BARGAINING ABOUT WAGES: EVIDENCE FROM SPAIN

DEPARTAMENT D'ECONOMIA
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AUTOR: SERGI JIMÉNEZ MARTÍN
DIRECTOR: DR. JAUME GARCÍA VILLAR

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implicitly implying a lower wage in sectors in which bargaining is mostly driven at industry level.

Several interesting conclusions may be drawn from strike variables (incidence and duration). On the one hand, for the manufacturing sector, the occurrence of a strike implies, unconditionally, a small cut in gross wages (four per thousand) and a small increase in base wage[73] (less than one per thousand). The conditional (to the occurrence of a strike) effects are of the same sign but larger in size (a cut of 2 per cent in gross wages and an increase of 1 per cent in base wage). On the other hand, for the services, work stoppages imply a small increase in both, gross and base wage. As expected, the unconditional effect is much smaller in size (between one and two per thousand) than the conditional one (between three and one and a half per cent). Combining both pieces of evidence, it can be assessed that the strike effect on wages is, unconditionally, not very important in wage levels determination in Spain[74], though, given the simplicity of the approach, assertions must be taken with extreme caution.

b. Extension for the manufacturing sector's wage equation.

As we have pointed out in chapter 2, in our sample firms negotiate either at firm level (about 80 percent in sample) or at industry-wide level (20 per cent). So, according to the centralization theory[75], it is expected that the relevant insider parameters, λ (the nominal productivity

[73] Both have been computed in sample means.

[74] Our result is similar to previous findings for the US and Canada, see Card (1990) for a review.

[75] Which might be found in Layard et al. (1991) and, recently, in Jimeno (1992).

coefficient) and α^* (the insider hysteresis coefficient) will be different for both kinds of bargaining. We expect insider power to be lower for firms that negotiate at industry level.

Table 3.1.b provides the basic set of results about differences in insider power by bargaining level. We report the same basic specification for all the sample (columns (1) a joint wage-employment estimation results); for all the sample but interacting the insider variables with a dummy which takes the value of 1 if the bargaining unit negotiates at industry level and 0 if the bargaining unit negotiates at firm level (column (2)); and finally, using the sample of firms which negotiates at firm level for the whole period (columns (3) and (4)). Note that we are excluding from this sample firms that change, at least once, their bargaining level. Consequently, findings on this restricted subsample must be taken with a lot of caution due to the possibility of some kind of sample selection bias[76].

Overall, we must point out the similarity between the results of estimation using all the sample (column (1) in Table 3.1.a or 3.1.b) and the results using the restricted subsample of firms that negotiate at firm level (column (3) or (4) of Table 3.1.b), especially with respect to insider power estimation (in fact, it is estimated higher using all the sample, see Table 3.3 for a summary of findings). Notice the fact that the estimated correlation between the wage and employment equations is positive (as expected if both result from a joint maximization process) and also the fact that it is found higher when looking at the restricted sample estimates (0.18 compared with 0.10 in the whole manufacturing sample). There seems to

[76]Some exploratory results do not confirm such a possibility, though we must point out the difficulty of modelling bargaining level decisions.

be no significant difference between the effect of strike incidence (around 0.01 in all the cases) and strike duration (negative and significant in all the cases except in column (5) in which is found non relevant) on wages by bargaining level.

On the other hand, the results of interacting a bargaining level dummy with all the insider variables are quite different. Insider power is found to be lower (column (2)) in firms that negotiate at industry level (0.05) than in firms bargaining at firm level (a range of 0.15-0.19), as we a priori could expect. Note also the difference in the size of the insider hysteresis coefficient (considerably higher in absolute value for firms that negotiate at industry level). This might be explained by a different employment objective for firm and industry bargaining levels.

c. The employment equation.

The basic manufacturing and services employment equations are reported in Table 3.4.a and Table 3.5, respectively. As it was done for the wage equation, some extensions for the manufacturing sector are reported in Table 3.4.b. In the common tables, there are two basic specifications, columns (1) and (2), where we consider only the wage bill as a payroll variable, and columns (3) and (4) where the base wage is considered. The sample we use is exactly the same as that for the wage equation we described above. The basic set of instruments is the same for all the columns of both tables. However, columns (3) and (4) include more instruments than column (1), due to the consideration of wage's structure variables. Notice that all the equations reported in both tables pass the m_2 specification test, under the null that there is no second order serial correlation on the estimated first differences residuals.

Despite the simplicity of our employment equation specification, which does not include either capital or financial variables, the findings about employment dynamics are satisfactory. They reflect the existence of strong employment adjustment costs. For the manufacturing sector we estimate a significant coefficient of 0.46 in our basic model. For services our basic estimate is 0.667. However, employment dynamics are estimated to be lower than alternative estimates in the manufacturing sector in the 1984-1988 period[77].

The wage variable has the expected negative coefficient in both cases, when using the wage bill (wb) and when using the base wage (ω), the estimated coefficient being quite similar in both variables for manufacturing (-0.271 in (1) and -0.319 in (3), respectively), but not in services (-0.339 in (1) and -0.137 in (3)). Likewise, lagged wage is found to be negligible in manufacturing and positive in services. Firm variables have been found to be significant in manufacturing but not in services (except past overtime hours that have a significant positive effect on employment).

