WAGE INDEXATION AND POLITICAL CYCLES*

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Sintesi - In una situazione discrezionale un governo "di sinistra" tende a ridurre il tasso d'indicizzazione salariale così da accrescere gli effetti della sorpresa inflazionistica sul livello di produzione; al contrario, un governo "di destra" preferisce un'indicizzazione salariale elevata. Se, prima della stipula dei contratti di lavoro, è possibile vincolarsi all'introduzione di un dato tasso d'indicizzazione salariale, per entrambi i partiti è preferibile annunciare un'indicizzazione più elevata rispetto a quella del caso discrezionale, in modo da ridurre il tasso d'inflazione d'equilibrio.

Abstract - If the wage indexation rate is chosen discretionarily, a Left hand government lowers it in order to increase the output effects of surprise inflation, while a Right hand government prefers high indexation. These choices magnify the differences between the inflation rates preferred by the two parties. When binding commitments before the signature of the labor contract are possible, both parties prefer a higher wage indexation with respect to the discretionary situation, in order to reduce the inflationary bias.

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Several studies concern the macroeconomic effects of the wage indexation; others analyze the influence of politics on fiscal and monetary policies. These problems have been studied independently of each other and the interactions between political cycles and wage indexation have not been examined.

This paper shows that, in a two-party setup, ideologically motivated policymakers that prefer different degrees of intervention in the economy, choose different wage indexation rates (WIRs) according to thier preferences. Therefore, the wage indexation schemes affect inflation and output.

1 - Introduction.

The mechanism behind the political-ideological cycle is simple: a Right-hand party (RHP) and a Left-hand party (LHP) compete for government; LHP prefers a higher inflation rate than the RHP, in order to obtain higher unexpected inflation and output.

Inflationary expectations are rational but, because are fixed before the elections, get an intermediate value between the inflation rates that the two parties prefer.

Following the success of the LHP, there is a period of unexpected inflation and output increase; on the contrary, after the success of the RHP, the inflation rate is lower than expected and there is a fall in output. Households' prediction errors in the inflation rate and changes in output, however, are temporary and last until the renewal of labor contracts[1].

Usually, wage indexation schemes are not considered as a peculiar element of the parties' behavior: ideological differences concern the traditional instruments of economic policy, while the "economic structure" which is influenced by indexation is assumed to have no obvious link with politics[2]. Therefore, the wage indexation analysis has been usually developed without reference to electoral competition. The optimal indexation rate depends on the length of contracts and on the relative importance of nominal demand shocks and real supply shocks. If the nominal wages contracts are set at the beginning of each period, before unpredictable shocks, then the optimal indexation rate increases with the ratio of the variance of nominal shocks to the variance of real shocks. A complete indexation is not convenient, however, because does not permit changes in the relative prices: fi a vertical supply curve emerges, the burden of the adjustment to the real shocks is only on output.

Game theoretic research that links monetary policy and indexation focuses on the timing of decisions, on the types of labor contracts and on the existence of commitments. The policymaker's discretionary behavior depends on the indexation rate: in absence of stabilization goals, indexation is put to a maximum because its increase steepens the supply curve and reduce inflationary incentives; cf. Crosby (1995). If the bargaining is decentralized, however, atomistic households and firms ignore this point, so that the WIR set in the labor contracts is lower than the socially desirable one. This result might be an argument in favour of centralized negotiation between trade unions and firms[3]. This results can be obtained also when it is taken into account that an higher indexation lowers the (economic) cost of inflation; cf. Ball & Cecchetti (1991).

However, if the wage indexation is a mechanism that binds, partly at least and at no extra costs, the policymaker's behavior, the inflationary bias of the discretionary can be reduced.

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[1] In this work the length of the labor contracts and governments coincide.

[2] However, the WIR is an issue debated in the political arena by governments, trade unions and firms.

[3] However, agents with market power and that are fully aware of this fact, make the possible range of equilibria larger.

2 - Political cycles and wage indexation.

An analysis of the link between WIR and political preferences is in Crosby (1995), which consider a situation in which there are two ideologically motivated parties and households' preferences about inflation and unemployment are between the extreme position of the two parties. The voters' choice comes from the minimization of their loss function. In absence of stochastic disturbances (or stabilization goals) full indexation is always preferred, regardless of their ideology. Furthermore, if the incumbent can set the WIR for a while after the future elections, it can influence the households' voting behavior. In particular, a right hand incumbent reduces the WIR, so that the opponent LHP, if elected, will find it convenient to increase the inflation rate. As long as these developments are anticipated, at the time of the elections the LHP is worse off, because of the strategic behavior of the voters; cf. Milesi-Ferretti (1993).

