DEPARTAMENTO DE ECONOMIA

PUC - RJ

TEXTO PARA DISCUSSÃO

NO. 275

A MODEL OF WAGE OVER-INDEXATION

EDWARD J. AMADEO

ABRIL 1992

A Model of Wage Over-Indexation

Edward J. Amadeo

Department of Economics, PUC-RJ
Rio de Janeiro, Brazil

April 1992

Abstract:
The model developed in the paper is an attempt to illustrate two basic propositions: (a) the smaller the degree of centralization of wage bargains, the greater the incentives to the unions to demand wage increases and (b) to the extent that market constraints affect the determination of prices, relative wages and relative prices tend to move together. The figures on Brazil show that over most of the period 1976-1991, on an yearly basis, industrial wages grew faster than CPI inflation. Decentralized wage bargaining in an environment of accelerating inflation and soft market constraints seems to be at the root of this process. It was also noted that a positive correlation between the indexation parameters of wages (with respect to past inflation) and industrial prices (with respect to costs) holds in most of the industrial sectors in Brazil. This can be interpreted as an evidence that the outcome of wage bargains is not independent from the market structure faced by firms.

A Model of Wage Over-Indexation

1. Themes

There are a variety of elements, different in nature, affecting the bargaining attitude of unions in wage negotiations. Institutions, market constraints and expectations are all important factors. The central notion, however, is that unions and workers care about the future path of relative wages when bargaining over their wages. This notion was first put forward by Keynes in the General Theory where he argued that

> the struggle about money-wages primarily affects the distribution of the aggregate real wage between different labour-groups, and not its average amount per unit of employment which depends ... on a different set of forces. The effect of combination on the part of a group of workers is to protect their relative real wage". [1936, p. 14]

In Keynes view, the average real wage depends on the aggregate rate of inflation over which individual unions do not have any control. On the other hand, the distribution of the aggregate wage bill among workers of different sectors depend on the path of relative wages. Keynes is right that in a decentralized system of wage bargaining, unions can only care about their own wage, and that the purchasing power of the latter will depend on the wages of other labour groups.

However, as the level of centralization of bargains and the size of the bargaining parties increase, unions may start to have a sense of the likely effect of their wage demands on aggregate variables, and in particular the effect over the rate of inflation. If this is indeed the case, the incentives to the union to demand increases in money wages, in an attempt increase

the relative wage of the union members, are reduced as the level of centralization of wage bargaining increases. The greater the size of the bargaining party, the more stringent becomes the trade-off between the direct positive effect on the relative wage of the workers and the indirect negative effect over their real wage due to the rise in inflation. In principle, therefore, the incentives to demand wage increases will be greater the lower the degree of centralization of wage negotiations.\[1]

Market conditions both at the aggregate level and at the sectoral level, affect the bargaining power of unions and firms, and hence the path of wages. In a situation of growing aggregate demand for labour, the bargaining power of unions increase thus inducing demands for wage increases. On the other hand, the goods market poses a constraint for the individual firm which will resist increases in wage costs. The more severe the market constraint, the greater the willingness of the firm to resist wage increases, and to impose conflict costs on unions.

The goods and labour markets at the sectoral level have their own dynamics but they certainly interact. The attitude of firms in wage bargains is affected by the goods market constraint they face. Given the market constraint, the willingness of a firm or group of firms to impose conflict costs on workers grows with the demand for wage increases. If, for example, the firm chooses to peg the price to the rate of inflation in the international market, given the path of labour productivity and of non-labour costs, there is an obvious trade-off between the path of the wage and the profit margin. The actual levels of the wage and the profit margin will depend on the incentives to the union to

demand wage increases (as discussed above) and the relative bargaining power of the union and the firm.

The alleviation of the goods market constraint, say an acceleration of inflation of the relevant price in the international market, reduces the pressures over the profit margin of wage increases and, as a result, mitigates the willingness of the firm to impose conflict costs on workers. Firms become more tolerant and workers have an extra incentive to demand wage increases as market conditions become more favorable. As a result, it seems plausible to assume that both the indexation factors of wages (with respect to past inflation) and prices (with respect to costs) will tend to increase. This argument implies that, to the extent that market conditions are an important determinant of the bargaining structure between the union and the firm, the indexation factors of wages and prices will tend to move together over time.

In section 2 below, we develop a simple model to shed light on the following two propositions: (a) As negotiations become more centralized, the perceived effect of wage negotiations on inflation becomes clearer, thus creating a negative incentive to unions to demand wage increase after a certain point; (b) In a given sector, a relaxation of the goods market constraint will tend to have a positive effect on both the wage and the profit margin. In section 3 we illustrate the results of the model by looking at some data on the Brazilian industry. Section 4 provides the concluding notes.

2. Price and Wage Formation in Industry

We start by assuming that neither the industrial goods nor the labour markets are perfectly competitive. Both firms and unions have some degree of market power as a result of restrictions to entry or competition in the respective markets. As a result, the price of goods is usually greater than the 'competitive' price, and wages differ from the 'reservation wages'. Both relative prices and relative wages are therefore influenced by the degrees of market power of firms and unions, respectively.

