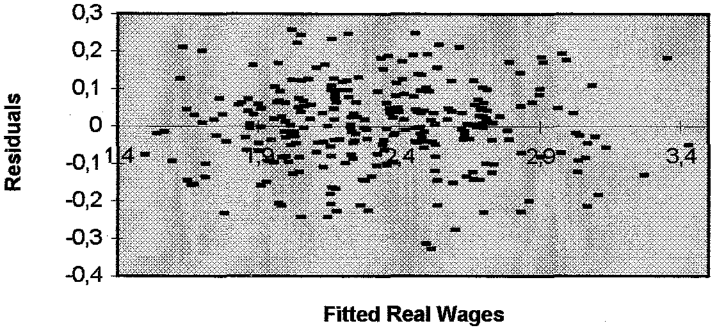
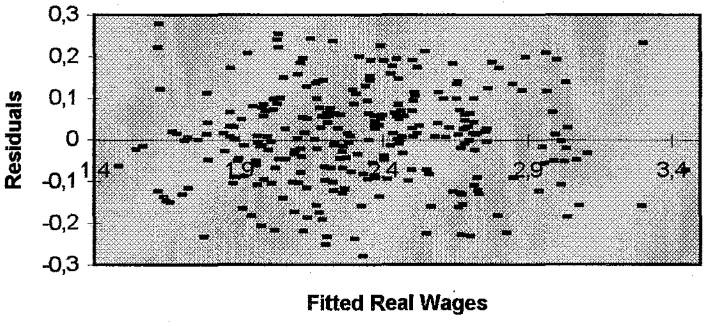



Figure 3.b. Residuals vs. Fitted Values of Real Wages Plot for the fixed effects model with sector-specific var. dummies



# *APPENDIX*

## *A. Data Definitions and Sources*

$W_i$ = Hourly wages in a two-digit manufacturing sector calculated as $TW_i / H_i$ where $TW_i$ is the real total wages deflated by consumer price index for production workers and $H_i$ is the total number of work hours among production workers. Source : 1.

$W_{ai}$ = Outside hourly wages in a two-digit manufacturing sector calculated as $\Sigma_{j\neq i}[( H_j / \Sigma_{j\neq i} H_j ) (TW_j / H_j )]$ ( i,j = 1,...,9). Source : 1.

$S_i$ = Sales from production deflated by industrial implicit deflator for a two digit manufacturing sector. Source : 2.

$L_i$ = Total number of production workers in a two-digit manufacturing sector. Source: 1.

U = Aggregate unemployment rate. Source : 3.

$M_i$ = Unionization rate in a two-digit manufacturing sector. Source : 4.

I = Treasury bill rate as a minimum lending rate. Source : 5.

***Sources:*** 1. Manufacturing Industry , Employment , Payments , Production and Tendencies, State Institute of Statistics

2. Manufacturing Industry and Rates of Capacity Utilization Statistics, Istanbul Chamber of Industry
3. Statistical Yearbook of Turkey, State Institute of Statistics
4. The Ministry of Labor and Social Security Statistics
5. Main Economic Indicators, The Undersecretary of Treasury and Foreign Trade

## *B. 1. Data used in the introduction*

***Table B.1.1. Manufacturing GNP and employment data***

| | $GNP_m$ | $GNP$ | $GNP_m/GNP$ (%) | $L_m$ | $L_t$ | $L_m/L_t$ (%) |
|---|---|---|---|---|---|---|
| *1988.I* | 4140 | 14522 | 28.5 | | | |
| *II* | 3995 | 16832 | 23.7 | | | |
| *III* | 4039 | 25614 | 15.8 | 2534 | 17668 | 14.34 |
| *IV* | 4402 | 19140 | 23.0 | | | |
| *1989.I* | 3908 | 14395 | 27.1 | 2474 | 18013 | 13.73 |
| *II* | 4048 | 16606 | 24.4 | | | |
| *III* | 4383 | 26449 | 16.6 | 2673 | 17997 | 14.85 |
| *IV* | 4740 | 19898 | 23.8 | | | |
| *1990.I* | 4424 | 16114 | 27.5 | 2382 | 18047 | 13.20 |
| *II* | 4474 | 19073 | 23.5 | | | |
| *III* | 4748 | 27931 | 17.0 | 2722 | 18681 | 14.57 |
| *IV* | 5083 | 21473 | 23.7 | | | |
| *1991.I* | 4244 | 15900 | 26.7 | 2974 | 20023 | 14.85 |
| *II* | 4542 | 18789 | 24.2 | | | |
| *III* | 5110 | 28893 | 17.7 | 2729 | 19454 | 14.03 |
| *IV* | 5279 | 21361 | 24.7 | | | |
| *1992.I* | 4695 | 17294 | 27.1 | 2885 | 19579 | 14.74 |
| *II* | 4786 | 19920 | 24.0 | | | |
| *III* | 5367 | 30453 | 17.6 | 3284 | 19958 | 16.45 |
| *IV* | 5434 | 22678 | 24.0 | | | |
| *1993.I* | 4846 | 18066 | 26.8 | 2730 | 19705 | 13.85 |
| *II* | 5462 | 22014 | 24.8 | | | |
| *III* | 5879 | 32471 | 18.1 | 3002 | 19907 | 15.08 |
| *IV* | 5980 | 24434 | 24.5 | | | |
| *1994.I* | 5159 | 19017 | 27.1 | 3082 | 20314 | 15.17 |
| *II* | 4620 | 19982 | 23.1 | | | |
| *III* | 5260 | 29960 | 17.6 | 2985 | 20396 | 14.64 |
| *IV* | 5434 | 22773 | 23.9 | | | |
| *1995.I* | 5088 | 18970 | 26.8 | 2936 | 20835 | 14.09 |
| *II* | 5729 | 22503 | 25.5 | | | |
| *III* | 6356 | 32968 | 19.3 | 2947 | 21277 | 13.85 |
| *IV* | 6148 | 24587 | 25.0 | | | |

$GNP_m$ : Manufacturing GNP at 1987 producers' prices, in billions of TL.
$L_t$ : Total employment in the economy, in thousands.
$L_m$ : Civilian employment by manufacturing industry, in thousands.