This paper assumes a stochastic outcome for elections and takes into account the consequences of this electoral uncertainty on households' expectations and parties' behavior. Moreover it is assumed that the government in office is fully responsible for the current WIR only. Indexation is fixed directly by the Law, or indirectly, by means of signals sent to the rest of the system, such as the implementation of a particular indexation clause for State employees.

In the following, the monetary policy is discretionary and the shocks (not explicitly considered in the assumed deterministic framework) always take place immediately before the monetary policy. Since this instrument is used (also) to stabilize output, any announcement before the observation of shocks will not be believed.

In such a situation the only commitment that each party can introduce before the election is its program, a "contract" which may concern the WIR to be introduced in case of electoral success and that lasts only as long as the government is in office. There exists a commitment technology, so that each party has the chance to bind itself to the initial electoral program, which then get credible[4].

The alternative is that of a party that does not enter into this mechanism and avoids any announcement. In this case, in equilibrium, households anticipate the government's lack of credibility and no commitment device reduces the discretionary monetary policy losses.

Figure 1 shows the three cases considered in the paper.

Figure 1- Temporal sequences of decisions and actions

CASE A- Discretionary Indexation

contracts and expectations	elections	indexation	monetary policy

CASE B- Partially Committed Indexation

contracts and expectations	indexation announcement	elections	indexation	monetary policy

CASE C- Fully Committed Indexation

indexation announcement	contracts and expectations	elections	indexation	monetary policy

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In case A, in each period the WIR is set discretionarily immediately before monetary policy and after the labor contracts have been signed and after the elections. Alternatively, the WIR is announced

[4] The Central Bank is not independent: its policies are in line with the preferences of the government. Commitments concern WIRs only and not monetary policies. Differently from monetary policy, unforeseen shocks do not represent an escape clause for wage policy: the two decisions are different in kind.

before the elections. I consider the case of indexation with partial commitment, if the WIR is fixed after the stipulation of contracts (Case B). In the case of indexation with full commitment, decisions about WIRs are set, by each party, in a binding announcement before the contracts are signed, before the election and before monetary policy (Case C).

3 - The economy.

The technology is given by the logarithmic production function[5]:

$$y=hn \qquad 0<h<1$$

The labour market is perfectly competitive and, neglecting the constant term, the demand curve is:

$$n^d = - (w-p)/(1-h)$$

Having signed the labor contract the workers are expected to supply all the labour required by the firms. Without inflationary surprises (with full information), the nominal wage is $W^{pi}=P$ and the ex-ante labour supply is $n^s = 0$, because the workers supply the equilibrium quantity of labour (normalized to unity), in correspondence of W/P=1; in more general situations the negotiated wage is P^e. Because of errors in inflationary expectations the workers can find themselves out of the supply schedule, with a real wage different from the expected one.

If a share q of the price prediction error is covered by indexation, the wage is

$$w= p^e +q(p-p^e)=qp+(1-q)p^e \qquad 0\leq q\leq 1$$

and, having substituted it in the labour demand, we obtain the employment level:

$$n = (1-q)(p-p^e)/(1-h) = (1-q)(\pi - \pi^e)/(1-h)$$

where $\pi=p-p(-1)$ stands for the inflation rate. The economy is then described by the supply curve:

[1] $$y = \alpha(q)(\pi-\pi^e) \qquad \alpha>0,\ \alpha'>0$$

I assume that the WIR introduced by the party in office maintain the slope of the supply curve in the socially agreed interval (α_{min}, α_{max}). The coefficient $\alpha(q)$ has no structural nature and the usual interpretation of the supply curve is inadequate[6].

A LHP and a RHP, ideologically motivated, show the households their economic policy proposals. These parties do not modify their preferences because of a change in the economic situation or in the households' preferences; the ideological position does not depend on the indexation schemes. Wage indexation is instrumental in the political arena and, *per sè*, has no (ideological) value. Each party has only two macroeconomic goals, increasing output and reducing inflation; the LHP cares more about output increase and the RHP is more concerned with the control of inflation. The uniperiodal loss functions are:

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[5] Lowercase characters refer to logarithmic variables.

[6] A similar mechanism emerges if the Central Bank modifies the degree of monetary expansion and its operational practices, thus making more or less perfect the control of the inflation (Cukiermann and Meltzer, 1986). Each Central Bank has an optimal degreee of monetary uncertainty, because of the link with the slope of the supply curve.