Firms and Price Formation

Following Kalecki (1971), we assume that firms fix a mark-up over direct average costs. The size of the mark-up varies with structural factors (such as barriers to entry, monopoly rights, protection from international competition) as well as short-run fluctuations (such as movements in the elasticity of demand). Firms have both direct labour and non-labour costs, and in each sector, the weight of each of them in total direct costs varies. The price equation of a typical firm j is given by:

$$1. \qquad \Pi_j = M_j \left[(W_j/\delta_j)^{\gamma_j} * (\Pi/\beta_j)^{1-\gamma_j} \right]$$

where: Π_j = wholesale price of good j,
M_j = profit margin over direct costs,
W_j = money wage rate,
δ_j = average product of labour,
Π = average wholesale price level of industrial goods \2,
β_j = technical coefficient expressing the ratio of material direct costs per unit of output,
γ_j = share of labour costs in total costs and
$(1-\gamma_j)$ = share of material costs.

The time derivative of this equations yields the rate of

inflation of the price of good j:

2. $\pi_j = m_j + c_j$

where $c_j = \gamma_j (w_j - \delta_j) + (1-\gamma_j)\pi$ and all lowercase letters represent the time derivative of the corresponding variables, assuming the time derivative of β to be zero. Price inflation can also be written as:

3. $\pi_j = \epsilon_j c_j$

From the two equations it is clear that whenever $\epsilon_j > 1$, the mark-up increases, and vice-versa, that is, $m_j > 0$ when $\epsilon_j > 1$. The variable ϵ_j measures the degree of indexation of the price level of firm j to cost inflation.

Workers and Wage Formation

When negotiating money wages, unions attempt to recover the purchasing power losses of wages incurred due to inflation since the last bargain. In addition, they bargain over 'real increases' in wages due to changes in labour productivity.\[3] We assume that unions negotiating with firm(s) j try to adjust the wage according to the following equation:

4. $W^d_j = W_{j,-1} [1 + \lambda^d_j (p_{-1} + \delta_{j,-1})]$

where W^d_j and λ^d_j stand for the desired wage and the desired indexation factor, respectively, and p_{-1} for the CPI inflation

since the last bargain. The size of λ^d_j depends on the levels of organization and militancy of the union members, on the degree of dissatisfaction of workers with their real wage and on the expected rate of acceleration of inflation. \[4] The ex-post indexation factor, or the effective 'bargaining power of the union', λ_j, depends on the determinants of λ^d_j, on the one hand, and on the other, on factors associated with the bargaining process as seen in the introductory section. The actual indexation factor is at most equal to the desired indexation, $\lambda^d_j \leq \lambda_j$.

The actual variation of the wage in sector j is therefore given by

$$5. \quad w_j = \lambda_j \, (p_{.-1} + \delta_{j,-1})$$

Note that whenever $\lambda_j > 1$, given the rate of inflation, <u>real</u> wages will grow faster than productivity in which case we say that there is 'over-indexation' of wages.

The inflationary process and the associated distributional implications are critically influenced by the sizes of the indexation factors of industrial prices with respect to costs and of money wages with respect to the consumer price and productivity. The acceleration of inflation results necessarily from the over-indexation of wages and prices.

<u>The Wage Curve</u>

Dividing equation 4. through by the CPI in period t (P_t), we get an expression for the average real wage over period t:

5. $\omega_{j,t} = \omega_{j,-1}\ [1/(1 + p_t)][1 + \lambda_j\ v_j]$

where $v_j \equiv (p_{-1} + \delta_{j,-1})$. Let α_j be the weight of sector j in the wholesale price index.\[5] Hence, the inflation of wholesale prices is given by \[6]:

6. $\pi = \Sigma\ \alpha_j\ \pi_j = \Sigma\ \alpha_j\ \epsilon_j\ c_j \qquad i = 1, \ldots, n.$

Solving for π:

7. $\pi = \{\Sigma\ \alpha_j\ \epsilon_j\ \gamma_j\ [\lambda_j\ v_j - \delta_j]\}\ /\ [1 - \Sigma\ \alpha_j\ \epsilon_j\ (1 - \gamma_j)]$

Differentiating π with respect to λ_j gives:

$$\partial\pi/\partial\lambda_j = [\alpha_j\ \epsilon j_j\ \gamma_j\ v_j]\ /\ [1 - \Sigma\ \alpha_j\ \epsilon_j\ (1 - \gamma_j)]$$

Assume that all sectors have the same size, in which case, $\alpha_j = \alpha = 1/n$ where n is the number of sectors or negotiating parties. The effect of an increase in λ in sector j on the average rate of inflation is now given by:

$$\partial\pi/\partial\lambda_j = (\epsilon_j\ \gamma_j\ v_j)/\ \{n[1 - (1/n)\Sigma\ \epsilon_j\ (1 - \gamma_j)]\}$$

If we now assume that the inflation of consumption goods prices (p) is linearly related to the inflation of wholesale prices (π), say $p = e\ \pi$, where e is a constant, it becomes obvious that inflation over period t is not independent from the bargaining power based on which wages were negotiated at the beginning of

the period. To see this we differentiate p in relation to λ:

$$\partial p/\partial \lambda_j = e \quad \partial \pi/\partial \lambda_j \quad \equiv \theta_j$$

Note that θ_j is negative in n: the greater the number of sectors, and therefore the smaller the share of each sector in the average price index, the greater the effect of a change in the bargaining power on the rate of inflation.