***Table B.1.2. Manufacturing industries employment data***

| | $L_1/L_m$ (%) | $L_2/L_m$ (%) | $L_3/L_m$ (%) | $L_4/L_m$ (%) | $L_5/L_m$ (%) | $L_6/L_m$ (%) | $L_7/L_m$ (%) | $L_8/L_m$ (%) | $L_9/L_m$ (%) |
|---|---|---|---|---|---|---|---|---|---|
| ***1988.I*** | 16.92 | 27.18 | 2.01 | 3.77 | 9.42 | 8.29 | 9.77 | 22.20 | 0.46 |
| ***II*** | 19.45 | 26.03 | 1.90 | 3.66 | 9.11 | 8.85 | 9.27 | 21.34 | 0.41 |
| ***III*** | 20.60 | 25.81 | 1.87 | 3.39 | 8.97 | 8.91 | 9.18 | 20.86 | 0.40 |
| ***IV*** | 19.18 | 27.28 | 1.84 | 2.87 | 9.25 | 8.86 | 9.42 | 20.91 | 0.40 |
| ***1989.I*** | 16.51 | 28.99 | 1.97 | 3.70 | 10.26 | 8.48 | 9.80 | 19.86 | 0.44 |
| ***II*** | 20.07 | 27.79 | 1.85 | 3.58 | 9.44 | 9.34 | 8.67 | 18.83 | 0.43 |
| ***III*** | 21.92 | 27.26 | 1.79 | 3.47 | 9.04 | 8.90 | 8.83 | 18.36 | 0.42 |
| ***IV*** | 18.86 | 28.73 | 1.84 | 3.61 | 9.59 | 8.60 | 9.09 | 19.23 | 0.45 |
| ***1990.I*** | 15.62 | 30.20 | 1.87 | 3.75 | 9.77 | 8.11 | 9.99 | 20.24 | 0.46 |
| ***II*** | 18.73 | 28.17 | 1.76 | 3.56 | 9.24 | 8.43 | 9.62 | 20.04 | 0.45 |
| ***III*** | 20.81 | 26.91 | 1.64 | 3.50 | 9.05 | 8.30 | 9.24 | 20.18 | 0.38 |
| ***IV*** | 19.05 | 26.94 | 1.58 | 3.54 | 10.57 | 7.84 | 9.58 | 20.52 | 0.37 |
| ***1991.I*** | 16.93 | 28.27 | 1.80 | 3.66 | 9.62 | 7.51 | 10.09 | 21.71 | 0.41 |
| ***II*** | 20.04 | 26.52 | 1.72 | 3.61 | 9.39 | 8.02 | 9.37 | 20.95 | 0.39 |
| ***III*** | 22.32 | 25.21 | 1.72 | 3.57 | 9.21 | 7.92 | 9.03 | 20.61 | 0.41 |
| ***IV*** | 20.88 | 25.87 | 1.72 | 3.57 | 9.36 | 7.62 | 9.61 | 20.99 | 0.38 |
| ***1992.I*** | 17.38 | 27.86 | 1.78 | 3.76 | 9.86 | 7.25 | 9.96 | 21.76 | 0.39 |
| ***II*** | 20.13 | 26.44 | 1.73 | 3.73 | 9.42 | 7.79 | 9.42 | 20.97 | 0.37 |
| ***III*** | 22.92 | 25.51 | 1.71 | 3.65 | 9.17 | 7.78 | 8.74 | 20.14 | 0.38 |
| ***IV*** | 20.15 | 27.42 | 1.80 | 3.87 | 9.15 | 7.38 | 8.29 | 21.55 | 0.38 |
| ***1993.I*** | 17.43 | 28.59 | 1.94 | 3.82 | 9.52 | 6.70 | 9.57 | 22.07 | 0.36 |
| ***II*** | 18.93 | 26.95 | 1.90 | 3.57 | 9.31 | 7.50 | 9.57 | 21.91 | 0.38 |
| ***III*** | 22.79 | 25.49 | 1.83 | 3.45 | 9.03 | 7.33 | 8.60 | 21.12 | 0.36 |
| ***IV*** | 20.48 | 26.21 | 1.82 | 3.61 | 9.03 | 7.12 | 9.21 | 22.18 | 0.33 |
| ***1994.I*** | 17.54 | 29.38 | 1.92 | 3.53 | 9.28 | 6.94 | 9.09 | 21.97 | 0.35 |
| ***II*** | 19.18 | 28.87 | 1.80 | 3.50 | 9.29 | 7.93 | 8.81 | 20.29 | 0.33 |
| ***III*** | 23.03 | 27.98 | 1.76 | 3.42 | 9.03 | 7.59 | 8.53 | 18.36 | 0.31 |
| ***IV*** | 20.93 | 29.79 | 1.82 | 3.29 | 9.08 | 7.33 | 8.45 | 19.01 | 0.29 |
| ***1995.I*** | 17.25 | 32.22 | 1.96 | 3.53 | 9.47 | 6.89 | 8.39 | 19.84 | 0.44 |
| ***II*** | 19.31 | 31.82 | 1.89 | 3.28 | 8.98 | 7.50 | 7.80 | 19.01 | 0.41 |
| ***III*** | 20.54 | 30.16 | 1.88 | 3.26 | 8.95 | 7.52 | 7.60 | 19.66 | 0.44 |
| ***IV*** | 19.65 | 31.14 | 1.89 | 3.29 | 8.98 | 7.16 | 7.49 | 19.96 | 0.44 |

$L_i$ : Civilian employment by each manufacturing industry ( i = 1,...,9 )

***Table B.1.3. Total wages data for metal industry***

| | $TW_{public}$ (billion TL) | $TW_{private}$ (billion TL) | $TW_{total}$ (billion TL) |
|---|---|---|---|
| ***1988.I*** | 23.8 | 12.3 | 36.1 |
| ***II*** | 31.1 | 12.6 | 43.7 |
| ***III*** | 31.8 | 14.9 | 46.7 |
| ***IV*** | 35.2 | 22.5 | 57.7 |
| ***1989.I*** | 46.1 | 23.9 | 70.0 |
| ***II*** | 43.6 | 28.3 | 71.9 |
| ***III*** | 65.1 | 34.1 | 99.2 |
| ***IV*** | 117.5 | 44.9 | 162.4 |
| ***1990.I*** | 141.0 | 48.3 | 189.3 |
| ***II*** | *326.8 | 50.6 | *377.4 |
| ***III*** | *502.3 | 51.9 | *554.2 |
| ***IV*** | *532.6 | 54.9 | *587.5 |
| ***1991.I*** | 209.6 | 89.0 | 298.6 |
| ***II*** | 256.8 | 112.4 | 369.2 |
| ***III*** | 347.9 | 113.8 | 461.7 |
| ***IV*** | 591.6 | 126.0 | 717.6 |
| ***1992.I*** | 542.3 | 136.6 | 678.9 |
| ***II*** | 664.7 | 161.0 | 825.7 |
| ***III*** | 707.7 | 175.5 | 883.2 |
| ***IV*** | 609.2 | 189.4 | 798.6 |
| ***1993.I*** | 823.8 | 252.7 | 1076.5 |
| ***II*** | 1024.4 | 292.0 | 1316.4 |
| ***III*** | 934.0 | 307.1 | 1241.1 |
| ***IV*** | 1318.4 | 348.4 | 1666.8 |
| ***1994.I*** | 1557.1 | 390.5 | 1947.6 |
| ***II*** | 1294.8 | 438.5 | 1733.3 |
| ***III*** | 1186.6 | 464.8 | 1651.4 |
| ***IV*** | 1554.7 | 525.3 | 2080.0 |
| ***1995.I*** | 1451.9 | 961.2 | 2413.1 |
| ***II*** | 1448.1 | 1189.7 | 2583.8 |
| ***III*** | 1439.4 | 1180.0 | 2619.4 |
| ***IV*** | 1678.7 | 1333.1 | 3011.8 |