[2.a] $$L_L = L_L(\pi, y, \pi^e, y_L^*) \qquad y_L^*>0$$

[2.b] $$L_R = L_R(\pi, y, \pi^e, y_R^*) \qquad y_R^*>0$$

The loss functions consider output deviations from the natural level y=0 which is considered inefficient; for this reason the goal level of output, y_i^*, is positive; the optimal inflation rate is zero for each party.

Households' inflationary (rational) expectations are an average between the inflation rates that the two parties prefer, weighted with the (exogenous) probability of electoral success of each party[7]:

[3] $$\pi^e = p\pi_R^e + (1-p)\,\pi_L^e$$

4 - Optimal indexation rate.

4.1 - Monetary policy.

In order to derive to optimal WIR, we work backward and solve the final stage, the problem of monetary policy, given the wage indexation rate, the result of the election and the inflationary expectations. This step is common to all the cases considered, since monetary growth is always the last decision to be taken.

Substituting [1] in the loss function [3], for given π^e, the first order condition in case of success of the LHP, is:

[4.a] $$dL_L/d\pi_L = \partial L_L/\partial\pi_L + \partial L_L/\partial y\;\partial y/\partial\pi_L = 0$$

whereas in the other case is:

[4.b] $$dL_R/d\pi_R = \partial L_R/\partial\pi_R + \partial L_R/\partial y\;\partial y/\partial\pi_R = 0$$

where π_L e π_R refer, respectively, to LHP and RHP inflation rates. From [4.a] we obtain

[5.a] $$\pi_L = \pi_L(\pi_L^e, \pi_R^e, \alpha_L),$$

while from [4.b] we obtain

[5.b] $$\pi_R = \pi_R(\pi_L^e, \pi_R^e, \alpha_R),$$

where the functions of [5.a] and [5.b] differ because they depend on each party's preference.

4.2 - Discretionary indexation.

At the beginning of each period, labor contracts are signed and households' inflationary expectations are set. After the elections the party in office sets the discretionary WIR within the interval $(\alpha_{min}, \alpha_{max})$. The indexation is effective only for the current period and it not possible to use it as commitment device for the future. The government puts then into action the discretionary monetary policy that, besides the above

[7] These probabilities are common knowledge.

mentioned goals, can react also to observable shocks[8]. Because of the timing of decisions, the government chooses the WIR taking as given π_L^e and π_R^e.

Having substituted [5.a] and [5.b] in their respective loss functions

[6.a] $$L_L[y,\pi_L] = L_L[y(\alpha_L, \pi_L(\alpha_L)),\pi_L(\alpha_L)]$$

[6.b] $$L_R[y,\pi_R] = L_R[y(\alpha_R, \pi_R(\alpha_R)),\pi_R(\alpha_R)],$$

we obtain the two first order conditions:

$$\frac{dL_L}{d\alpha_L} = \frac{\partial L_L}{\partial y}\frac{\partial y}{\partial \alpha_L} + \left(\frac{\partial L_L}{\partial y}\frac{\partial y}{\partial \pi_L} + \frac{\partial L_L}{\partial \pi_L}\right)\frac{\partial \pi_L}{\partial \alpha_L}$$

$$\frac{dL_R}{d\alpha_R} = \frac{\partial L_R}{\partial y}\frac{\partial y}{\partial \alpha_R} + \left(\frac{\partial L_R}{\partial y}\frac{\partial y}{\partial \pi_R} + \frac{\partial L_R}{\partial \pi_R}\right)\frac{\partial \pi_R}{\partial \alpha_R}$$

Moreover, using the conditions [4], from which the choice of discretionary inflation rate derives, the previous expressions reduces to:

[7.a] $$\frac{dL_L}{d\alpha_L} = \frac{\partial L_L}{\partial y}\frac{\partial y}{\partial \alpha_L}$$

[7.b] $$\frac{dL_R}{d\alpha_R} = \frac{\partial L_R}{\partial y}\frac{\partial y}{\partial \alpha_R}$$

Expressions [7] have opposite signs because the derivative $\partial y/\partial\alpha_R$ ($\partial y/\partial\alpha_L$) is positive (negative) if $\pi_R>\pi^e>\pi_R$ and negative (positive) if $\pi_R<\pi^e<\pi_L$ and equal to zero only if $\partial L_R/\partial y=0$ and $\partial L_L/\partial y=0$. In this latter case the policy problem vanishes: even in the discretionary equilibrium, the policymaker reaches the bliss point with $\pi=0$. But if we exclude this uninteresting case, we must expect corner solutions to the wage indexation problem.