The effect of an indexation clause has been found to be negative for both manufacturing (-0.014 in Table 3.a(1)) and services (-0.008 in Table 3.5(1)). This estimate corroborates our initial guess about the COLA effect on employment. This estimate suggest that a COLA clause, that can be

[77]For instance, in the work of Arrazola (1992), in a model with capital and financial factors, it is reported a coefficient of 0.66 for manufacturing firms in good financial condition and 0.32 for firms in bad financial condition.

considered a deferred wage increase (although subject to a degree of uncertainty), lowers employment around one percent. Hence, in the Spanish case, where indexation clauses are signed very often in large firm agreements (mean 1985-90: 52%) and industry-wide agreements (mean 1985-90: 44%), we might conclude that revision clauses depress employment, though we should be cautious about the consistency of such a result[78]. On the other hand, the productivity clause (which normally targets an increase in productivity) has a different effect on manufacturing (negative) than in services (positive, although in some columns of Table 3.5 is not significant).

Evidence about wage structure variables is ambiguous in both manufacturing and services. In manufacturing, we might reject the hypothesis that only the base wage is relevant in employment determination (Table 3.4.a, column (3), Wald-test(df): 18.9(2)) but we should reject also the alternative that the base wage coefficient (-0.319) is equal to the tenure payments (0.01, Table 3.4.a(3)) and the productivity (-0.138, Table 3.4.a(3)) coefficients. In column (4) of both mentioned tables we report the best alternative specification considering a lag of tenure and productivity payments and the tax wedge (current and lagged). The findings are basically the same[79]. Notice that, for the manufacturing sector, we cannot reject that

[78]There are several forms for a COLA clause. Since we have no information about the COLA provisions, we opted for considering a dummy taking the value one if the clause is present and zero otherwise. Consequently, we should take with caution the estimated coefficient.

[79]We also tried using a more general definition of flexible wage structure. We used fix payments instead of tenure payments and variable payments instead of productivity payments. For the manufacturing sector, the results were similar in variable payments (around -0.20) and different in fix payments that we found significantly negative (-0.04) in contrast with those in Table 3.4(3). For services we obtained very close results in both fix

the tenure coefficient is zero. Hence, there is some evidence in favor of Weiztman's argument with respect to tenure payments, though we might be cautious not to use this result to do inference about the effect of tenure itself on employment.

In services, the null hypothesis that only base wage matters is not rejected (Table 3.5, column (3), Wald-test(df): 4.81(2)). In any case, we shall note that the observed pattern is opposite to the manufacturing pattern. On the one hand, the productivity payments coefficient is close to zero[80]. On the other hand, the tenure payments coefficient has a strong negative coefficient in column (3), though there is no clear long run effect, as we can see when looking at the results in column (4), which includes the lagged tenure payments. Therefore, our guess is that tenure matters more in the services sector than in the manufacturing sector and that productivity incentives are more important for manufacturing than for the services sector.

For the manufacturing sector, the consideration of the subsample of firms which negotiate at firm level (columns (3) and (4), for system estimates, in Table 3.4.b) does not change abruptly the relevant findings in the employment equation. In any case, we mention that the effect of employment dynamics (0.396 in (3) and 0.336 in (4)) is lower than of obtained when using all the available sample (0.439 in (1) and 0.426 in (2) of the same table) and the current wage coefficient is higher in magnitude (-0.415 in (3) compared with -0.301 in (1)), though the long run effect is

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payments (-0.177) and variable payments (-0.029) with respect to those for tenure and productivity in Table 3.5(3).

[80] This hypothesis might be not rejected in Table 5.5(3).

much more similar (-0.33 in (3) and -0.30 in (1)). Combining both pieces of evidence, it seems that employment is slightly more flexible in the sample of firms negotiating at firm level than in the whole sample, though there is little evidence to support it.

Apart from this, in this table we have introduced a couple of additional variables. On the one hand, a dummy if a work stoppage is realized during negotiations. For this variable evidence is ambiguous. Whilst equation estimates are negligible (columns (1) and (3)), system estimates are significantly negative (columns (3) and (4)). However, the implicit elasticity is not very important (less than two per thousand unconditionally and six per thousand conditional to the occurrence of a strike). On the other hand, we also consider a variable which represents the degree of centralization of bargaining in the industry (afr_j). Whilst its effect is not significantly different from zero in the subsample of firms negotiating at firm level, it is found to be negative in the whole sample (especially in column (2)). The finding suggests that firm's employment is less flexible when negotiating at industry level.

Our final comment concerns the bargaining structure test (see Table 3.6). It is not rejected for services and rejected for manufacturing. Hence, we do not reject the labour demand model (only bargaining over payroll) for the services and we reject it for the manufacturing sector. As a matter of fact, evidence for this last sector might be interpreted in favor of either a combined wage-employment bargaining or an efficiency wage model. The wage-employment framework, which is a reasonable bargaining assumption in large firms, is poorly determined. The reason is that we are using very few variables that should enter the wage equation and should not enter the employment equation if bargaining is only over wages. On the other hand, we have the efficiency wages model, which implies that the coefficient of the mean aggregate wage (in fact should be the alternative wage: $W_a=\bar{W}\{(1-u)+uB\}$) is equal (but opposite in sign) to the wage coefficient. This model is not rejected in our manufacturing employment equation. Note that this result suggests the Insider-Outsider model is not an adequate representation of the wage setting process in Spain. Therefore, there is an incentive to improve our specification, using more union objective function variables to discriminate between these two alternatives.