* Notable movements in real wages coming from the public sector

## B.2. Data used in the model

***Table B.2.1. Data used in the model for food-beverages-tobacco industry***

| | $TW_1$ | $H_1$ | $M_1$ | $L_1$ | $S_1$ | $DEF_1$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 42515929 | 62832953 | 99.44 | 310647 | 220829968 | 152.5 |
| ***II*** | 77791377 | 75007672 | 99.44 | 370678 | 307370755 | 173.0 |
| ***III*** | 74189364 | 78041843 | 95.80 | 394093 | 398720638 | 193.4 |
| ***IV*** | 65533044 | 71284517 | 95.80 | 353282 | 476108715 | 213.9 |
| ***1989.I*** | 64969145 | 59473566 | 98.35 | 293491 | 529100334 | 251.9 |
| ***II*** | 110164652 | 72711903 | 98.35 | 374045 | 542893094 | 269.9 |
| ***III*** | 158367456 | 84647016 | 68.46 | 423488 | 690906730 | 290.5 |
| ***IV*** | 173933380 | 72230295 | 68.46 | 353058 | 1003195761 | 321.3 |
| ***1990.I*** | 156926252 | 57817348 | 86.55 | 284814 | 904508464 | 391.0 |
| ***II*** | 224368203 | 69860791 | 86.55 | 357895 | 972160255 | 421.0 |
| ***III*** | 321211934 | 80406171 | 89.26 | 404207 | 1181643294 | 417.1 |
| ***IV*** | 311182905 | 74474847 | 89.26 | 359817 | 1268167418 | 465.9 |
| ***1991.I*** | 304581271 | 58032277 | 91.82 | 292539 | 1491004667 | 627.5 |
| ***II*** | 387147835 | 69869373 | 91.82 | 343938 | 1623365344 | 711.9 |
| ***III*** | 744668997 | 79448825 | 91.22 | 385271 | 2162942173 | 700.4 |
| ***IV*** | 770844038 | 69929209 | 91.22 | 348618 | 2367609336 | 803.1 |
| ***1992.I*** | 682776741 | 55501484 | 92.85 | 272675 | 2437867111 | 1140.3 |
| ***II*** | 996512126 | 65291688 | 92.85 | 328041 | 2757319717 | 1186.1 |
| ***III*** | 1222368514 | 76144157 | 95.10 | 380941 | 3181455297 | 1143.7 |
| ***IV*** | 1225936663 | 64461551 | 95.10 | 318368 | 3433559148 | 1317.1 |
| ***1993.I*** | 1107276697 | 52607692 | 94.85 | 267805 | 4187227005 | 1878.0 |
| ***II*** | 1319527897 | 60837508 | 94.85 | 302927 | 4637945076 | 1913.1 |
| ***III*** | 2036125689 | 78089417 | 99.51 | 379271 | 6390885997 | 1862.0 |
| ***IV*** | 2182981840 | 65126500 | 99.51 | 321381 | 8148300176 | 2365.6 |
| ***1994.I*** | 2111333199 | 56382320 | 98.98 | 276730 | 4852317295 | 3222.6 |
| ***II*** | 2569885757 | 60219904 | 98.98 | 296366 | 8796453144 | 4243.4 |
| ***III*** | 3165851787 | 73252517 | 99.10 | 357266 | 11685050498 | 4617.7 |
| ***IV*** | 3640441638 | 63664042 | 99.10 | 311015 | 13273013300 | 5776.7 |
| ***1995.I*** | 3283115000 | 52031763 | 97.39 | 258422 | 21760221843 | 7402.4 |
| ***II*** | 4332497000 | 62933018 | 97.39 | 310151 | 13917245094 | 7846.0 |
| ***III*** | 4778576000 | 65548258 | 96.97 | 334994 | 22525876414 | 8062.5 |
| ***IV*** | 6407774000 | 64942625 | 96.97 | 319940 | 24811966434 | 9589.4 |

$TW_i$ : Total wages for production workers in each manufacturing industry, 000 TL
$H_i$ : Total man - hours worked by production workers in each manufacturing industry
$M_i$ : Unionization rate, %
$L_i$ : Number of production workers in a sector
$S_i$ : Sales from production in a sector, 000 TL
$DEF_i$ : Implicit price deflator for a sector, 1987=100

***Table B.2.2. Data used in the model for textiles industry***

| | $TW_2$ | $H_2$ | $M_2$ | $L_2$ | $S_2$ | $DEF_2$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 70540620 | 100328328 | 71.17 | 499094 | 553785236 | 167.8 |
| ***II*** | 72383458 | 98059298 | 71.17 | 496013 | 610783670 | 190.4 |
| ***III*** | 82819569 | 97567288 | 71.90 | 493728 | 615883627 | 213.0 |
| ***IV*** | 144968285 | 106549799 | 71.90 | 502549 | 856842838 | 235.6 |
| ***1989.I*** | 134131248 | 104281432 | 72.87 | 515427 | 903431300 | 258.9 |
| ***II*** | 153952905 | 103878753 | 72.87 | 517886 | 1061440260 | 288.5 |
| ***III*** | 189293851 | 103946497 | 57.80 | 526590 | 1292717062 | 331.2 |
| ***IV*** | 240404697 | 109198688 | 57.80 | 537775 | 1591032086 | 366.4 |
| ***1990.I*** | 256938953 | 109999863 | 60.59 | 550756 | 1474792711 | 411.9 |
| ***II*** | 272349344 | 107154942 | 60.59 | 538210 | 1623793137 | 456.9 |
| ***III*** | 307408972 | 101948908 | 62.96 | 522752 | 1916595467 | 529.3 |
| ***IV*** | 369947230 | 102573827 | 62.96 | 508787 | 2124337260 | 574.4 |
| ***1991.I*** | 560821387 | 96067033 | 66.92 | 488405 | 1981131446 | 581.2 |
| ***II*** | 597307217 | 87558675 | 66.92 | 455315 | 2387020391 | 727.9 |
| ***III*** | 655956011 | 86166776 | 74.55 | 435083 | 2973785540 | 849.5 |
| ***IV*** | 765138548 | 87448999 | 74.55 | 431972 | 3721606601 | 1023.7 |
| ***1992.I*** | 779596922 | 87172865 | 75.53 | 436980 | 3672726787 | 980.6 |
| ***II*** | 854478440 | 83531986 | 75.53 | 430779 | 4060954949 | 1173.3 |
| ***III*** | 983713286 | 83824350 | 78.05 | 423897 | 5199859295 | 1360.0 |
| ***IV*** | 1137740370 | 87096044 | 78.05 | 433274 | 6040612552 | 1740.2 |
| ***1993.I*** | 1458510496 | 85575218 | 79.26 | 439427 | 5641159911 | 1527.7 |
| ***II*** | 1599946637 | 82450987 | 79.26 | 431307 | 6518019173 | 1938.3 |
| ***III*** | 1744790424 | 82407762 | 87.26 | 424091 | 8153669614 | 2221.0 |
| ***IV*** | 1991802066 | 81236830 | 87.26 | 411237 | 8717728495 | 2779.2 |
| ***1994.I*** | 2608510177 | 91300086 | 87.98 | 463568 | 9474275951 | 2769.7 |
| ***II*** | 2457105824 | 84009895 | 87.98 | 445994 | 11136124030 | 5134.6 |
| ***III*** | 2756631229 | 85252942 | 89.45 | 434092 | 16253916293 | 5687.9 |
| ***IV*** | 3443049190 | 89932835 | 89.45 | 442788 | 19423851939 | 6975.7 |
| ***1995.I*** | 4226265000 | 95351345 | 88.11 | 482508 | 18773205243 | 5990.9 |
| ***II*** | 4950668000 | 97351133 | 88.11 | 511147 | 31202367561 | 9036.9 |
| ***III*** | 5655307000 | 99599298 | 86.37 | 492029 | 30890115884 | 9680.7 |
| ***IV*** | 7309441000 | 103765966 | 86.37 | 506963 | 33073820102 | 11196.0 |