Let us suppose that is always $\pi_R<\pi^e<\pi_L$[9]; with $\partial L_i/\partial y<0$ the RHP will find it convenient to raise indexation to maximum ($\alpha=\alpha_{min}$), in order to minimize the real consequences of the unexpected fall in inflation, while the LHP will find it convenient to reduce indexation to minimum ($\alpha=\alpha_{max}$) in order to tie households' hands as much as possible and to increase the effect on output of any given inflationary surprise. In this case, like in the following ones, the election of RHP (LHP) causes a temporary decrease (increase) in output, in the same way as in the traditional models of political cycles.

The conclusions are unambiguous: the party that is more averse to inflation increases the WIR relatively to the other party. The "political " label ascribable to a party for its monetary policy is therefore unsuitable for discretionary wage indexation: the mere presence of two parties entails different options as regards to monetary policy and wage negotiation setup. If indexation is an instrument (and not a policy goal), the LHP dislikes it, while the opposite is true for the RHP.

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[8] Because the analysis of the variability of shocks is beyond the scope of the paper, a deterministic setup is considered.

[9] This hypothesis is the empirically relevant one; it requires that the choice of the minimum WIR by the RHP and of the maximum WIR by the LHP do not modify the ranking of the inflation rates.

4.2.1. A particular case.

Let us now consider the particular (and rather artificial) case in which the party in office decides discretionarily (after the elections) to legislates about the WIR, but as if this was happening before the signature of labor contracts. An alternative interpretation is that of a party which decides to commit itself in a rather peculiar way, namely, considering its success as certain and neglecting therefore its influence on the choices of the other party (and viceversa). However, each party recognises the existence of the electoral competition via the level of the inflationary expectations.

Similar cases have already been examined in literature, assuming that after the elections the party in office delegates to firms and households any decision about wage indexation or commits itself to a given WIR before contracts are signed; cf. Waller & Van Hoose (1992). In these latter cases there is no electoral uncertainty also in the inflationary expectations.

If households in forming inflationary expectations take into account the policymaker's credibility about such a move, we have to impose *ex-ante* $\pi_L=\pi_L^e$ and $\pi_R=\pi_R^e$: that is to say, the policymaker can "virtuously" influences expectations.

Conditional on its electoral success, and before fixing the optimal monetary growth, LHP minimizes the loss[10]:

[8.a] $$L_L=L_L[y(\alpha_L,\pi^e,\pi_L(\pi^e,\alpha_L)),\pi_L(\pi^e,\alpha_L)],$$

while for RHP is:

[8.b] $$L_R=L_R[y(\alpha_R,\pi^e,\pi_R(\pi^e,\alpha_R)),\pi_R(\pi^e,\alpha_R)],$$

where $\pi^e=p\pi_R+(1-p)\pi_L$ is now endogenous. The first order conditions, taking into account the simplifications due to the optimal choice of the inflation rate in the last step of the game, are:

[9.a] $$\frac{dL_L}{d\alpha_L}=\frac{\partial L_L}{\partial y}\left(\frac{\partial y}{\partial \alpha_L}+\frac{\partial y}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_L}+\frac{\partial y}{\partial \pi_L}\frac{\partial \pi_L}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_L}\right)+\frac{\partial L_L}{\partial \pi_L}\frac{\partial \pi_L}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_L}$$

[9.b] $$\frac{dL_R}{d\alpha_R}=\frac{\partial L_R}{\partial y}\left(\frac{\partial y}{\partial \alpha_R}+\frac{\partial y}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_R}+\frac{\partial y}{\partial \pi_R}\frac{\partial \pi_R}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_R}\right)+\frac{\partial L_R}{\partial \pi_R}\frac{\partial \pi_R}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_R}$$

If we compare [9] to [7] clearly emerges that in the latter situation some of the links between inflation, expected inflation and wage indexation have not been ignored.

The optimal WIRs, α_L and α_R are given as the solutions of the homogeneous system $dL_L/d\alpha_L=0$, $dL_R/d\alpha_R=0$ and reflect the characteristics of both parties and of their respective initial probability of electoral success. However it is not possible to characterize more precisely α_L and α_R without a specific loss function. In comparison with the previous case, it is reasonable to expect that both parties would prefer lower αs, because it is now recognized the ex-post monetary policy ineffectiveness and a higher indexation rate reduces the inflationary incentives. This intuition is confirmed by the numerical example in section 5.

[10] I consider the situation in which both parties decide to behave in the same way. Because such a decision is completely voluntary, we cannot rule out asymmetries in the behavior.