If we now differentiate the real wage with respect to λ_j, we get

$$\partial \omega_j/\partial \lambda_j = \omega_{j,-1} \{[v_j/(1 + p_t)] - \theta_j(1 - \lambda_j v_j)(1 + p_t)^2\}$$

Thus, ω_j is an increasing function of λ_j if

$$\lambda_j < [(1 + p_t)] /\theta_j] - (1/v_j)$$

which is also the necessary condition for $\partial^2\omega_j/\partial\lambda_j^2 < 0$. Hence, if this condition is satisfied, the $\omega_j(\lambda_j)$ curve is concave.\[7] Note that in the case in which $\theta_j = 0$, that is, the effect of an increase in λ_j is insignificant because n is too large or imperceptible to the union, the $\omega_j(\lambda_j)$ relation becomes linear. It is also important to note that for any value of λ_j, $\omega_j(\theta_j = 0) > \omega_j(\theta_j > 0)$.

The Cost Curve

We assume that the negotiating firm (or group of firms) j faces a goods market constraint according to which, to keep their share of the market, its price can not grow faster than a fixed

level of inflation (Π):

$$8. \quad \pi_j = \epsilon_j c_j \geq K \implies \epsilon_j \geq K / (\gamma_j[\lambda_j v_j - \delta_j] + (1 - \gamma_j)\pi$$

The ceiling price (K) is given by the international market or by a price leader in the industry. We assume that the objective of the firm is to keep its share of the market constant which implies that $\epsilon_j c_j = K$. This equation shows quite clearly that, given the market constraint, there is a conflict between firms and workers: given K, the greater λ_j, the smaller ϵ_j.

Firms have an incentive to inflict bargaining costs on workers as ϵ_j falls. The union, on the other hand, have an incentive to counteract as λ_j falls. However, the mark-up of the firms associated with each level of λ_j will be larger the less stringent the market constraint becomes, that is, the greater K. To keep the level of bargaining costs constant in face of a greater K, firms can accept an increase in λ_j.

The level of costs imposed by the firms on workers is a function of the relative bargaining power of the two parties. Firms have a greater incentive to inflict costs on workers as the distance between ϵ_j and the desired level of ϵ_j, say ϵ_j', increases. Likewise, workers react with greater intensity as λ_j deviates from λ_j' the desired degree of wage indexation. Accordingly, the cost function can be written as follows:

$$9. \quad G(\lambda_j, K) = G\{[\epsilon_j' - \epsilon_j(\lambda_j, K)], \ [\lambda_j' - \lambda_j]\}$$

Let $D_f \equiv \epsilon_j' - \epsilon_j(\lambda_j, K)$ with $\partial G/\partial D_f > 0$ and $D_w \equiv \lambda_j' - \lambda_j$ with

$\partial G/\partial D_W < 0$. The partial derivatives of G with respect to λ_j and K are, respectively:

$$\partial G/\partial \lambda_j = - (\partial G/\partial D_F)\ (\partial \epsilon_j/\partial \lambda_j) - (\partial G/\partial D_W)$$

$$\partial G/\partial K = - (\partial G/\partial D_F)\ (\partial \epsilon_j/\partial K)$$

In principle, the first derivative can be either positive or negative. We shall assume that it is positive: the costs inflicted by firms on workers increase in λ_j. In other words, the relative bargaining power of firms is sufficient to increase costs as λ_j increases.\[8] The second derivative is negative: given λ_j, costs fall as K increases. That is, as K increases, given λ_j, ϵ_j increases thus reducing the incentives of firms to impose costs on workers, and workers will have an extra incentive to impose costs on the firms if they know that market conditions are more favorable.

The following cost function satisfies the conditions just mentioned:

10. $G\ (\lambda_j,\ K) = \lambda^{\beta}_j - \mu\ K\ \lambda_j \qquad \beta > 1,\quad \mu > 0$

The parameters β and μ represent the relative bargaining power of the firms and the union. We can write $\beta = \beta_F - \beta_W$ and $\mu = \mu_W - \mu_F$ where the subscripts F and W stand for firms and workers, respectively. Given K, firms will impose greater costs as λ_j increases. However, the second term ($- \mu K \lambda_j$) implies that as the market constraint becomes less stringent (K increases), costs

will fall, and firms will tend to accept a greater λ_j .\[9],[10]

The Union Maximization Problem

The union is assumed to maximize the difference between the gains and costs associated with changes in λ.\[11] That is, to

$$\text{Max } \omega(\lambda) - \lambda^{\beta} + \mu K \lambda \quad \text{over } \lambda$$

The first order condition to the maximization problem implies:

$$11. \quad \beta(\lambda^*)^{\beta-1} + \xi v\lambda^* = (\Gamma - \xi) + \mu K$$

where $\Gamma \equiv (\omega_{-1} v)/(1 + p_t)$ and $\xi \equiv (\omega_{-1} \theta)/(1 + p_t)^2$.