***Table B.2.3. Data used in the model for wood products industry***

| | $TW_3$ | $H_3$ | $M_3$ | $L_3$ | $S_3$ | $DEF_3$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 4765451 | 7459900 | 47.64 | 36891 | 13756358 | 181.9 |
| ***II*** | 4933264 | 7264421 | 47.64 | 36236 | 14564485 | 206.3 |
| ***III*** | 5724737 | 7115671 | 47.53 | 35863 | 24897011 | 230.8 |
| ***IV*** | 6569262 | 6862175 | 47.53 | 33982 | 29843335 | 255.2 |
| ***1989.I*** | 7414100 | 7074447 | 49.07 | 34996 | 32317260 | 320.5 |
| ***II*** | 10510667 | 6915233 | 49.07 | 34495 | 48593247 | 324.7 |
| ***III*** | 13162532 | 6768922 | 31.81 | 34555 | 58748992 | 372.5 |
| ***IV*** | 14793160 | 6991329 | 31.81 | 34490 | 66638874 | 411.9 |
| ***1990.I*** | 16818744 | 6859869 | 43.78 | 34168 | 79985287 | 519.9 |
| ***II*** | 19488800 | 6688756 | 43.78 | 33635 | 86784780 | 530.6 |
| ***III*** | 23762405 | 6135038 | 36.19 | 31890 | 87637503 | 603.1 |
| ***IV*** | 24351088 | 6124082 | 36.19 | 29910 | 88837427 | 610.4 |
| ***1991.I*** | 29067241 | 6229600 | 34.38 | 31041 | 131146116 | 903.0 |
| ***II*** | 30013712 | 5751917 | 34.38 | 29461 | 116049933 | 841.0 |
| ***III*** | 47469768 | 5957374 | 37.45 | 29697 | 144038197 | 1066.3 |
| ***IV*** | 60089154 | 5950130 | 37.45 | 28643 | 146646352 | 960.2 |
| ***1992.I*** | 61920594 | 5801080 | 37.25 | 27988 | 102000076 | 1437.6 |
| ***II*** | 69710431 | 5345179 | 37.25 | 28112 | 210448211 | 1407.8 |
| ***III*** | 79023024 | 5609048 | 37.24 | 28370 | 195444077 | 1708.2 |
| ***IV*** | 89763716 | 5636076 | 37.24 | 28437 | 377232374 | 1755.2 |
| ***1993.I*** | 104317809 | 5683346 | 37.63 | 29820 | 277871904 | 2728.5 |
| ***II*** | 113345063 | 5917991 | 37.63 | 30456 | 469667240 | 2790.3 |
| ***III*** | 146471486 | 5999304 | 36.91 | 30397 | 510183626 | 3112.3 |
| ***IV*** | 165379081 | 5818100 | 36.91 | 28522 | 597115768 | 3078.7 |
| ***1994.I*** | 186579891 | 5948305 | 39.80 | 30372 | 398550980 | 5113.3 |
| ***II*** | 184334941 | 5291902 | 39.80 | 27816 | 511066130 | 6573.8 |
| ***III*** | 199509886 | 5391441 | 39.65 | 27324 | 717194641 | 8207.1 |
| ***IV*** | 259440348 | 5490800 | 39.65 | 27077 | 595836346 | 6880.9 |
| ***1995.I*** | 286251000 | 5630630 | 39.46 | 29393 | 661871992 | 10599.8 |
| ***II*** | 329432000 | 5989743 | 39.46 | 30300 | 1098895674 | 11208.4 |
| ***III*** | 383794000 | 6092674 | 38.07 | 30606 | 1538916418 | 13172.4 |
| ***IV*** | 484555000 | 6186682 | 38.07 | 30728 | 1395151163 | 11209.0 |

***Table B.2.4. Data used in the model for paper products and printing industry***

| | $TW_4$ | $H_4$ | $M_4$ | $L_4$ | $S_4$ | $DEF_4$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 13491373 | 14732466 | 43.94 | 69235 | 118042914 | 181.7 |
| ***II*** | 14216243 | 14843425 | 43.94 | 69689 | 152032594 | 206.2 |
| ***III*** | 13959099 | 13093573 | 45.23 | 64920 | 161811768 | 230.6 |
| ***IV*** | 16312952 | 10209200 | 45.23 | 52871 | 222680016 | 255.1 |
| ***1989.I*** | 29123975 | 13999881 | 45.89 | 65745 | 258224481 | 341.4 |
| ***II*** | 33888721 | 14179499 | 45.89 | 66796 | 263903721 | 383.9 |
| ***III*** | 41017067 | 14753079 | 28.56 | 67100 | 299919459 | 355.6 |
| ***IV*** | 46064554 | 14828724 | 28.56 | 67537 | 377329242 | 393.4 |
| ***1990.I*** | 53385601 | 14625973 | 30.79 | 68464 | 376329258 | 477.3 |
| ***II*** | 62578692 | 14976084 | 30.79 | 67966 | 431468064 | 603.6 |
| ***III*** | 62651635 | 14494007 | 34.07 | 68041 | 467391744 | 503.5 |
| ***IV*** | 70256043 | 14740891 | 34.07 | 66884 | 575380995 | 632.5 |
| ***1991.I*** | 95243520 | 12273673 | 36.81 | 63144 | 515782619 | 768.9 |
| ***II*** | 117084063 | 13192377 | 36.81 | 61999 | 601057433 | 980.8 |
| ***III*** | 141698395 | 13163273 | 39.73 | 61683 | 597810473 | 843.4 |
| ***IV*** | 164144877 | 13106674 | 39.73 | 59611 | 845503187 | 1060.8 |
| ***1992.I*** | 174043627 | 12666977 | 39.86 | 59039 | 943750463 | 1554.8 |
| ***II*** | 207033717 | 12918494 | 39.86 | 60789 | 986851436 | 1718.3 |
| ***III*** | 216934643 | 12790236 | 40.94 | 60687 | 1196894141 | 1336.8 |
| ***IV*** | 239920690 | 13365106 | 40.94 | 61198 | 1993645378 | 1738.6 |
| ***1993.I*** | 317909337 | 12449974 | 47.28 | 58689 | 2532393100 | 3384.7 |
| ***II*** | 362001629 | 12129532 | 47.28 | 57122 | 2868191546 | 3233.9 |
| ***III*** | 415678069 | 12268124 | 52.68 | 57463 | 2669050260 | 2483.7 |
| ***IV*** | 470188221 | 12282457 | 52.68 | 56650 | 3655828405 | 3058.1 |
| ***1994.I*** | 533517157 | 11664538 | 54.25 | 55781 | 3053427105 | 5855.6 |
| ***II*** | 504137685 | 11102010 | 54.25 | 54044 | 3115645670 | 6209.1 |
| ***III*** | 587986964 | 11035131 | 55.05 | 53069 | 3182279044 | 5272.9 |
| ***IV*** | 707674327 | 10583611 | 55.05 | 48952 | 7683962141 | 7101.0 |
| ***1995.I*** | 845594000 | 10835527 | 49.68 | 52865 | 7003837770 | 15054.7 |
| ***II*** | 900928000 | 10602127 | 49.68 | 52647 | 8907144507 | 13771.8 |
| ***III*** | 938088000 | 10587643 | 48.37 | 53178 | 10628751686 | 12649.6 |
| ***IV*** | 1238234000 | 11068094 | 48.37 | 53576 | 11918825483 | 13889.6 |