4.3 - Partially Committed Indexation

In the cases described in this and in the following section, the timing of the action is as follows. Each party states in the programme the WIR that is going to apply if elected. This announcement may be done either before (case C) or after (case B) the contracts have been signed and inflationary expectations fixed. The annoucement is binding and the WIR announced is therefore the optimal one at the moment of announcement, before the elections. The announcement represents a commitment which reduces the inefficiencies caused by the discretionary policy and that influences the opponent's behaviour. Therefore, a party that has only a few chances to be elected, may find it more useful to influence the opponent's behaviour instead of paying attention to the adequaces of its moves in the remote case of success.

The labor contracts consider both past (case C) or expected (case B) indexation announcements and the uncertain results of elections. Once the winner enters into office, the announced WIR is introduced and, eventually, the discretionary monetary policy is implemented.

In case of partial commitment (case B) the binding announcement about the WIR follows the stipulation of contracts, but precedes the elections. Because of the timing of decisions, in choosing the optimal WIR the government considers π_L^e and π_R^e as given even if the policymaker keeps into account each party's probability of success. The loss functions to be minimized are:

[10.a] $$EL_L=pL_L[y(\alpha_R,\pi_R),\pi_R]+(1-p)L_L[y(\alpha_L,\pi_L),\pi_L]$$

[10.b] $$EL_R=pL_R[y(\alpha_R,\pi_R),\pi_R]+(1-p)L_R[y(\alpha_L,\pi_L),\pi_L]$$

and obtain the first order conditions:

$$\frac{\partial EL_L}{\partial \alpha_L}=(1-p)\frac{\partial L_L}{\partial y}\frac{\partial y}{\partial \alpha_L}+(1-p)\left(\frac{\partial L_L}{\partial y}\frac{\partial y}{\partial \pi_L}+\frac{\partial L_L}{\partial \pi_L}\right)\frac{\partial \pi_L}{\partial \alpha_L}$$

$$\frac{\partial EL_R}{\partial \alpha_R}=p\left(\frac{\partial L_R}{\partial y}\frac{\partial y}{\partial \pi_R}+\frac{\partial L_R}{\partial \pi_R}\right)\frac{\partial \pi_R}{\partial \alpha_R}+p\frac{\partial L_R}{\partial y}\frac{\partial y}{\partial \alpha_R}$$

Therefore, taking into account the optimal choice of the discretionary monetary policy, we obtain conditions analogous to the ones of the case of discretionary indexation. Of course, we come also to the same conclusions. It is not so important to be able to plan and announce a credible WIR if, at the moment of the announcement, inflationary expectation are already known: there is no advantage since the announcement comes "too late".

4.4 - Fully committed Indexation.

If both parties commit themselves to a given WIR before the stipulation of contracts, they can influence also inflationary expectations, because everyone in the economy (the two parties and the households) anticipate that in equilibrium will be $\pi_L=\pi_L^e$ and $\pi_R=\pi_R^e$; moreover each party influences the other.

After the discretionary inflation rate is set, the solution of the system:

[5.a] $$\pi_L=\pi_L(\alpha_L,\pi^e)$$

[5.b] $$\pi_R=\pi_R(\alpha_R,\pi^e)$$

[2] $$\pi^e=p\pi_R+(1-p)\pi_L$$

makes it possible to express the inflation rates preferred by the two parties and the expected inflation rate in function of α_L, α_R and of the parameters of the loss functions:

[5'.a] $$\pi_L=\pi_L(\alpha_L,\alpha_R)$$

[5'.b] $$\pi_R=\pi_R(\alpha_L,\alpha_R)$$

The WIR comes from the joint minimization of the expressions:

[11.a] $$EL_L=pL_L[y(\alpha_R,\pi_R,\pi^e),\pi_R]+(1-p)L_L[y(\alpha_L,\pi_L,\pi^e),\pi_L]$$

[11.b] $$EL_R=pL_R[y(\alpha_R,\pi_R,\pi^e),\pi_R]+(1-p)L_R[y(\alpha_L,\pi_L,\pi^e),\pi_L]$$