FIGURE 1

The equilibrium configuration is depicted in Figure 1. Two interesting results arise from this condition. The first is that when $\theta = 0$ (and therefore, $\xi = 0$), the optimal level of λ will be greater than in the case when θ is positive. The other interconnected result is that λ^* will be smaller the greater is θ. To see this, we totally differentiate the first order condition with respect to θ to get:

$$d\lambda^*/d\theta = - \{(1 + \lambda^* v)\omega_{-1}/\{(1 + p_t)^2 [\beta(\beta - 1)(\lambda^*)^{\beta-2} + \xi v]\}\} < 0$$

Hence, the greater the (perceived) effect of an increase of λ on the rate of inflation, the lower the incentive to increase wages.

This result is crucial to illustrate the first proposition. When wages are set in isolated negotiations, and the level of decentralization of negotiations is very high, unions see the result of their negotiations as being irrelevant from the macroeconomic perspective. Put in other words, they do not see the effect of their negotiations on the aggregate rate of inflation, and therefore on the real wage. As negotiations become more centralized, and the bargaining parties become greater, the perceived effect of wage negotiations on inflation becomes clearer, thus creating a negative incentive to increase λ after a certain point. Note that θ is a positive function of 1/n where n is the number of negotiating parties. As negotiations become more centralized, n falls and θ increases.

The Effect of a change in the Market Constraint

When $\mu > 0$, an increase in K will lead to an increase in the degree of wage indexation. Indeed, the elasticity of λ with respect to K is given by

12. $$\eta_{\lambda} = \mu K/[\beta(\beta - 1)(\lambda^*)^{\beta-1} + \xi v\lambda] > 0$$

Note that since $\beta > 1$,

$$\eta_{\lambda} < \mu K/[\beta(\lambda^*)^{\beta-1} + \xi v\lambda] = \mu K/[(\Gamma - \xi) + \mu K] < 1$$

that is, the elasticity of λ with respect to K is positive but smaller than 1. The effect of an increase in K over the

indexation of prices (ϵ) is not independent from the elasticity of λ. Indeed, it can be shown that the elasticities of ϵ and λ are related in accordance with the following equation:

13. $\eta_\epsilon = 1 - \eta_\lambda z$

where $z \equiv (\gamma \vee \lambda)/[\gamma(\lambda v - \delta) + (1 - \gamma)\pi] < 1$ when $(1 - \gamma)\pi > \gamma\delta$, which is usually the case. Hence, a sufficient (but not necessary \[12]) condition for $\eta_\epsilon > 0$ is that $\eta_\lambda < 1$ which is always satisfied.

This result supports the second proposition according to which an increase in the constraint in the goods market will have a positive effect on both the bargaining power (λ) and the mark-up power (ϵ). The result stems form the hypothesis that an alleviation of the goods market constraint reduces the costs inflicted by the firms on workers, thus leading to an increase in the degree of wage indexation (λ). However, as λ increases, the rate of inflation also increases thus mitigating the extent to which λ grows. Of course, the greater the effect of changes in λ over inflation, the smaller the increase in the equilibrium degree of indexation of wages. The elasticity of λ with respect to K ends up being smaller than one.\[13] Given the relation between the elasticities of λ and ϵ with respect to K, both end up being positive.

3. An Empirical Evaluation of the Brazilian Case \[14]

In Brazil, the incentives to over-indexation are enormous. Wage bargains are decentralized which implies that unions are

essentially interested with the relative wage of their members. However, over the last ten years, negotiations have become more centralized within industries. \[15] This means that union leaders (still) do not care about the reverberation of wage demands on inflation but have increased their bargaining power as a result of the clustering of unions. The fact that the Brazilian economy is remarkably closed and that, with the exception of one short period (1981-83), the government has conducted a very accommodative monetary policy are also important elements in explaining the high incidence of over-indexation. Finally, the continuous expectation that inflation will accelerate in the future provides yet additional incentives to demand over-indexation.

FIGURE 2

Figure 2 and column 3 in Table 1 provide evidences of wage over-indexation in Brazil. Figure 1 shows the movement of λ in the industrial sector.\[16] With the exception of two very short periods in 1987 and 1988, and the recession of 1982-3, the indexation factor of wages is greater than one, implying that over most of the period, money wages grew faster than past CPI inflation plus labour productivity. The figures in column 3 on Table 1 provide a measure of over-indexation for the manufacturing sectors. This measure is the sum, over the period 1976-1990, of $\lambda - 1$, \[17] With the exception of only one sector (liquors), the measure of over-indexation is positive indicating that the incidence of over-indexation is considerably greater

than that of under-indexation.

Tables 1 and 2

It is not surprising that the sectors for which the measures of over-indexation are greater are also the ones in which relative wages (with respect to the average wage in industry) grew over the period. Columns 1 and 2 in Table 1 display the structure of wage differentials in 1976 and 1991 and column 1 in Table 2 provides a measure of the relative bargaining power in each sector.\[18] With a few exceptions, those sectors in which wages were greater than the average in 1976 were the same in which the relative bargaining power were positive and relative wages grew over the period 1976-91.

To explore the factors determining the movement of the relative bargaining power, we look at the movement of the relative mark-up power (column 2 in Table 2) and the correlation between the measures of relative bargaining and mark-up power in each sector (column 3 in Table 2). We note that, with the exception of four sectors, the correlation between the measures is positive. This result may be interpreted as an indication that sectoral market conditions, which have a direct effect on the mark-up power of firms, also have an indirect effect on the behavior of the bargaining power of the associated unions. As noted above, firms are more tolerant and workers have an extra incentive to demand wage increases in sectors in which market conditions are more favorable. Indeed, the sectors in which relative wages grew have, on average, a much greater degree of

industrial concentration (column 4) and are the sectors which have received government incentives (export subsidies and protection from external competition) over the period in consideration. Also, they are undoubtedly the sectors in which the labour movement is best organized.