***Table B.2.5. Data used in the model for chemicals-petroleum products industry***

| | $TW_5$ | $H_5$ | $M_5$ | $L_5$ | $S_5$ | $DEF_5$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 39102240 | 34450388 | 73.72 | 172917 | 816882050 | 183.2 |
| ***II*** | 44696391 | 32152093 | 73.72 | 173617 | 895988043 | 207.8 |
| ***III*** | 51938179 | 32905851 | 74.04 | 171640 | 931691057 | 232.4 |
| ***IV*** | 49893004 | 34213349 | 74.04 | 170455 | 1279821397 | 257.0 |
| ***1989.I*** | 72432787 | 35594178 | 74.25 | 182397 | 1520057907 | 325.0 |
| ***II*** | 98296881 | 34212985 | 74.25 | 175814 | 1649128678 | 357.4 |
| ***III*** | 120888941 | 33918985 | 60.27 | 174610 | 1884575197 | 409.3 |
| ***IV*** | 138404695 | 35496929 | 60.27 | 179433 | 2515395945 | 452.6 |
| ***1990.I*** | 166643455 | 35283152 | 61.78 | 178166 | 2518849354 | 495.9 |
| ***II*** | 183800091 | 33082239 | 61.78 | 176615 | 2305699100 | 520.0 |
| ***III*** | 246507607 | 33375229 | 58.50 | 175698 | 2774646053 | 603.2 |
| ***IV*** | 248306524 | 34181811 | 58.50 | 199633 | 3291021903 | 685.7 |
| ***1991.I*** | 328811422 | 32391585 | 61.43 | 166233 | 3293720520 | 785.1 |
| ***II*** | 413999336 | 30550335 | 61.43 | 161121 | 3604901608 | 843.0 |
| ***III*** | 461543205 | 30806996 | 60.58 | 158924 | 4749944333 | 1078.6 |
| ***IV*** | 504820825 | 30646299 | 60.58 | 156353 | 5991790439 | 1195.8 |
| ***1992.I*** | 566292915 | 30094671 | 60.23 | 154611 | 5739063571 | 1475.2 |
| ***II*** | 683964991 | 28592165 | 60.23 | 153419 | 6508476782 | 1342.9 |
| ***III*** | 743230766 | 28627281 | 61.37 | 152320 | 7575874402 | 1907.0 |
| ***IV*** | 782682758 | 28111445 | 61.37 | 144604 | 9009422072 | 1889.3 |
| ***1993.I*** | 978522313 | 28013139 | 62.79 | 146303 | 10036851740 | 2423.7 |
| ***II*** | 1130565810 | 28237468 | 62.79 | 148948 | 11949049151 | 2449.4 |
| ***III*** | 1278511462 | 28783216 | 73.40 | 150258 | 12281093694 | 3070.2 |
| ***IV*** | 1339974513 | 27685270 | 73.40 | 141673 | 15304396945 | 2915.2 |
| ***1994.I*** | 1694547043 | 27894326 | 73.39 | 146469 | 14257282399 | 3921.5 |
| ***II*** | 1860871028 | 26685027 | 73.39 | 143605 | 17664424685 | 5185.4 |
| ***III*** | 2250583111 | 27521291 | 75.01 | 140076 | 27092631614 | 7024.6 |
| ***IV*** | 2215312812 | 27023498 | 75.01 | 135004 | 33634067757 | 7177.3 |
| ***1995.I*** | 2823658000 | 27814794 | 74.85 | 141896 | 40862900366 | 9752.9 |
| ***II*** | 3390809000 | 28211417 | 74.85 | 144235 | 48517785228 | 10184.1 |
| ***III*** | 3568619000 | 28782526 | 72.39 | 145931 | 55133040574 | 12517.9 |
| ***IV*** | 4042350000 | 29606496 | 72.39 | 146277 | 63588747534 | 12560.3 |

***Table B.2.6. Data used in the model for non-metallic minerals industry***

| | $TW_6$ | $H_6$ | $M_6$ | $L_6$ | $S_6$ | $DEF_6$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 26546366 | 30393280 | 63.40 | 152192 | 161963027 | 153.5 |
| ***II*** | 32868927 | 33311005 | 63.40 | 168616 | 178487124 | 174.2 |
| ***III*** | 36302833 | 32265927 | 61.49 | 170403 | 228030143 | 194.8 |
| ***IV*** | 37772209 | 32392923 | 61.49 | 163252 | 238835220 | 215.5 |
| ***1989.I*** | 52522713 | 30263143 | 61.82 | 150672 | 277543167 | 249.3 |
| ***II*** | 70794938 | 33918246 | 61.82 | 173982 | 311756648 | 298.2 |
| ***III*** | 72953622 | 32214128 | 43.18 | 171958 | 375813845 | 312.8 |
| ***IV*** | 74666568 | 31764772 | 43.18 | 161050 | 365777457 | 346.1 |
| ***1990.I*** | 108321539 | 29047074 | 48.12 | 147914 | 447444986 | 403.3 |
| ***II*** | 149742502 | 29626195 | 48.12 | 161001 | 505586415 | 440.2 |
| ***III*** | 159979702 | 30777395 | 49.17 | 161136 | 595119543 | 482.1 |
| ***IV*** | 160244860 | 29210979 | 49.17 | 148011 | 546366789 | 520.2 |
| ***1991.I*** | 208466878 | 25177575 | 52.25 | 129694 | 342347080 | 584.0 |
| ***II*** | 252737314 | 24332627 | 52.25 | 137591 | 708482901 | 674.4 |
| ***III*** | 278303630 | 26486168 | 55.02 | 136691 | 1012164692 | 719.3 |
| ***IV*** | 274385631 | 24926881 | 55.02 | 127314 | 1045906519 | 832.3 |
| ***1992.I*** | 381813957 | 22880200 | 56.39 | 113755 | 1518044350 | 1062.4 |
| ***II*** | 465104502 | 24728696 | 56.39 | 126869 | 1437202304 | 1075.6 |
| ***III*** | 464788609 | 25175285 | 58.62 | 129206 | 1595996361 | 1179.6 |
| ***IV*** | 479193439 | 23276474 | 58.62 | 116612 | 1532529909 | 1170.2 |
| ***1993.I*** | 541603095 | 20060236 | 60.10 | 102970 | 1499672326 | 1573.4 |
| ***II*** | 716328570 | 23285480 | 60.10 | 119959 | 2342826938 | 1750.0 |
| ***III*** | 724216280 | 23813830 | 60.09 | 121912 | 2804028677 | 1826.1 |
| ***IV*** | 731207048 | 22446141 | 60.09 | 111792 | 2869238540 | 2082.9 |
| ***1994.I*** | 1007706961 | 21498192 | 62.21 | 109490 | 3533439121 | 3047.6 |
| ***II*** | 1124052018 | 23502470 | 62.21 | 122500 | 7491070672 | 4103.8 |
| ***III*** | 1195409905 | 22950674 | 62.15 | 117689 | 6298989861 | 3876.8 |
| ***IV*** | 1228329220 | 21633047 | 62.15 | 108903 | 5793068945 | 4040.9 |
| ***1995.I*** | 1637628000 | 20033323 | 63.49 | 103257 | 6051757922 | 5942.8 |
| ***II*** | 2020985000 | 23185882 | 63.49 | 120418 | 9477727389 | 7321.2 |
| ***III*** | 2298954000 | 24345930 | 62.41 | 122732 | 9440585801 | 6144.7 |
| ***IV*** | 2322909000 | 23690212 | 62.41 | 116582 | 10929299021 | 7002.9 |