V. Summary of findings.

In this chapter we have analyzed wage levels setting and employment. We have formalized the wage-setting process using the Nickell and Wadhwani (1990) influential Insider-Outsider model and we also have assumed a simple labour-demand employment equation for testing purposes. Therefore, our initial assumption was that The Right to Manage model constitutes an adequate bargaining assumption for the Spanish case. Then, we have formulated some *ad hoc* extensions of this basic model. More in detail, we have formulated a base wage equation to show the effect of some special kind of payments, like tenure payment and productivity payments, on the base wage. We also have tested, using the employment equation, the validity of the Right to Manage assumption, although we must point out that the rejection of such a model should not be generalized to all the firms. Our guess is that such a result is only valid in a large firm context. We used an unbalanced panel of large firms in the 1984-1990 period to test such an extensions.

We have found an insider power range of 0.12 to 0.16, slightly higher than previous estimates for the whole manufacturing sector. Likewise, we have found a lower range from 0.01 to 0.02 for the services. Both results are robust to the alternative base wage specification. Aggregate variables like unemployment rate and long term unemployment proportion have been found relevant factors of the wage-setting process. Particularly important is the evidence about outsider hysteresis, which might be interpreted as an additional wage pressure determinant. Hence, any policy intended to reduce the long term unemployment proportion might be interpreted as a policy against wage pressure. We also confirm, at least partially, our initial guess that insider power is different between units that bargain at firm level and units that follow an industry-wide agreement. There is evidence to support the idea of different employment objectives in those two bargaining levels. There is also evidence supporting the idea of lower employment flexibility in firms bargaining at industry-level. Our suggestion for further research is to discriminate the model for these two bargaining groups. In this case, the possibility of sample selection bias must be taken into account, though it requires an in-depth analysis of the specific determinants of the bargaining level decision.

The results about wage structure (tenure and productivity payments) variables suggest that those variables are relevant in the wage-setting process, that is, the gross wage does not suffice to explain wage determination. For the manufacturing sector we have found that tenure and productivity payments lower the base wage but increase the total payroll. Services are similar with respect to productivity payments but different with respect to tenure payments. We have found that this kind of payments lowers the base wage and also the payroll. This finding suggests a higher value of tenure in services than in manufacturing, and more important, it also suggests that the group of employees that have long tenure periods in firms have higher bargaining power and, consequently, they might fix better pay conditions.

Flexible pay structures have recently captured the interest of policy makers, because it has been argued (Weitzman (1984, 1987) and Jackman (1988)) that the introduction of a flexible pay structure may reduce unemployment. If that is the case, the government has a clear incentive to motivate, through tax incentives, the generalization of bonuses and other flexible pay schemes. The assertion relies crucially in the fact that employers look only at the base wage in setting employment, making the trade-off between employment and wages more favourable to the first. In our case, the crucial question (only the base wage is relevant in employment determination) has no clear answer, although our guess is that base wage is not the relevant marginal price of labour. For the manufacturing sector we have found that the productivity payment, our measure of flexible payment, is a relevant employment determinant. Consequently, the base wage should not be considered the relevant marginal price of labour for that sector. For services we have found, in the basic equation, a positive answer to the above question, although the results must be taken with a lot of caution because the sample is, in this case, rather small. In any case, it has been found that the base wage is more important for employment determination in services than in manufacturing.

The result about the COLA effect on employment might be interpreted as a warning about the incidence of this clause in the wage-setting process, although the evidence about this might be taken with a lot of caution[81]. Our final point is about the bargaining framework test. We reject the alternative model, either a combined wage-employment framework or an efficiency wage model, for services and we do not reject it for manufacturing. In fact, there is some evidence in favour of both alternative models. We do not reject the alternative efficiency wage model, though the

[81] If the firm is risk neutral the COLA clause has, ceteris paribus, no incidence on employment. Alternatively, if the firm is risk averse and the union enforces a COLA clause, it may have a negative effect on employment.

power of the test is very low, because we used very few time series observations (no more than five in estimation). An avenue to improvement would be to use more information to discriminate the alternative options. Our guess is that there is some implicit employment bargaining in manufacturing (notice that the correlation between the wage equation and the employment equation is sensibly higher in the subsample of firms that bargain at firm level), but any properly test on this negotiation framework requires a more sophisticated specification.

Table 3.1.a. Manufacturing wage equations.

dependent: variable	WB (1) coef. (t-st)	WB (2) coef. (t-st)	WB (3) coef. (t-st)	ω (4) coef. (t-st)
Constant	-0.017 (2.24)	-0.012 (1.19)	-0.009 (0.99)	-0.014 (1.27)
wb_{i-1}	0.074 (3.20)	0.071 (3.09)	0.082 (3.57)	---
ω_{i-1}	---	---	---	0.070 (6.34)
$(p+y-n)_i$	0.137 (6.09)	0.138 (5.83)	0.163 (5.93)	0.125 (5.43)
$(B/NP_j*100)_{i-1}$	0.024 (0.53)	0.032 (0.70)	0.138 (1.85)	0.083 (1.27)
mp_i	-0.002 (2.48)	-0.002 (2.17)	-0.002 (2.31)	0.005 (3.85)
Δn_i	-0.042 (2.71)	-0.043 (2.81)	---	-0.077 (4.15)
n_i	---	---	0.015 (0.50)	---
n_{i-1}	---	---	0.069 (2.55)	---
S_i	-0.042 (2.71)	-0.021 (1.80)	-0.024 (1.84)	-0.006 (0.55)
S_dur_i	0.009 (3.41)	0.008 (3.22)	0.013 (4.75)	0.007 (4.75)
eh_i	0.506 (9.67)	0.489 (9.39)	0.509 (8.33)	0.662 (12.7)
$(\text{TEN}/\omega)_i$	---	---	---	-0.151 (1.51)
$(\text{PROD}/\omega)_i$	---	---	---	-0.475 (13.6)
UGT_i	-0.114 (4.56)	-0.115 (4.58)	-0.157 (4.48)	-0.134 (5.03)
$\bar{W}$	0.852[c]	---	0.823[c]	0.867[c]
u_{-1}	-0.212 (3.00)	---	-0.233 (2.99)	-0.333 (5.65)
LTU	0.140 (3.90)	---	0.164 (4.18)	0.196 (5.77)
u_j	-0.083 (2.60)	-0.091 (2.45)	-0.065 (1.82)	-0.136 (4.53)
$\Delta^2 P_{-1}$	0.024 (3.96)	---	0.029 (4.20)	0.031 (5.50)
afr_j	-0.231 (2.00)	-0.212 (1.85)	-0.059 (0.43)	-0.118 (0.96)
Wald Test	321.3	271.0	336.2	926.6
Sargan(df)	80.0(84)	79.4(84)	67.8(83)	90.2(100)
m_1	-3.49	-3.46	-4.09	-1.43
m_2	1.45	1.44	1.42	0.32
time dum.	No	Yes	No	No
Industry dum.	Yes	Yes	Yes	Yes