4. Concluding Notes

Very little has been written on the role of wage bargaining in economies with chronic and accelerating inflation. It seems that the conventional wisdom is that, specially in Third World countries in which unions are relatively weak, wages are solely victims of inflationary processes with very little or virtually any contribution to the acceleration of inflation. Indeed, in periods of acceleration of inflation, when wages are indexed to past inflation, real wages do tend to decline. However, if unions are able to over-index past inflation --and they have incentives to do so to protect relative wages against the acceleration of inflation-- this can obviously create inflationary pressures. The model developed here is an attempt to illustrate two basic propositions concerning the incentives and costs of unions to over-index wages, namely, that (a) the smaller the degree of centralization of wage bargains, the greater the incentives to over-indexation and that, (b) to the extent that market constraints affect the determination of prices, relative wages and relative prices tend to move together. Obviously, there are many other factors affecting the determination of the degrees of indexation of prices and wages, and the model only tries to highlight the two mentioned above.

The figures on Brazil show that over most of the period 1976-1991, the degree of over-indexation of wages was very high, implying that on an yearly basis, industrial wages grew faster than CPI inflation. Decentralized wage bargaining in an environment of accelerating inflation and soft market constraints (due to a lack of external competition and to accommodative monetary policies) seems to be at the root of this process. It was also noted that a positive correlation between the indexation factors of wages and industrial prices holds in most of the industrial sectors in Brazil. This can be interpreted as an evidence that the outcome of wage bargains is not independent from the market structure faced by firms. In sectors in which the mark-up power (or market power) of firms is high there will be a tendency for the bargaining power of unions to be high as well. In a sense, there is a sharing out of the firm's market power between wages and profits.

ENDNOTES:

1. Starting from very low levels of centralization, however, a gradual centralization of negotiations may lead to greater, not smaller, incentives to over-indexation. The bargaining power of a union increases as the share of the work force under its control increases.

2. The composition of non-labour costs is not discernible from the data-base used for the purpose of the empirical analysis in section 3. That is why it is assumed that in all sectors the composition is the same as the composition of the average industrial price index.

3.. In a competitive environment, workers would only get their reservation wage, independently from the path of labour productivity. However, if firms see a positive relationship between productivity and wages, they become sensitive to unions' demands associated with productivity gains. When this is the case, the path of labour productivity can be an important element in determining money wages.

4. The greater the expectation of future inflation, the smaller the expected real wage in the future, and thus the greater the incentives to mobilize to demand wage increases.

5. For convenience, we assume that there is perfect coincidence between the 'sector' and the 'bargaining party'. Thus, a centralization of wage bargaining, involving more firms and workers, increases the weight of the sector in the price index.

6. In the text, Σ refers to summation over j, j ranging from 1 to n.

7. Note that for reasonable values of the variables, the critical value of λ_j is very large. If, for example, we assume that n = 20, and for the representative firm j, $\epsilon_j = 1.1$, $\gamma_j = 0.2$, $v_j = 0.22$, $e = 1$, and $(1 + p_t) = 1.3$, we get $\theta_j = 0.02$ and λ_j has to be smaller than 60 for the ω_j curve to be concave. The critical value of lambda grows with n and inflation.

8. As we shall see in the following section, if this was not the case, λ would tend to infinite.

9.. Note that to keep the level of cost constant in face of an increase in K, the firm will accept an increase in λ_j:

$$d\,\text{cost} = (\beta\,\lambda_j^{\beta-1} - \mu\,K)\,d\lambda_j - \mu\,\lambda_j\,dK = 0$$

which implies:

$$d\lambda_j/dK = \mu\,\lambda_j/(\beta\,\lambda_j^{\beta-1} - \mu\,K) > 0$$

10. Note that μ measures the effect on the marginal cost (associated with changes in λ) of changes in the market constraint, that is, $\mu = \partial^2 G/[(\partial G/\partial \lambda)(\partial G/\partial K)]$.

11. We will drop the subscript j to simplify the notation.

12. The necessary condition is $z\eta_\lambda < 1$ which is always satisfied.

13. In the case where $\theta = 0$, η_λ could be greater than one.

14. The source of the data is the Monthly Industrial Survey conducted by the Brazilian Institute of Statistics and Geography (IBGE).

15. Petrochemical workers for example, bargain at the national level.

16.. The indexation factor of wages is calculated by dividing the annual rate of wage inflation by the sum of the annual rate of CPI inflation and the proportional change in labour productivity. Figure 1 shows the 12 months moving average of λ.

17. The measure of over-indexation used is $\Sigma\ (\lambda_t - 1)$ over t.

18.. Wage differentials are measured by the ratio of the wage in the specific sector to the average wage in industry. The measure of relative bargaining power in column 3 is calculated as follows:

$RBP_j = \Sigma\ (\lambda_{j,t}/\lambda_t - 1)$ over t where λ is the average indexation factor.