***Table B.2.7. Data used in the model for metals industry***

| | $TW_7$ | $H_7$ | $M_7$ | $L_7$ | $S_7$ | $DEF_7$ |
|---|---|---|---|---|---|---|
| **1988.I** | 36079014 | 39476248 | 79.47 | 179332 | 523359162 | 199.6 |
| **II** | 43672160 | 36519788 | 79.47 | 176631 | 393478266 | 226.4 |
| **III** | 46693824 | 35497403 | 81.89 | 175640 | 647696759 | 253.2 |
| **IV** | 57725873 | 38294054 | 81.89 | 173479 | 737655835 | 280.1 |
| **1989.I** | 69964743 | 36707388 | 79.99 | 174146 | 927089080 | 394.2 |
| **II** | 71924537 | 28228676 | 79.99 | 161529 | 852309646 | 417.5 |
| **III** | 99231219 | 30350594 | 63.16 | 170501 | 1092939177 | 350.2 |
| **IV** | 162385073 | 35310152 | 63.16 | 170119 | 1243234550 | 387.4 |
| **1990.I** | 189343693 | 37838692 | 66.87 | 182164 | 1318738477 | 479.4 |
| **II** | 377431035 | 37942212 | 66.87 | 183754 | 2151723233 | 476.3 |
| **III** | 554166099 | 35520627 | 65.41 | 179411 | 1559731570 | 442.6 |
| **IV** | 587549639 | 37336648 | 65.41 | 180980 | 1456660871 | 543.5 |
| **1991.I** | 298598607 | 35357413 | 67.67 | 174384 | 1494353886 | 701.8 |
| **II** | 369188940 | 33287447 | 67.67 | 160890 | 2195294448 | 727.9 |
| **III** | 461694806 | 30499145 | 70.41 | 155894 | 2583834963 | 698.0 |
| **IV** | 717618142 | 32298430 | 70.41 | 160440 | 2603958656 | 803.8 |
| **1992.I** | 678927554 | 33009689 | 70.98 | 156197 | 2472747839 | 883.5 |
| **II** | 825727009 | 31527275 | 70.98 | 153531 | 2722068308 | 1006.6 |
| **III** | 883196177 | 29126962 | 72.96 | 145318 | 3539999596 | 980.7 |
| **IV** | 798635410 | 26866328 | 72.96 | 130918 | 4690877051 | 1383.4 |
| **1993.I** | 1076543287 | 29508169 | 73.77 | 147119 | 5240056669 | 1490.5 |
| **II** | 1316428041 | 31128654 | 73.77 | 153146 | 6026132277 | 1742.5 |
| **III** | 1241085392 | 30644178 | 74.19 | 143186 | 5764067512 | 1539.7 |
| **IV** | 1666809784 | 30195365 | 74.19 | 144473 | 8688417503 | 2169.1 |
| **1994.I** | 1947608886 | 29346113 | 74.80 | 143391 | 9769898157 | 2568.2 |
| **II** | 1733321813 | 29220184 | 74.80 | 136146 | 13596778094 | 4748.2 |
| **III** | 1651370312 | 26513659 | 76.03 | 132398 | 15117733964 | 3792.3 |
| **IV** | 2080042270 | 25943474 | 76.03 | 125596 | 18199350781 | 6091.0 |
| **1995.I** | 2413134000 | 24490001 | 77.61 | 125649 | 15724535982 | 5349.6 |
| **II** | 2583810000 | 25413644 | 77.61 | 125216 | 28086336754 | 7412.0 |
| **III** | 2619351000 | 25155015 | 76.57 | 123944 | 30434034241 | 6117.0 |
| **IV** | 3011759000 | 25361630 | 76.57 | 121871 | 32303243591 | 9307.0 |

***Table B.2.8. Data used in the model for metals-machinery-vehicles industry***

| | $TW_8$ | $H_8$ | $M_8$ | $L_8$ | $S_8$ | $DEF_8$ |
|---|---|---|---|---|---|---|
| ***1988.I*** | 73150572 | 76820269 | 76.75 | 407657 | 1241323101 | 162.8 |
| ***II*** | 72372962 | 75137764 | 76.75 | 406639 | 929308937 | 184.7 |
| ***III*** | 81719794 | 69294226 | 77.52 | 399118 | 886136024 | 206.6 |
| ***IV*** | 115934295 | 74119006 | 77.52 | 385177 | 1213733626 | 228.5 |
| ***1989.I*** | 115351827 | 69213830 | 77.26 | 353037 | 1140208527 | 288.0 |
| ***II*** | 134884001 | 67149927 | 77.26 | 350815 | 2052786790 | 325.6 |
| ***III*** | 159310031 | 64173129 | 58.35 | 354736 | 2018844089 | 326.8 |
| ***IV*** | 223136541 | 70264193 | 58.35 | 360042 | 2866618537 | 361.5 |
| ***1990.I*** | 248777869 | 71340577 | 64.27 | 369156 | 3323928773 | 436.6 |
| ***II*** | 266800231 | 72329008 | 64.27 | 382754 | 3698312154 | 487.8 |
| ***III*** | 305564492 | 70592645 | 64.60 | 391933 | 3929023109 | 495.5 |
| ***IV*** | 367186147 | 76651883 | 64.60 | 387628 | 5211640514 | 527.4 |
| ***1991.I*** | 507630670 | 67149952 | 67.48 | 374997 | 4134767209 | 647.5 |
| ***II*** | 610739258 | 65647697 | 67.48 | 359662 | 6411977679 | 772.2 |
| ***III*** | 750106704 | 66020276 | 70.79 | 355669 | 6921640600 | 768.0 |
| ***IV*** | 891730860 | 69111481 | 70.79 | 350536 | 9240890274 | 822.8 |
| ***1992.I*** | 988841333 | 67146430 | 71.62 | 341273 | 9725553118 | 1045.0 |
| ***II*** | 1130685895 | 63435573 | 71.62 | 341762 | 11517687077 | 1213.1 |
| ***III*** | 1245760695 | 64852297 | 73.60 | 334727 | 12276892508 | 1279.5 |
| ***IV*** | 1550398904 | 66737116 | 73.60 | 340545 | 16934457359 | 1402.8 |
| ***1993.I*** | 1702715911 | 62216915 | 75.00 | 339157 | 19246136997 | 1807.9 |
| ***II*** | 2040153825 | 64563984 | 75.00 | 350634 | 24039060176 | 2119.2 |
| ***III*** | 2266172410 | 66844385 | 79.35 | 351446 | 24512164142 | 2080.5 |
| ***IV*** | 2686683341 | 68570790 | 79.35 | 348087 | 34633632904 | 2313.2 |
| ***1994.I*** | 2748834355 | 62953114 | 80.00 | 346681 | 29039387725 | 2995.7 |
| ***II*** | 2695237579 | 52299075 | 80.00 | 313508 | 23954369313 | 4060.5 |
| ***III*** | 2853274451 | 54176602 | 80.96 | 284801 | 35100574193 | 4502.2 |
| ***IV*** | 3666469355 | 55502694 | 80.96 | 282514 | 47013659115 | 4945.7 |
| ***1995.I*** | 4495563000 | 55804827 | 80.69 | 297124 | 46692267146 | 6590.5 |
| ***II*** | 5401840000 | 57303385 | 80.69 | 305375 | 66180055806 | 7580.9 |
| ***III*** | 6026947000 | 60505288 | 79.34 | 320685 | 73972395749 | 7644.7 |
| ***IV*** | 7389385000 | 64595504 | 79.34 | 324996 | 113620596394 | 8734.1 |