c:constrained.

INSTRUMENTS SET: $wb_{it-2},..,wb_{i0}$; $n_{it-2},..,n_{io}$; $(p+y-n)_{it-2},..,$ $(p+y-n)_{t-4}$, $(B/NP_j)_{it-2},..,$ $(B/NP_j)_{t-4}$, S_{it-2}, S_{it-3}, pm_{i-2}, pm_{i-3}, eh_{it-2}, ..., eh_{t-4}, UGT_{it-2}, PWW_{it-2}, w_{jt-2}, S_{jt-2} and all the exogenous variables.

TESTING:

Wald Test: Wald test of the null that the vector of coefficients (excluding time and industry dummies) is zero.

Sargan: Test of the validity of the set of instruments. Under the null of adequacy the test is distributed as a χ^2_r where r is the number of overidentifying restrictions.

m_1: Test of the absence of first order serial correlation in the error term (Arellano and Bond (1991)).

m_2: Test of the absence of second order serial correlation in the error term (Arellano and Bond (1991)).

Table 3.1.b. Further manufacturing wage bill equations.

SAMPLE	ALL	ALL	firms bargaining at firm level (249)	
Est. Method⇒ variable	FIML-IV (1) coef. (t-st)	LIML-IV (2) coef. (t-st)	LIML-IV (3) coef. (t-st)	FIML-IV (4) coef. (t-st)
Constant	-0.015 (2.51)	-0.006 (0.94)	0.008 (1.79)	0.013 (5.36)
wb_{i-1}	0.070 (4.27)	0.086 (3.43)	0.108 (5.01)	0.078 (8.27)
$(p+y-n)_i$	0.160 (11.7)	0.122 (4.93)	0.120 (6.07)	0.134 (17.4)
$(B/NP_j*100)_{i-1}$	0.024 (2.45)	-0.001 (0.01)	0.052 (1.63)	0.092 (6.39)
mp_i	-0.002 (4.02)	-0.001 (1.06)	-0.001 (1.43)	-0.002 (8.93)
Δn_i	-0.062 (6.67)	-0.019 (1.43)	-0.055 (5.89)	-0.068 (17.9)
$BL*w_{-1}$	---	-0.093 (2.35)	---	---
$BL*(p+y-n)_i$	---	-0.069 (1.34)	---	---
$BL*mp_i$	---	-0.007 (1.73)	---	---
$BL*\Delta n_i$	---	-0.140 (2.09)	---	---
S_i	-0.022 (1.91)	-0.036 (4.11)	0.001 (0.12)	-0.024 (6.14)
S_dur_i	0.011 (7.37)	0.013 (6.12)	0.010 (5.42)	0.011 (12.9)
eh_i	0.478 (13.4)	0.312 (5.73)	0.504 (16.6)	0.536 (25.2)
UGT_i	-0.132 (7.45)	-0.050 (2.44)	-0.086 (4.41)	-0.110 (16.5)
$\bar{W}$	0.827[c]	0.866[c]	0.866[c]	0.855[c]
$BL*\bar{W}$	---	0.946[c]	---	---
u_{-1}	-0.237 (4.73)	-0.141 (2.21)	-0.221 (3.30)	-0.215 (9.05)
LTU	0.153 (5.70)	0.128 (3.73)	0.142 (4.30)	0.144 (12.1)
u_j	-0.068 (2.91)	-0.086 (3.04)	-0.038 (2.23)	-0.033 (3.26)
$\Delta^2 P_{-1}$	0.027 (5.85)	0.018 (3.39)	0.031 (5.33)	0.034 (13.0)
afr_j	-0.085 (0.97)	-0.137 (1.73)	0.182 (2.20)	0.200 (4.98)
Time dum.	No	No	No	No
Industry dum.	Yes	Yes	Yes	Yes
Wald Test	1057.6	269.6	1219.9	11802.1
Sargan(df)	144.9(162)	93(105)	85.1(84)	161.2(162)
m_1	-3.07	-3.25	-2.02	-2.55
m_2	1.32	1.72	1.04	0.85
ρ_{v_w,v_e}	0.109†	---	---	0.183‡
Test BL*I (df)	---	16.6(4)	---	---

TESTING: see at the bottom of Table 3.1.a.

INSTRUMENT SET: see Table 3.1.a.

All the columns consider industry dummies.

c:constrained.