References

Amadeo, E. J. 1992. "A model of wage over-indexation", Mimeo, Department of Economics, PUC-RJ.

Amadeo, E. J. and Camargo, J. M. 1992. "Uma analise estruturalista de inflacao e estabilizacao", Revista de Economia Politica, 12(3).

Calmfors, L. and Driffill, J. 1988. Centralization of wage bargaining", Economic Policy.

Crouch, C. 1985. "Conditions for trade union and wage restraint", in L. Lindberg and C. Maier (eds.), The Economics of Inflation and Economic Stagnation, Brookings Institution.

Fischer, S. 1981. "RElative shocks, relative price variability, and inflation", Brookings Papers on Economic Activity.

Flanagan et al. 1983. Unionism, Economic Stabilization and Incomes Policies: European Experience, Brookings Institution.

Goldthorpe, J. 1984. Order and Conflict in Contemporary Capitalism, Clarendon Press.

Jackman, R. 1988. "Wage formation in Nordic countries viewed from an international perspective", Working Paper n. 1042, Centre for Labour Economics.

Kalecki, M. 1971. Selected Essays on the Dynamics of the Capitalist Economy, Cambridge University Press.

Keynes, J. M. 1936. The General Theory of Employment, Interest, and Money, MacMillan.

Marglin, S. and Schor, J. (eds.) 1990. The Golden Age of Capitalism, Oxford University Press.

Rowthorne, R. and Glyn, a. 1990. "Diversity of unemployment experiences", in Marglin, S. and Schor, J. (eds.).

Tarantelli, E. 1983. "The regulation of inflation in Western countries and the degree of neocorporatism", Economia, 7(3).

Taylor, L. 1991. Income Distribution, Inflation and Growth: lectures on structuralist macroeconomics, forthcoming.

Wallerstein, M. 1987. "Union centralization and trade dependency: the origins of democratic corporatism", Mimeo, UCLA.

Windmuller, J. et al. 1987. Collective Bargain in Industrialized Economies, ILO.

Figure 1

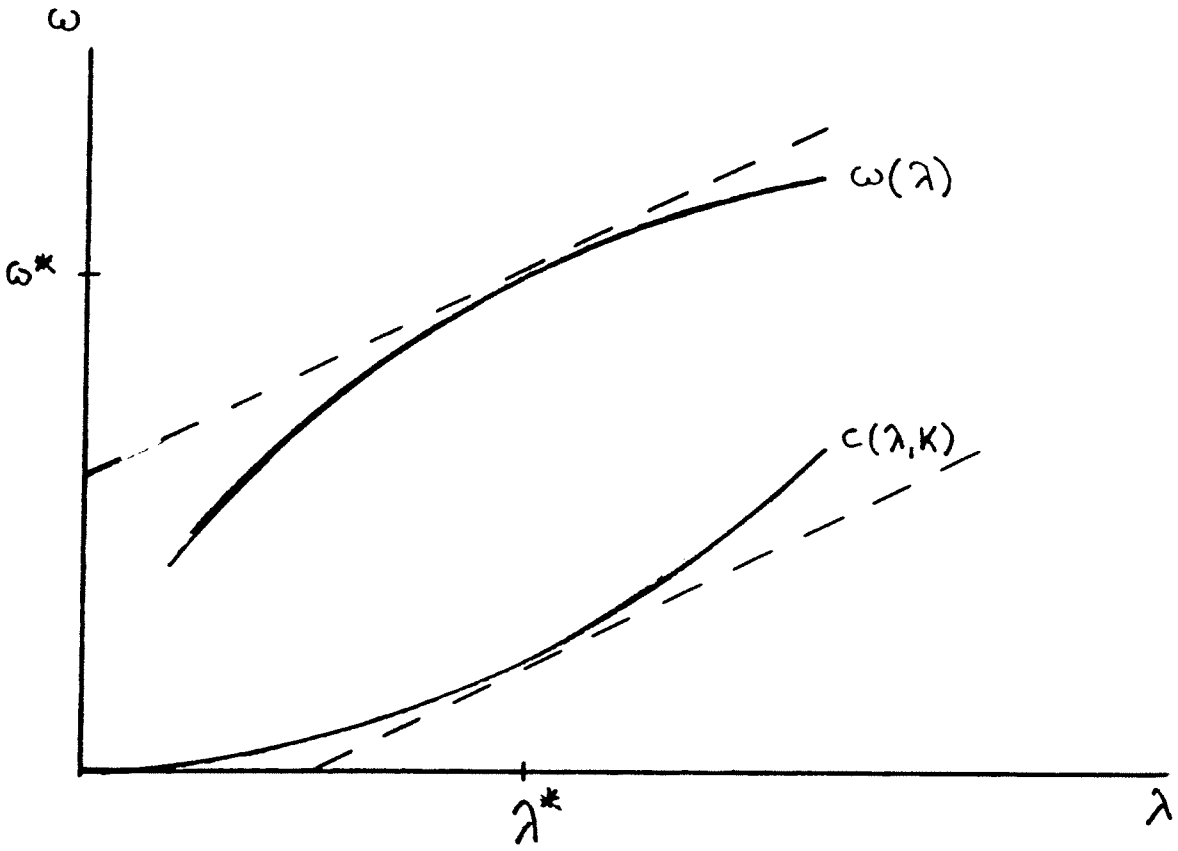
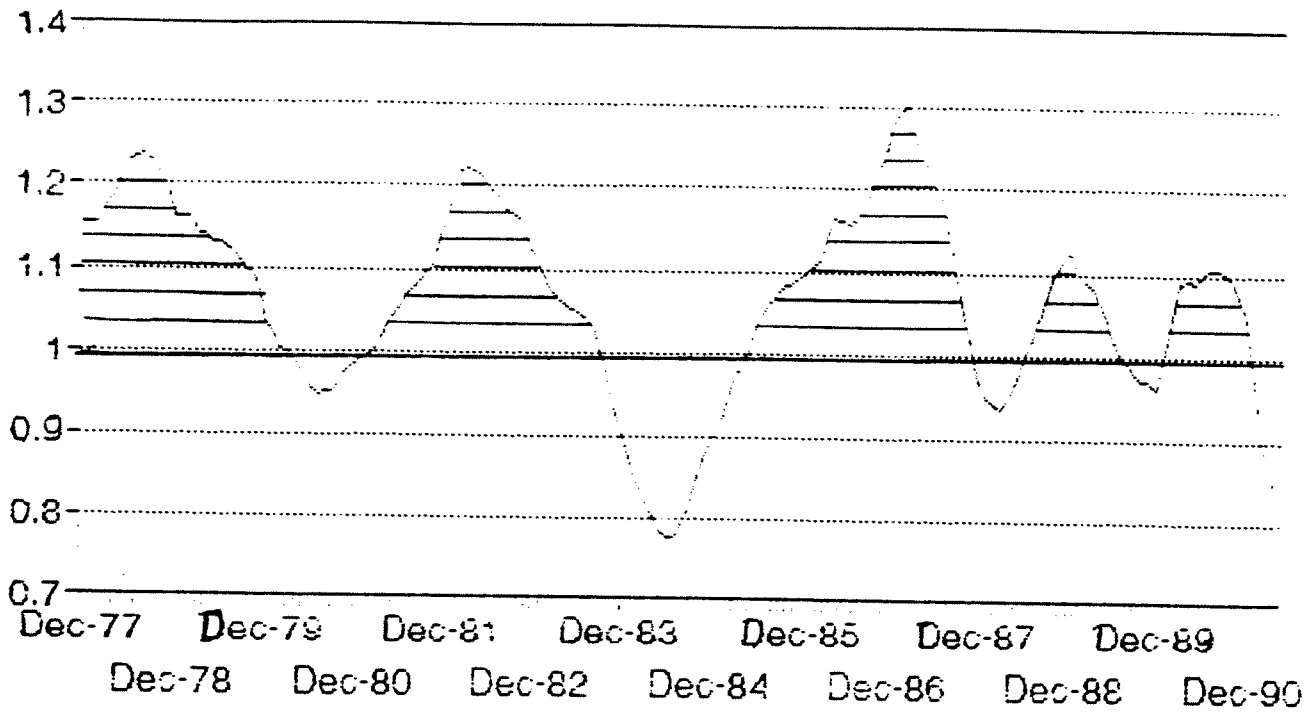