***Table B.2.9. Data used in the model for other industry and aggregate data***

| | $TW_9$ | $H_9$ | $M_9$ | $L_9$ | $S_9$ | $DEF_9$ | $U$ | $I$ | $CPI$ |
|---|---|---|---|---|---|---|---|---|---|
| ***1988.I*** | 1331285 | 1820544 | 76.75 | 8448 | 10944849 | 144.7 | 8.53 | 52.91 | 152.4 |
| ***II*** | 1293227 | 1763303 | 76.75 | 7731 | 13423460 | 164.2 | 8.53 | 60.28 | 169.0 |
| ***III*** | 1423709 | 1619858 | 77.52 | 7600 | 15516292 | 183.7 | 8.29 | 45.11 | 186.2 |
| ***IV*** | 1781571 | 1600413 | 77.52 | 7342 | 20021767 | 203.1 | 8.29 | 57.67 | 212.2 |
| ***1989.I*** | 2310118 | 1633735 | 77.26 | 7743 | 19847917 | 218.2 | 8.42 | 52.03 | 244.2 |
| ***II*** | 2543449 | 1661992 | 77.26 | 7954 | 32348980 | 296.1 | 8.42 | 46.11 | 272.9 |
| ***III*** | 3021394 | 1674992 | 58.35 | 8085 | 34910995 | 348.8 | 8.51 | 52.25 | 307.5 |
| ***IV*** | 3879781 | 1809816 | 58.35 | 8413 | 36745407 | 385.7 | 8.51 | 41.64 | 348.6 |
| ***1990.I*** | 4448857 | 1714155 | 64.27 | 8324 | 35867857 | 397.8 | 8.54 | 40.44 | 397.6 |
| ***II*** | 4826095 | 1674882 | 64.27 | 8560 | 49904375 | 414.2 | 8.54 | 40.47 | 443.6 |
| ***III*** | 5491875 | 1458043 | 64.60 | 7403 | 50124023 | 479.3 | 7.43 | 45.03 | 489.9 |
| ***IV*** | 5952469 | 1383537 | 64.60 | 6973 | 53778513 | 585.9 | 7.43 | 51.16 | 559.2 |
| ***1991.I*** | 7221543 | 1407837 | 67.48 | 7132 | 47382971 | 621.4 | 7.48 | 59.51 | 645.2 |
| ***II*** | 7693640 | 1353454 | 67.48 | 6657 | 72435067 | 739.7 | 7.48 | 69.00 | 731.4 |
| ***III*** | 9387486 | 1486130 | 70.79 | 7053 | 92927990 | 850.8 | 8.41 | 67.60 | 817.4 |
| ***IV*** | 11185520 | 1351530 | 70.79 | 6356 | 79324211 | 930.3 | 8.41 | 71.95 | 957.0 |
| ***1992.I*** | 12431359 | 1214720 | 71.62 | 6085 | 94284179 | 1042.6 | 8.10 | 67.67 | 1152.9 |
| ***II*** | 11560802 | 1284596 | 71.62 | 6100 | 129051582 | 1162.8 | 8.10 | 71.67 | 1212.6 |
| ***III*** | 16019642 | 1240800 | 73.60 | 6280 | 147549661 | 1391.0 | 8.04 | 75.47 | 1370.5 |
| ***IV*** | 17251995 | 1252418 | 73.60 | 6040 | 206924073 | 1349.9 | 8.04 | 74.59 | 1588.3 |
| ***1993.I*** | 19935558 | 1216310 | 75.00 | 5569 | 140844269 | 1639.0 | 7.54 | 69.84 | 1821.7 |
| ***II*** | 21045687 | 1279003 | 75.00 | 6020 | 175802511 | 1776.8 | 7.54 | 66.67 | 2027.9 |
| ***III*** | 27407525 | 1291322 | 79.35 | 6032 | 233336215 | 2174.2 | 7.96 | 65.79 | 2305.8 |
| ***IV*** | 26790336 | 1128110 | 79.35 | 5246 | 200820665 | 2269.2 | 7.96 | 66.41 | 2717.2 |
| ***1994.I*** | 30996438 | 1120024 | 80.00 | 5547 | 200274110 | 2797.8 | 8.40 | 88.25 | 3163.3 |
| ***II*** | 29952809 | 1054421 | 80.00 | 5069 | 352262864 | 3884.1 | 8.40 | 137.51 | 4377.0 |
| ***III*** | 43893471 | 1009127 | 80.96 | 4825 | 418067133 | 5313.7 | 7.86 | 95.15 | 4868.3 |
| ***IV*** | 43977448 | 959790 | 80.96 | 4355 | 402776738 | 5668.5 | 7.86 | 88.86 | 6127.0 |
| ***1995.I*** | 64005000 | 1369872 | 80.69 | 6557 | 611108047 | 6689.5 | 7.19 | 104.26 | 6960.4 |
| ***II*** | 80682000 | 1358330 | 80.69 | 6657 | 595364939 | 8984.0 | 7.19 | 76.75 | 7805.9 |
| ***III*** | 90568000 | 1515149 | 79.34 | 7217 | 703356383 | 8374.4 | 6.65 | 76.74 | 9039.3 |
| ***IV*** | 124688000 | 1482548 | 79.34 | 7147 | 554201951 | 9744.2 | 6.65 | 102.07 | 10442.7 |

*U* : Unemployment rate, %
*I* : Interest rate, %
*CPI* : Consumer Price Index, 1987=100

# C. Regression Outputs

## Table C.1. Pooled regression

| | Coeff | Std Error | T-Stat |
|---|---|---|---|
| **Constant** | 1.799 | 0.472 | 3.807 |
| $Ln(S/L)_{-1}$ | 0.362 | 0.021 | 17.123 |
| $L_1$ | 0.002 | 0.001 | 2.450 |
| $I$ | -0.002 | 0.001 | -1.544 |
| $(W_a)_{-1}$ | 0.066 | 0.005 | 12.327 |
| $Ln\ M$ | -0.284 | 0.048 | -5.884 |
| $Ln\ U$ | -0.165 | 0.200 | -0.827 |
| $D_M$ | 1.014 | 0.129 | 7.841 |
| | | | |
| $N$ | 279 | | |
| $D.F$ | 271 | | |
| $R^2$ | 0.695 | | |
| $SEE$ | 0.219 | | |
| $SSR$ | 13.032 | | |
| $F(7,271)$ | 88.263 | | |
| $D.W.$ | 0.616 | | |

## Table C.2. Fixed effects model

| | Coeff | Std Error | T-Stat |
|---|---|---|---|
| $Ln(S/L)_{-1}$ | 0.145 | 0.037 | 3.943 |
| $L_1$ | 0.002 | 0.001 | 3.661 |
| $I$ | -0.002 | 0.001 | -3.304 |
| $(W_a)_{-1}$ | 0.082 | 0.004 | 21.675 |
| $Ln\ M$ | -0.288 | 0.083 | -3.470 |
| $Ln\ U$ | -0.291 | 0.124 | -2.351 |
| $D_M$ | 0.772 | 0.083 | 9.326 |
| $D_1$ | 2.742 | 0.465 | 5.899 |
| $D_2$ | 2.424 | 0.452 | 5.367 |
| $D_3$ | 2.478 | 0.406 | 6.099 |
| $D_4$ | 2.683 | 0.423 | 6.339 |
| $D_5$ | 3.033 | 0.460 | 6.600 |
| $D_6$ | 2.814 | 0.437 | 6.445 |
| $D_7$ | 3.087 | 0.461 | 6.697 |
| $D_8$ | 2.784 | 0.463 | 6.020 |
| $D_9$ | 2.444 | 0.456 | 5.354 |
| | | | |
| $N$ | 279 | | |
| $D.F$ | 263 | | |
| $R^2$ | 0.889 | | |
| $SEE$ | 0.135 | | |
| $SSR$ | 4.761 | | |
| $F(15,263)$ | 139.876 | | |
| $D.W.$ | 1.520 | | |