If we consider [2], [5.a], [5.b] and the optimal choice of the inflation rate, the first order conditions with respect to α_L and α_R are, respectively:

$$p\left(\frac{\partial L_L}{\partial y}\left(\frac{\partial y}{\partial \pi_R}\frac{\partial \pi_R}{\partial \alpha_L}+\frac{\partial y}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_L}\right)+\frac{\partial L_L}{\partial \pi_R}\frac{\partial \pi_R}{\partial \alpha_L}\right)+(1-p)\left(\frac{\partial L_L}{\partial y}\left(\frac{\partial y}{\partial \alpha_L}+\frac{\partial y}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_L}\right)+\left(\frac{\partial L_L}{\partial y}\frac{\partial y}{\partial \pi_L}+\frac{\partial L_L}{\partial \pi_L}\right)\frac{\partial \pi_L}{\partial \alpha_L}\right)$$

$$p\left(\frac{\partial L_R}{\partial y}\left(\frac{\partial y}{\partial \alpha_R}+\frac{\partial y}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_R}\right)+\left(\frac{\partial L_R}{\partial y}\frac{\partial y}{\partial \pi_R}+\frac{\partial L_R}{\partial \pi_R}\right)\frac{\partial \pi_R}{\partial \alpha_R}\right)+(1-p)\left(\frac{\partial L_R}{\partial y}\left(\frac{\partial y}{\partial \pi_L}\frac{\partial \pi_L}{\partial \alpha_R}+\frac{\partial y}{\partial \pi^e}\frac{\partial \pi^e}{\partial \alpha_R}\right)+\frac{\partial L_R}{\partial \pi_L}\frac{\partial \pi_L}{\partial \alpha_R}\right)$$

Anyway, it is not possible to get to precise conclusions about the general characteristics of α_L and α_R.

The following examples, without any pretence of generality, make it possible to evaluate the different cases examined up to now.

5 - A simple example.

Let us now consider the loss function

[10] $$L = -a_i y+0.5\, b_i\, \pi_i^2 \qquad i=L,R$$

where the ideological differences of the parties are expressed by $a_R/b_R<a_L/b_L$. In the example the discretionary inflation rate chosen by a party does not depend on the households' expectations and, consequently, neither from the other party's preferences and behavior. Discretionary inflation rates are:

[11.a] $$\pi_L = \alpha_L a_L/b_L$$

[11.b] $$\pi_R = \alpha_R a_R/b_R$$

In the discretionary indexation case, indexation commitments are absent, and inflationary expectations are considered given by each party (as well as the opponent's characteristics and policies). The loss functions of LHP and RHP to be minimized with respect to α_L and α_R, respectively, are:

[12.a] $$L_L = a_L\alpha_L\pi^e - a_L^2\alpha_L^2/b_L + a_L^2\alpha_L^2/2b_L$$

[12.b] $$L_R = a_R\alpha_R\pi^e - a_R^2\alpha_R^2/b_R + a_R^2\alpha_R^2/2b_R$$

from which we obtain the first order conditions:

[13.a] $$dL_L/d\alpha_L = a_L(\pi^e-\pi_L)$$

[13.b] $$dL_R/d\alpha_R = a_R(\pi^e-\pi_R)$$

With $\pi_L>\pi^e>\pi_R$ we obtain $dL_R/d\alpha_R>0$ and $dL_L/d\alpha_L<0$; in a discretionary situation with respect to both monetary policy and wage indexation, the LHP exploits the rigidities obtained by means of the lowest wage indexation to a major extent through the highest inflationary surprise. For the RHP the problem is instead to lower π and the choice is that of the highest indexation.

As far as the particular case of section 4.3.1 is concerned, each party takes into account, in fixing the WIR, of its own and other's influences on π^e, even if it is impossible to change directly these latter elements. In the simple case analyzed, the two loss functions are:

[14.a] $$L_L= -a_L\alpha_L p(a_L\alpha_L/b_L-a_R\alpha_R/b_R) + a_L^2\alpha_L^2/2b_L$$

[14.b] $$L_R = -a_R\alpha_R(1-p)(a_R\alpha_R/b_R-a_L\alpha_L/b_L) + a_R^2\alpha_R^2/2b_R$$

from which we obtain the first order conditions:

[15.a] $$dL_L/d\alpha_L=pa_R\alpha_R/b_R+(1-2p)a_L\alpha_L/b_L$$

[15.b] $$dL_R/d\alpha_R=(1-p)a_L\alpha_L/b_L+(1-2(1-p))a_R\alpha_R/b_R$$

Also in this situation a corner solution emerges. In the case of uncertain election ($p\approx1/2$) it is almost certain that both parties agree on the proposals α_{min}. For $0<p\leq1/2$, $dL_L/d\alpha_L$ is always positive, so the LHP always chooses α_{min} and the maximum WIR: a commitment makes the policymaker more averse to inflationary surprises - that is, more virtuous - the more likely is its election. Because the second order derivative $d^2L_R/d\alpha_R^2$ is always negative, the condition $dL_R/d\alpha_R=0$ identifies the maximum loss. We are therefore interested only in α_{min} and α_{max}.