†:Jointly estimated with Table 3.4.b(2).

‡:Jointly estimated with Table 3.4.b(4).

Table 3.2. Services wage equations. 172 firms.

dependent: variable	WB (1) coef. (t-st)	WB (2) coef. (t-st)	WB (3) coef. (t-st)	ω (4) coef. (t-st)
Constant	-0.040 (4.39)	-0.020 (1.73)	-0.035 (3.70)	-0.011 (1.39)
wb_{i-1}	0.075 (1.80)	0.080 (1.93)	0.078 (1.84)	---
ω_{i-1}	---	---	---	0.243 (7.71)
$(p+y-n)_i$	0.008 (2.08)	0.011 (2.83)	0.009 (2.50)	0.003 (1.30)
$(B/NP_s*100)_{i-1}$	0.110 (2.49)	0.120 (2.83)	0.110 (2.46)	0.030 (1.39)
Δn_i	-0.120 (1.83)	-0.087 (1.26)	---	-0.000 (0.00)
n_i	---	---	-0.176 (3.47)	---
n_{i-1}	---	---	0.010 (1.49)	---
eh_i	0.170 (1.20)	0.050 (0.32)	0.180 (1.22)	-0.290 (1.98)
$(TEN/\omega)_i$	---	---	---	-1.840 (9.06)
$(PROD/\omega)_i$	---	---	---	-0.200 (3.29)
S_i	0.028 (2.14)	0.033 (2.90)	0.028 (2.15)	0.021 (1.91)
dur_S_i	-0.001 (0.20)	-0.008 (2.90)	-0.001 (0.20)	-0.010 (1.56)
UGT_i	-0.017 (0.54)	-0.034 (1.16)	-0.028 (0.90)	0.074 (3.26)
W	0.99[c]	---	0.99[c]	1.00[c]
u	-0.735 (5.78)	---	-0.720 (5.60)	-0.130 (1.07)
LTU	0.113 (4.67)	---	0.098 (3.83)	0.030 (1.16)
$\Delta^2 P_{-1}$	-0.010 (1.27)	---	-0.010 (0.95)	0.010 (1.22)
afr_j	-0.074 (1.12)	-0.030 (0.51)	-0.090 (1.36)	-0.025 (0.45)
Joint Sign.	130.2	22.0	142.7	425.0
Sargan(df)	45.2(66)	58.5(66)	48.7(65)	69.7(82)
m_1	-2.11	-2.34	-2.16	-3.15
m_2	1.05	1.04	1.09	-1.32
time dum.	No	Yes	No	No
Ind. dum.	Yes	Yes	Yes	Yes

TESTING: see at the bottom of Table 3.1.a.

INSTRUMENTS SET: Same as Table 3.1.a.

Table 3.3. A summary of insider's power.

Sector	TABLE	GROUP OF FIRMS	(1)	(2)	(3)	(4)
Manufacturing	I.a.	ALL	0.13	--	0.16	0.12
	I.b.	ALL	0.13	--	--	--
		BARGAINERS	--	0.13	0.13	0.14
		FOLLOWERS	--	0.05	--	--
Services	II	ALL	0.01	--	0.01	0.00

Table 3.4.a. Manufacturing employment equations.

variable	(1) coef. (t-st)	(2) coef. (t-st)	(3) coef. (t-st)	(4) coef. (t-st)
Constant	-0.030 (2.88)	0.005 (0.51)	-0.023 (2.39)	-0.015 (1.72)
e_{-1}	0.460 (17.5)	0.484 (21.0)	0.409 (17.7)	0.423 (19.2)
$(p+y)_i-p_j$	0.070 (1.97)	0.110 (3.40)	0.082 (2.34)	0.057 (1.73)
$(B/NP_j{*}100)_{i-1}$	0.619 (9.14)	0.208 (11.7)	0.570 (8.72)	0.591 (9.53)
wb_i-p_j	-0.271 (2.64)	-0.147 (3.10)	---	---
$wb_{i-1}-p_{j-1}$	0.027 (1.03)	0.033 (1.76)	---	---
ω_i-p_j	---	---	-0.319 (4.59)	-0.272 (4.28)
$\omega_{i-1}-p_{j-1}$	---	---	0.006 (0.40)	0.004 (0.27)
$(TEN/\omega)_i$	---	---	0.013 (1.23)	---
$(TEN/\omega)_{i-1}$	---	---	---	0.015 (1.36)
$(PROD/\omega)_i$	---	---	-0.138 (3.41)	-0.086 (2.15)
tax_i	---	---	---	0.145 (1.69)
xh_{i-1}	-0.160 (0.63)	-0.210 (1.00)	-0.218 (0.91)	-0.205 (0.97)
$COLA_i$	-0.014 (2.74)	-0.015 (3.11)	-0.015 (3.11)	-0.014 (2.94)
$prodc_i$	-0.020 (3.70)	-0.020 (3.70)	-0.019 (4.00)	-0.021 (4.33)
UGT_i	0.110 (2.91)	0.076 (2.22)	0.098 (2.67)	0.091 (2.56)
W	0.241 (3.13)	---	0.387 (3.61)	0.205 (3.57)
O_j	0.048 (1.06)	0.100 (1.00)	0.056 (1.37)	0.024 (0.61)
u_j	-0.026 (1.07)	-0.037 (1.08)	-0.024 (0.93)	-0.021 (0.86)
Time dum.	No	Yes	No	No
Ind. dum.	Yes	Yes	Yes	Yes
Wald test	673.3	932.6	738.1	806.9
Sargan(df)	54.2(65)	49.8(65)	67.2(81)	82.0(89)
m_1	-2.835	-2.781	-2.944	-2.869
m_2	0.085	0.054	-0.108	-0.072
Test Z_2'(df)	18.00(3)	---	20.86(3)	12.66(3)

TESTING: see at the bottom of Table 3.1.a.