***Table C.3. Fixed effects model with sector - specific variable dummies***

| | *Coeff* | *Std Error* | *T-Stat* |
|---|---|---|---|
| $I_{-1}$ | 0.002 | 0.001 | 3.744 |
| $I$ | -0.002 | 0.001 | -3.536 |
| $Ln\ U$ | -0.332 | 0.119 | -2.791 |
| $Ln\ M$ | -0.186 | 0.086 | -2.152 |
| $Ln(S/L)_{-11}$ | 0.129 | 0.129 | 0.998 |
| $Ln(S/L)_{-21}$ | 0.303 | 0.216 | 1.401 |
| $Ln(S/L)_{-31}$ | 0.156 | 0.078 | 1.983 |
| $Ln(S/L)_{-41}$ | 0.230 | 0.096 | 2.390 |
| $Ln(S/L)_{-51}$ | 0.116 | 0.204 | 0.569 |
| $Ln(S/L)_{-61}$ | -0.051 | 0.098 | -0.518 |
| $Ln(S/L)_{-71}$ | -0.062 | 0.093 | -0.666 |
| $Ln(S/L)_{-81}$ | 0.232 | 0.108 | 2.142 |
| $Ln(S/L)_{-91}$ | 0.252 | 0.140 | 1.805 |
| $(W_d)_{-11}$ | 0.093 | 0.010 | 9.737 |
| $(W_d)_{-21}$ | 0.054 | 0.009 | 6.192 |
| $(W_d)_{-31}$ | 0.083 | 0.010 | 8.353 |
| $(W_d)_{-41}$ | 0.075 | 0.009 | 8.781 |
| $(W_d)_{-51}$ | 0.096 | 0.009 | 10.207 |
| $(W_d)_{-61}$ | 0.099 | 0.010 | 9.814 |
| $(W_d)_{-71}$ | 0.127 | 0.011 | 11.345 |
| $(W_d)_{-81}$ | 0.073 | 0.013 | 5.443 |
| $(W_d)_{-91}$ | 0.052 | 0.011 | 4.822 |
| $D_M$ | 0.849 | 0.080 | 10.600 |
| $D_1$ | 2.290 | 0.570 | 4.020 |
| $D_2$ | 1.911 | 0.747 | 2.559 |
| $D_3$ | 2.152 | 0.447 | 4.817 |
| $D_4$ | 2.151 | 0.503 | 4.273 |
| $D_5$ | 2.676 | 0.971 | 2.754 |
| $D_6$ | 2.954 | 0.487 | 6.062 |
| $D_7$ | 3.129 | 0.577 | 5.419 |
| $D_8$ | 2.158 | 0.575 | 3.749 |
| $D_9$ | 2.011 | 0.621 | 3.239 |
| | | | |
| $N$ | 279 | | |
| $D.F$ | 247 | | |
| $R^2$ | 0.906 | | |
| $SEE$ | 0.127 | | |
| $SSR$ | 3.997 | | |
| $F(31,247)$ | 77.234 | | |
| $D.W.$ | 1.874 | | |

## *Table C.4. SURE Model*

| | *Coeff* | *Std Error* | *T-Stat* |
|---|---|---|---|
| $I_{-11}$ | 0.002 | 0.002 | 1.442 |
| $I_{-21}$ | -0.002 | 0.002 | -1.133 |
| $I_{-31}$ | 0.002 | 0.001 | 1.519 |
| $I_{-41}$ | 0.002 | 0.002 | 1.158 |
| $I_{-51}$ | 0.003 | 0.001 | 2.272 |
| $I_{-61}$ | 0.001 | 0.002 | 0.778 |
| $I_{-71}$ | 0.001 | 0.001 | 0.689 |
| $I_{-81}$ | 0.003 | 0.001 | 1.812 |
| $I_{-91}$ | 0.002 | 0.001 | 2.022 |
| $I_1$ | 0.0002 | 0.002 | 0.147 |
| $I_2$ | -0.003 | 0.002 | -1.398 |
| $I_3$ | -0.002 | 0.001 | -1.476 |
| $I_4$ | -0.002 | 0.002 | -1.287 |
| $I_5$ | -0.002 | 0.002 | -1.643 |
| $I_6$ | -0.003 | 0.002 | -1.692 |
| $I_7$ | -0.005 | 0.002 | -2.849 |
| $I_8$ | -0.002 | 0.002 | -1.409 |
| $I_9$ | -0.003 | 0.001 | -2.399 |
| $LnU_1$ | -0.109 | 0.333 | -0.327 |
| $LnU_2$ | 0.010 | 0.348 | 0.030 |
| $LnU_3$ | -0.074 | 0.262 | -0.284 |
| $LnU_4$ | -0.131 | 0.328 | -0.400 |
| $LnU_5$ | -0.523 | 0.290 | -1.806 |
| $LnU_6$ | -0.801 | 0.356 | -2.250 |
| $LnU_7$ | -0.111 | 0.327 | -0.340 |
| $LnU_8$ | -0.327 | 0.296 | -1.105 |
| $LnU_9$ | -0.644 | 0.218 | -2.949 |
| $Ln\ M_1$ | -0.231 | 0.227 | -1.021 |
| $Ln\ M_2$ | 0.258 | 0.247 | 1.046 |
| $Ln\ M_3$ | -0.194 | 0.130 | -1.494 |
| $Ln\ M_4$ | 0.110 | 0.119 | 0.922 |
| $Ln\ M_5$ | -0.212 | 0.217 | -0.977 |
| $Ln\ M_6$ | 0.233 | 0.230 | 1.014 |
| $Ln\ M_7$ | -0.936 | 0.301 | -3.112 |
| $Ln\ M_8$ | 0.151 | 0.217 | 0.693 |
| $Ln\ M_9$ | -0.165 | 0.196 | -0.839 |
| $Ln(S/L)_{-11}$ | 0.159 | 0.080 | 1.999 |
| $Ln(S/L)_{-21}$ | -0.265 | 0.123 | -2.147 |
| $Ln(S/L)_{-31}$ | 0.081 | 0.035 | 2.342 |
| $Ln(S/L)_{-41}$ | 0.152 | 0.046 | 3.347 |
| $Ln(S/L)_{-51}$ | -0.101 | 0.115 | -0.879 |
| $Ln(S/L)_{-61}$ | -0.127 | 0.099 | -1.127 |
| $Ln(S/L)_{-71}$ | 0.111 | 0.072 | 1.534 |
| $Ln(S/L)_{-81}$ | 0.175 | 0.045 | 3.942 |
| $Ln(S/L)_{-91}$ | 0.173 | 0.079 | 2.177 |
| $(W_a)_{-11}$ | 0.083 | 0.009 | 9.079 |
| $(W_a)_{-21}$ | 0.067 | 0.009 | 7.583 |
| $(W_a)_{-31}$ | 0.086 | 0.008 | 10.989 |
| $(W_a)_{-41}$ | 0.067 | 0.009 | 7.604 |
| $(W_a)_{-51}$ | 0.093 | 0.010 | 9.576 |
| $(W_a)_{-61}$ | 0.101 | 0.010 | 9.662 |
| $(W_a)_{-71}$ | 0.122 | 0.010 | 11.931 |
| $(W_a)_{-81}$ | 0.071 | 0.008 | 8.405 |
| $(W_a)_{-91}$ | 0.055 | 0.007 | 7.604 |
| $D_1$ | 1.885 | 1.303 | 1.447 |
| $D_2$ | 1.188 | 1.282 | 0.926 |
| $D_3$ | 1.810 | 0.685 | 2.641 |
| $D_4$ | 1.012 | 0.829 | 1.221 |
| $D_5$ | 4.131 | 1.101 | 3.752 |
| $D_6$ | 2.575 | 1.194 | 2.158 |
| $D_7$ | 5.487 | 1.534 | 3.578 |
| $D_8$ | 0.930 | 1.168 | 0.796 |
| $D_9$ | 2.863 | 0.975 | 2.938 |
| $D_M$ | 0.701 | 0.062 | 11.328 |
| $N$ | 279 | | |
| $D.F$ | 215 | | |
| $R_i^2$ | 0.845 ; 0.681 ; 0.889 ; | 0.753 ; 0.855 ; 0.797 ; | 0.920 ; 0.855 ; 0.846 |
| $SEE_i$ | 0.137 ; 0.146 ; 0.110 ; | 0.141 ; 0.127 ; 0.153 ; | 0.132 ; 0.124 ; 0.093 |
| $SSR_i$ | 0.451 ; 0.508 ; 0.290 ; | 0.477 ; 0.387 ; 0.565 ; | 0.398 ; 0.369 ; 0.205 |
| $D.W._i$ | 1.801 ; 1.321 ; 2.092 ; | 1.446 ; 1.909 ; 1.982 ; | 2.346 ; 1.339 ; 2.156 |

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