The choice α_{min} by the RHP will be more likely the more the elections were uncertain, the higher was the polarization between the two parties (so that $(a_L/b_L)/(a_R/b_R)$ is far bigger than the unity) and finally the higher is α_{min}. Viceversa, the few are the probabilities that the RHP is elected, the less "extreme" are the ideologies, and the higher is the upper bound for WIR, the more likely will be α_{max}, a low WIR.

For $1/2\leq p<1$ the situation is reversed; $dL_R/d\alpha_R$ is always positive so that RHP chooses the highest WIR. A similar choice by the LHP will be more likely the more the elections were uncertain, the less extreme was the difference between the two parties' plans and the higher is α_{min}. Viceversa, if the LHP had a low probability of success, if the electoral programs were polarized and α_{min} was not high, the LHP would find it convenient to introduce the minimum WIR.

Obviously, the optimal indexation rates depend now upon the characteristics and the probability of electoral success of each party.

A numerical simulation permits the evaluation of the two solutions. Without loss of generalization I consider only two values for the wage indexation rate: α_{min} and α_{max}. The values of the parameters of the loss functions are: $a_R=10, b_R=20, a_L=10, b_L=5$. As regards to indexation I consider the case in which the maximum WIR entails $\alpha=0.1$ and the minimum $\alpha=1$ (tables 1.a-c).

Three situations have been considered. In the first one the result of the elections is highly uncertain and the probabilities of success are equal for RHP and LHP. In the second case RHP has more chances

(p=0.8), whereas in the third case we consider the opposite situation (p=0.2). The first value of each cell refers to the LHP's loss. The values underlined show the solution for case A, the case in which RHP increases WIR to maximum and LHP reduces it to minimum.

Tab. 1.a

p=0.5	α_L=1	α_L=0.1
α_R=1	2.50 10.00	0.25 1.00
α_R=0.1	<u>0.25</u> <u>1.00</u>	**0.025** **0.10**

Tab. 1.b

p=0.8	α_L=1	α_L=0.1
α_R=1	-2.00 5.50	0.34 1.90
α_R=0.1	**<u>-5.60</u>** **<u>0.415</u>**	-0.02 0.055

Tab. 1.c

p=0.2	α_L=1	α_L=0.1
α_R=1	7.00 14.50	**0.16** **0.10**
α_R=0.1	<u>6.10</u> <u>1.585</u>	0.07 0.145

The solutions for section 4.3.1, the particular case in which the party is credible and decides to get bound considering how its choices influences the supply curve and the expectations, are in bold. Because an increase of the WIR reduces inflationary expectations, the optimal indexation rate gets higher for both parties with respect to the discretionary outcome. There are, however, some exceptions. In the unlikely event of electoral success of the LHP (table 1.b) which would find it convenient to "announce" a low WIR without worsening the inflationary expectations, determined most of all by RHP's behavior. Conversely, if the success of LHP is almost certain, the RHP might find it optimal to introduce a low indexation in the remote case of victory: it does not suffer too much because of the scarce probability of success, and reduces the opponent's expansive monetary policy move.

The increase in the losses due to the lack of commitment can be quite high and only in the case of LHP 's low probability of success the two solutions coincide.

In case B, with a partially committed indexation, we have a solution similar to case A. The first order conditions are:

$$dEL_L/d\alpha_L = (1-p)\,\alpha_L(\pi^e-\pi_L)$$

$$dEL_R/d\alpha_R = p\alpha_R(\pi^e-\pi_R)$$

If we assume that $\pi_R<\pi^e<\pi_L$, RHP again will find it convenient to introduce the highest WIR, while for LHP it will be the opposite.

As far as case C is concerned the loss functions for LHP and RHP are respectively:

$$EL_L=p[b_L\pi_R^2/2-a_L\alpha_R(1-p)(\pi_R-\pi_L)]+(1-p)[\ b_L\pi_L^2/2-a_L\alpha_L p(\pi_L-\pi_R)]$$

$$EL_R=p[b_R\pi_R^2/2-a_R\alpha_R(1-p)(\pi_R-\pi_L)]+(1-p)[b_R\pi_L^2/2-a_R\alpha_L p(\pi_L-\pi_R)]$$

If we substitute the expressions for the inflation rate worked out and minimize the expressions above with respect to α_L and α_R we get:

$$dEL_L/d\alpha_L = p(a_R/b_R+a_L/b_L)\alpha_R+(1-2p)a_L\alpha_L/b_L$$

$$dEL_R/d\alpha_R = (1-p)(a_R/b_R+a_L/b_L)\alpha_L+(1-2(1-p))a_R\alpha_R/b_R$$

The solutions are similar to the ones worked out in the case of par. 4.3.1; it is worth noting, however, that the maximum indexation solution for both parties is more easily obtained in this case of full commitment.