Figure 2

WAGE INDEXATION



General Industry

Table 1
Relative Wages and Bargaining Power

	Relative wages 1976 (1)	Relative wages 1991 (2)	$\Sigma(\lambda_j-1)$ (3)
Sectors			
Growing relative wages			
Mechanic	1.51	1.59	13.6
Chemicals	1.43	1.65	9.2
Transp. equip.	1.32	1.39	16.3
Electrical mat.	1.04	1.21	11.7
Pharmaceutical	1.01	1.13	19.2
Mineral extraction	1.00	1.57	15.5
Metallurgy	1.05	1.21	11.9
Rubber	0.75	0.98	16.4
Tobacco	0.64	0.85	6.8
Paper	0.80	0.85	7.8
Falling relative wages			
Perfumes, etc	1.01	0.85	1.5
Plastic materials	1.09	0.82	5.0
Liquors	1.15	0.77	-0.7
Textile	0.76	0.70	7.5
Process	0.73	0.65	6.8
Foodstuff	0.71	0.61	9.4
Clothing	0.55	0.54	10.5

Source: Pesquisa Industrial Mensal, IBGE.

Table 2
Bargaining Power and Mark-up Power

	$\Sigma[\lambda(_j/\lambda)-1]$	$\Sigma[(\epsilon_j/\epsilon)-1]$	Corr*	Ind Conc **
	(1)	(2)	(3)	(4)
Growing relative wages				
Mechanic	2.42	4.80	0.25 [+2]	13.4
Chemicals	1.17	-7.00	0.64 [-3]	48.2
Transp. equip.	5.28	8.00	0.38 [-3]	55.4
Electrical mater.	0.13	-3.00	0.11 [-3]	54.7
Pharmaceutical	5.54	0.90	0.26 [+3]	25.5
Mineral extraction	6.47	1.20	-0.38 [+2]	83.1
Metallurgy	2.36	6.70	0.57 [-3]	35.1
Rubber	6.62	3.24	0.26 [+3]	67.3
Tobacco	-0.87	8.90	-0.59 [-3]	83.8
Paper	-1.31	9.17	-0.46 [-3]	29.1
Falling relative wages				
Perfumes, etc.	-8.07	-0.21	0.33 [+3]	52.3
Plastic materials	-3.73	-4.40	0.24 [+3]	17.5
Liquors	-7.39	1.04	-0.51 [+1]	33.5
Textile	-1.56	-5.50	0.28 [+3]	14.8
Process	-1.97	-4.32	0.13 [-3]	16.2
Foodstuff	0.32	0.81	0.75 [+3]	11.9
Clothing	1.43	9.50	0.36 [+3]	12.2