Test Z_2: Wald test of the null that the coefficients of the variables included in the vector Z_2 are jointly zero.

INSTRUMENTS SET: (1) to (2): $wb_{it-2},..,wb_{i0}$; $n_{it-2},..,n_{io}$; $(p+yn)_{it-2},..,$ $(p+y-n)_{t-4}$, $(B/NP_j)_{it-2},..,$ $(B/NP_j)_{t-4}$, $xh_{it-2},..,$ xh_{t-4}, UGT_{it-2}, PWW_{it-2}, w_{jt-2}, S_{jt-2} and all the exogenous variables. Col (3): Same set as above but using ω instead of wb. Additional instruments for col (4): $TEN/\omega)_{it-2}$, $(TEN/\omega)_{it-3}$, $(PROD/\omega)_{it-2}$, $(PROD/\omega)_{it-3}$.

Table 3.4.b. Further Manufacturing employment equations.

SAMPLE	all the 375	sample firms	firms at firm	bargaining level(272)
est. method:	LIML-IV (1)	FIML-IV (2)	LIML-IV (3)	FIML-IV (4)
variable	coef. (t-st)	coef. (t-st)	coef. (t-st)	coef. (t-st)
Constant	-0.026 (2.07)	-0.003 (0.36)	-0.006 (0.73)	0.017 (4.84)
e_{i-1}	0.439 (21.7)	0.426 (32.6)	0.396 (15.2)	0.338 (32.1)
$(p+y)_i-p_j$	0.038 (0.95)	-0.068 (2.47)	-0.047 (1.10)	-0.179 (8.00)
$(B/NP_j*100)_{i-1}$	0.577 (7.48)	0.712 (15.6)	0.489 (6.27)	0.559 (17.9)
mp_i	0.001 (1.31)	-.0001 (0.27)	.0001 (0.04)	0.002 (4.80)
wb_i-p_j	-0.301 (4.11)	-0.288 (6.99)	-0.415 (4.74)	-0.446 (17.7)
$wb_{i-1}-p_j$	0.013 (0.48)	-0.010 (0.42)	0.083 (2.27)	0.114 (6.51)
xh_{i-1}	-0.035 (0.11)	-0.632 (3.28)	-0.400 (1.03)	-1.446 (15.1)
$COLA_i$	-0.010 (1.75)	-0.012 (2.97)	-0.016 (2.03)	-0.037 (11.0)
$prodc_i$	-0.022 (4.31)	-0.030 (7.88)	-0.040 (4.87)	-0.056 (12.4)
UGT_i	0.060 (1.65)	0.061 (2.38)	0.281 (5.06)	0.404 (7.71)
S_i	-0.004 (0.12)	-0.007 (3.96)	-.0002 (0.07)	-0.006 (4.72)
W	0.420 (3.51)	0.229 (2.93)	0.488 (3.56)	0.452 (7.71)
u_j	-0.056 (1.94)	-0.026 (1.28)	-0.023 (0.76)	-0.012 (1.04)
afr_j	-0.082 (1.46)	-0.111 (2.50)	-0.049 (0.61)	-0.038 (1.01)
O_j	-0.082 (1.46)	0.035 (1.01)	-0.001 (0.02)	0.046 (2.06)
Wald Test	959.7	2715.8	1488.3	9789.9
Sargan(df)	57.0(78)	144.9(162)	57.4(78)	161.2(162)
m_1	-2.88	-2.69	-2.46	-2.52
m_2	0.07	0.08	0.03	0.13
ρ_{v_w,v_e}	---	0.11†	---	0.183‡
Test $Z_2'=0$(df)	18.24(4)	19.8(4)	33.5(4)	343.6(4)
time dum.	No	No	No	No
Ind. dum.	Yes	Yes	Yes	Yes

TESTING: see at the bottom of Table 3.1.a and Table 3.4.a.

†: Estimated jointly with Table 3.1.b (1).

‡: Estimated jointly with Table 3.1.b (4).

Table 3.5. Services employment equations.