If $0<p<1/2$, $dEL_L/d\alpha_L$ is always positive, so that the LHP prefers the highest indexation. The same policy is chosen by the RHP if elections are uncertain, ideologies polarized and the higher the upper bound for the indexation rate.

On the other hand, if $1/2<p<1$, $dEL_R/d\alpha_R$ is always positive, so that the RHP prefers the highest indexation; the same policy is more likely to be chosen by the LHP the more uncertain the election, the more similar the ideologies of the two parties and the higher α_{min}.

Let us consider again the cases $a_R=10, b_R=20, a_L=10, b_L=5$. In the tables 2.a-2.c the values in bold refer to the solutions for case C, in which WIR has been fully committed; the values underlined refer to the solutions for case B in which only partial commitment is considered. As usual, the first value of each cell refers to LHP.

As before, I consider three cases. If the result of the elections is highly uncertain (table 2.a) or the LHP has a high probability of success (table 2.c) both parties prefer a high WIR if the announcement is given before the labor contracts are set. The RHP which weights the control of inflation more than the increase in output, finds it convenient to put a high WIR so to reduce its own (and the opponent's) temptation to increase inflation. A similar outcome is achieved by LHP because it considers a low WIR too expensive because of the increase in inflationary expectations. Both decisions reinforce each other.

Tab. 2.a

p=0.5	$\alpha_L=1$	$\alpha_L=0.1$
$\alpha_R=1$	5.312 21.50	-0.313 0.775
$\alpha_R=0.10$	<u>0.616</u> <u>15.625</u>	**0.053** **0.213**

Tab. 2.b

p=0.8	$\alpha_L=1$	$\alpha_L=0.1$
$\alpha_R=1$	2.50 10.00	0.088 1.648
$\alpha_R=0.1$	<u>**-0.803**</u> <u>**5.212**</u>	0.025 0.10

Tab. 2.c

p=0.2	α_L=1	α_L=0.1
α_R=1	8.125 32.50	-0.227 0.388
α_R=0.1	5.193 29.197	**0.081** **0.325**

In the case in which the RHP has a high probability of success (p=0.8), LHP might find it convenient to announce a low WIR in the case of full commitment. This way it exploits as much as possible the likely success of the opponent: decreasing the WIR makes it possible to reduce - strategically - the fall in output, because a more favourable output-inflation trade-off makes the temptation of the winner harder to resist.

The picture changes with partial planning, when the announcements about indexation come after the contracts have been stipulated (losses underlined): if for the RHP it is preferable to put a high WIR, for the more active LHP the requirement to be "virtuous" is reduced and a low WIR is always preferable .

6 - Conclusions.

It has been sometimes suggested the existence of a link between wage indexation and inflation, according to which a Left (Right) hand government may be inclined to introduce (reduce) wage indexation mechanisms. In a standard framework, characterized by a surprise supply function and in which wage indexation has no political virtue *per sè*, but is just a policy instrument, this view does not hold.
If the wage indexation rate is set by ideologically motivated governments, the relationship between inflation and wage indexation rates crucially depends on the preferences of each party and on their respective probabilities of electoral success and on the precise temporal sequence of policies. When there are no commitmments on the wage indexation rate - such as the possibility to make binding announcements before the labor contract are set - Left hand governments (which are more concerned with output increase rather than price stability) find it convenient to introduce a low indexation rate in order to create inflationary "surprises" more easily, while Right hand governments are less active in this sense.

These results, which may seem surprising at first, emerge because the governments face no reputational cost in reducing wage indexation, a feature that reflects the simple institutional setup in which parties, households and firms operate (and because the need to engineer a surprise puts the burden more heavily on the Left hand governments).

When various kinds of commitments are present, crucially depending on their timing with respect to the stipulation of contracts and to elections (and if there are no output stabilization goals), the parties, no matter their ideology, are generally expected to follow a more rigorous policy and to increase the wage indexation rate in order to reduce inflationary bias. Without these commitments it is not easy to be "virtuous", because a low wage indexation makes unexpected inflation more effective.