* Correlation between λ_j/λ and ϵ_j/ϵ. The figures in parenthesis indicate the lag [-] or lead [+] of λ_j/λ in which the highest correlation with ϵ_j/ϵ was observed. Given the number of observations, the correlations are significant at the 5% level when greater than 0.10 or smaller than - 0.10.
** Industrial concentration: percentage share of the gross value of the industrial production of the largest eight firms in the sector.

Source: Pesquisa Industrial Mensal, IBGE.

Textos para Discussão

240. Abreu, M. de P., "The Rewards of Good Behaviour: Foreign Debt and Economic Growth in South America, 1929 - 1945".

241. Moraes, P.B., "Foreign Banks In The Brazilian Economy in the 1980s".

242. Amadeo, E.J. e P.V. Pereira, "Variáveis Distributivas e Ciclo Econômico: Exame da Indústria Brasileira (1976/1985)".

243. Amadeo, E.J. e J.M. Camargo, "Relações Entre Capital e Trabalho no Brasil: Percepção e Atuação dos Atores Sociais".

244. Camargo, J.M., "Salários e Negociações Coletivas".

245. Amadeo, E.J., "Desemprego: Teoria e Evidência sobre a Experiência Recente na OECD".

246. Franco, G.H.B., "A Regulação do Capital Estrangeiro no Brasil: Análise da Legislação e Propostas de Reforma".

247. Amadeo, E.J., J.M. Camargo, e C. C. de Moura, "The Political Economy of Budget Cuts: a suggested scheme of analysis".

248. Amadeo, E.J., "Keynes, Kalecki e abordagem neoclássica sobre a 'causalidade' entre emprego e distribuição".

249. Franco, G.H.B. e C. Parcias Jr.(BNDES), "Inflação, Clientelas e Preços relativos".

250. Amadeo, E.J. e G.H.B. Franco, "Inflação e Preços Relativos no Plano Collor - Avaliação e Perspectivas".

251. Bonelli, R. e E. Landau, "Do Ajuste à Abertura: a Economia Brasileira em Transição para os Anos 90".

252. Camargo, J.M. e E. Amadeo, "Labour Legislation and Institutional Aspects of the Brazilian Labour Market".

253. Cunha, L.R.A., "Congelamento e Preços Relativos: a Experiência Brasileira".

254. Amadeo, E.J. e E.K. Bastos, "Malthus e Ricardo sobre a Determinação da Taxa de Lucro".

255. Fritsch, W. e G.H.B. Franco, "Trade Policy, Trade Performance and Structural Change in Four Latin American Countries, 1970-1985".

256. Fritsch, W., "Latin America in a Changing Global Environment".

257. Bacha, E., "The Brady Plan and Beyond: New Debt Management Options for Latin America".

258. Bonelli, R., "Growth and Productivity in Brazilian Industries: Impacts of Trade Orientation.

259. Amadeo, E.J., "The Rational Basis of Wage Determination in Regimes of High Inflation".

260. Amadeo, E.J., "Unions, Social Structures and Wage Restraint, a Suggested Scheme of Analysis".

261. Amadeo, E.J., "Institutional Constraints to Economic Policies, Wage Bargaining and Stabilization in Brazil".

262. Amadeo, E.J., "Bargaining Power, Mark-up Power, and the Acceleration of Inflation in Brazil, 1976-1985".

263. Amadeo, E.J., "Bargaining Power, Mark-up Power, and Price and Wage Differentials in Brazil, 1976-1985".

264. Amadeo, E.J. & A.K. Dutt, "A Post Keynesian Theory of Growth, Interest and Money".

265. Amadeo, E.J. & A.K. Dutt, "The Wicksell-Keynes Connection: Dynamic Analysis, Loanable Funds, and Wage Flexibility".

266. Franco, G.H.B., "Dolarização: Mecanismos, Mágicas e Fundamentos".

267. Garcia, M., "The Formation of Inflation Expectations in Brazil: A Study of the Fisher Effect in a Signal Extraction Framework".

268. Fritsch, W. & G.H.B. Franco, "Trade Policy Issues in Brazil in the 1990s".

269. Garcia, M., "The Formation of Inflation Expectations in Brazil: A Study of the Futures Market for the Price Level".

270. Bonomo, M.A. & Garcia, R. "Can a well fitted equilibrium asset pricing model produce mean reversion?"

271. Amadeo, E.J. "Adjustment, stabilization and investment performance: Chile, Mexico and Bolivia"

272. Amadeo, E.J. "Causes for persistent unemployment and fluctuations in monetary economics"

273. Amadeo, E.J. & Camargo, J.M. "Liberalização comercial, distribuição e emprego"

274. Amadeo, E.J. & Landau, E. " Indexação e dispersão de preços relativos: análise do caso brasileiro (1975-1991)"