variable	(1) coef. (t-st)	(2) coef. (t-st)	(3) coef. (t-st)	(4) coef. (t-st)
Constant	0.009 (1.99)	0.019 (3.18)	0.019 (4.79)	0.001 (2.65)
e_{-1}	0.697 (17.4)	0.731 (17.5)	0.668 (20.7)	0.694 (24.8)
$(p+y)_i-p_j$	-0.010 (1.15)	-0.010 (0.97)	-0.001 (0.14)	.0001 (0.02)
$(B/NP_s*100)_{i-1}$	-0.027 (1.70)	-0.036 (2.04)	-0.035 (3.01)	-0.027 (2.42)
wb_i-p_j	-0.339 (7.02)	-0.290 (5.16)	---	---
$wb_{i-1}-p_{j-1}$	0.111 (2.72)	0.118 (2.51)	---	---
ω_i-p_j	---	---	-0.137 (4.14)	-0.139 (6.23)
$\omega_{i-1}-p_{j-1}$	---	---	0.156 (8.33)	0.169 (10.6)
$(TEN/\omega)_i$	---	---	-0.263 (1.61)	----
$\Delta(TEN/\omega)_i$	---	---	---	-0.586 (7.37)
$(PROD/\omega)_i$	---	---	-0.029 (1.70)	-0.026 (1.57)
Δtax_i	---	---	---	-0.126 (6.74)
xh_{i-1}	0.102 (2.47)	0.122 (2.89)	0.087 (3.26)	0.060 (2.04)
$COLA_i$	-0.008 (1.87)	-0.009 (1.88)	-0.008 (2.54)	-0.009 (3.44)
$prodc_i$	0.002 (0.63)	0.002 (0.51)	0.005 (1.88)	-.0002 (0.72)
UGT_i	-0.020 (1.26)	-0.010 (1.00)	-0.010 (0.86)	-0.007 (0.50)
W	-0.054 (0.48)	---	0.093 (1.27)	0.010 (0.14)
u_j	-0.047 (2.07)	-0.031 (1.18)	-0.037 (2.34)	-0.074 (4.97)
Time dum.	No	No	No	No
Ind. dum.	Yes	Yes	Yes	Yes
Wald test	603.9	476.0	1234.6	1996.1
Sargan(df)	50.6(65)	52.0(63)	77.6(81)	79.9(89)
m_1	-2.848	-3.106	-2.684	-3.054
m_2	0.441	0.152	0.113	0.777
Test Z_2'(df)	11.29(3)	3.61(3)	7.63(3)	3.29(3)

TESTING: see at the bottom of Table 3.1.a and Table 3.4.a.

INSTRUMENTS SET: See Table 3.4.a.

Table 3.6. A summary of the Z_2' test (in Tables 3.4 and 3.5).

Null hypothesis: Labour Demand Model.

Sector	REF.TABLE	Dist	(1)	(2)	(3)	(4)
Manufacturing	T.III.a	χ^2_3	18.00	--	20.86	12.66
	T.III.b†	χ^2_4	18.24	19.8	33.50	343.6
Services	T.IV	χ^2_3	11.29	--	7.63	3.29

† The variable afr_j is considered in Z_2'

Appendix. Data and variables.

The data used in this study comes from the NCGE, an annual survey about bargaining in Spanish large firms (more than 200 employees). Each survey provides information about the firms main results (sales, profits), employment structure and negotiation by bargaining unit, so we have to take into account that a single firm may have several bargaining units. Unfortunately, there are some problems that prevent us from using the bargaining unit information. First, much of the information is provided at firm level. Secondly, the number of bargaining units inside a firm often changes from year to year. And, thirdly, we want to avoid the potential cross-correlation between bargaining units inside a given firm.

Despite the survey runs since 1978, we only have information for the period 1985-1990. Although it is not a typical panel data, we use some code information to extract an unbalanced panel of bargaining units. From the original sample, we have excluded firms which did not report information about some key variables such as wages, sales or employment. We restricted the analysis to those firms which were observed at least for three consecutive years, minimum required to study dynamics in panel data.

The industry data has been taken from several data sources. In what follows, there is a brief description of the set of available data in each one of the two informational levels considered firm and industry.

***Variables. Definition and main source.**

-<u>Firm variables.</u> [Source:NCGE]

p+y: Gross sales.

WB: Gross wage bill.

n: Employment.

B: Gross profit.

mp: A proxy of the market power of the firm defined as:

(Added Value-Labor Cost)/Added Value.

eh: Effective annual working hours (regular hours minus lost hours by conflict, absentism, etc...)

rh: Annual regular hours agreement.

tax: Firm's labor tax.

xh: Extra hours as a ratio of gross hours (i.e. e*rh)

ω: Base wage.

PROD: Productivity payments.

TEN: Tenure payments.

COLA: Cost of living allowance clause (1 agreed; 0 otherwise).

PROC: Productivity clause (1 agreed; 0 otherwise).

UGT: % workers council representatives that belong to the UGT union.

BL: Bargaining level dummy. (1 if bargaining takes place at aggregate level without any explicit improvement, O otherwise).

PWW: Percentage of of firm's white collar workers.

S_i: Dummy variable. 1 if there was a strike in negotiation, 0 otherwise.

S_dur_i: Length of a strike (hours lost by contract conflict per employee).

-Other variables:

u: National unemployment ratio. (source: EPA)

LTU: National long term unemployment ratio (> two years). (source: EPA)

u_j: Industry unemployment ratio (44 industries). (source: EPA)

O_j: Industry output (100=1972). (source: BE)

P_j: Industry price Index (100=1976). (source: BE)

$\bar{W}$: National wage level. (source: ES)

W_j: Industry wage level (1 digit level). (source: ES)

S_j: Working days lost per man at the industry j. (source: BEL)

E_j: Employment in the j industry (44 industries). (source: EPA)

P: Inflation index (1983=100). (source: BE)

afr_j: Number of agreements at industry level by number of agreements at firm level. (source: ECC)

Data sources:

-Banco de España: *Boletín Estadístico* (BE). Various issues.

-Instituto Nacional de Estadítica:

Encuesta de Población Activa (EPA). Various issues.
Encuesta de Salarios (ES). Various issues.

-Ministerio de Economía y Hacienda: *La Negociación Colectiva en las Grandes Empresas en...* (NCGE). 1985 to 1990.

-Ministerio de Trabajo:

Boletín de Estadísticas Laborales (BEL). Various issues.
Estadística de Convenios Colectivos (ECC). Recording Tape. 1981-1990.

Table A.3.1. Some descriptive statistics.

a. Employment wages and sales by year and broad industry.

a1. Manufacturing.

	N	EMP.	BASE WAGE[1,2]	WAGE[1,2]	SALES[2]
1985	190	1438	1.21	2.14	25812,2
1986	276	1459	1.31	2.33	22009,9
1987	339	1308	1.43	2.51	21198,0
1988	375	1245	1.52	2.67	22375,2
1989	375	1243	1.68	2.93	25526,8
1990	273	1367	1.87	3.24	32234,1

a2. Services.

	N	EMP.	BASE WAGE[1,2]	WAGE[1,2]	SALES[2]
1985	62	2636	1.60	2.58	46283,2
1986	133	2408	1.72	2.81	28467,8
1987	154	2210	1.81	2.97	41702,3
1988	171	2275	1.91	3.14	50949,1
1989	171	2357	2.06	3.54	57745,1
1990	127	2906	2.20	3.68	64979,9

1. Wage bill per employee.
2. 10^6 pesetas.

b. Other useful statistics.

b1. Manufacturing. 1985..1990.

WAGE BY BARGAINING LEVEL	#	emp	wage 10^6	PROD %	TEN %	TAX %	COLA %	PROC %
Following a sector agreement	424	533	2.09	9.80	3.72	30.8	41.1	21.2
Bargaining at firm level	1518	1693	2.79	8.41	4.34	29.2	54.0	25.8
All	1942	1440	2.64	8.71	4.20	29.5	51.2	24.8

b2. Services. 1985..1990.

WAGE BY BARGAINING LEVEL	#	emp	wage 10^6	PROD %	ten %	tax %	COLA %	PROC %
Following a sector agreement	286	1677	3.11	4.12	5.71	25.2	41.4	27.3
Bargaining at firm level	574	2963	3.16	5.06	6.13	25.6	59.4	28.2
All	860	2535	3.15	4.75	6.00	25.4	53.5	27.9

Table A.3.1. Mean and Standard Deviation of the most relevant variables.

	manufacturing		services	
obs	1942		840	
	mean	st_dev	mean	st_dev
Bargaining variables.				
UGT.	0.21987	0.24394	0.18400	0.19985
BL	0.21833	0.41322	0.33810	0.47334
S_i	0.16426	0.37061	0.10000	0.30018
d_S_i	0.38413	1.67288	0.12792	0.81324
wb	7.81900	0.34977	7.99547	0.33259
w	7.24037	0.40613	7.47967	0.37606
ten	0.07961	0.09344	0.10432	0.08450
prod	0.18347	0.24062	0.09496	0.18697
tax	0.29563	0.06022	0.25422	0.06944
emp	6.48630	1.04121	6.66164	1.17657
xh	0.01696	0.02810	0.01554	0.03977
eh	7.42446	0.09268	7.42881	0.08577
COLA	0.39083	0.48806	0.36310	0.48118
proc	0.24820	0.45189	0.27381	0.47214
Firm's performance variables.				
sales	9.33874	0.78139	9.60926	1.10824
mp	0.23194	3.14939	0.37380	0.52365
B	5.77112	14.79046	11.32382	25.47854
Industry variables				
u_j	-1.77996	0.66925	-2.53418	0.63214
P_j	5.01636	0.31484	4.95824	0.12368
O_j	5.99861	0.30335	0.00000	0.00000
afr_j	0.45151	0.40579	0.17673	0.22553
Aggregate variables.				
u	-1.65022	0.09826	-1.65436	0.09794
LTU	-0.95095	0.10445	-0.94392	0.10081
$\bar{W}$	4.81798	0.12684	4.82823	0.11920

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CHAPTER 4

THE WAGE EFFECT OF AN INDEXATION CLAUSE: EVIDENCE FROM SPANISH MANUFACTURING FIRMS.

I. Introduction.

The process of wage determination in a bargaining context is an extremely difficult topic of empirical analysis. There are many reasons which could explain such difficulty. Sometimes the lack of information about it, other times because of the industrial, social or individual relationships involved or the fact that it is linked to decisions such as hours, employment setting or cost of living allowance clauses (COLA) or actions such as the conflicting activity. In our opinion, the correct framework for analyzing wage setting process must consider the above decisions and actions[82].

As mentioned, we consider that there is a potential gain in considering some of these issues which could be playing an important role in negotiations. Our main purpose consists in formulating a model of joint determination of a COLA clause and a wage increase under inflation uncertainty. If we believe that bargainers seek the maximization of a

[82] As examples of empirical papers relating wage and employment setting we could mention Alogoskoufis and Manning (1991) and Dorion (1992). Papers relating wage setting and indexation clauses are Card (1986) and Prescott and Wilton (1992). A paper relating the wage increase and the strike activity is Stengos and Swindinsky (1990).

function of their real income, protection against unexpected inflation ought to have an important role to play.

The literature on wage indexing in an uncertainty about inflation context has widely assessed that a firm and a union bargaining over wages could benefit from indexing the contract[83]. Under the assumption that the implicit bargaining costs are relatively low to the potential gain of indexation and the union is more risk averse than the firm[84], Shavell (1976) showed that there is at least one Pareto optimal contract which includes a COLA clause. In fact, the more risk averse the union is, the higher the indexation degree it wants. Clearly, the union ought to be willing to accept a lower expected real wage for getting a COLA clause from the firm.

Note that, in such a context, rejection of the escalator contract must be due to either the firm being relatively more risk averse than the union and/or relatively high transaction cost[85]. It is hard to believe *a priori* that both causes could explain the empirical evidence (in Spain and in other countries) that more than half of the contracts does not include a COLA.

Taking into account that the wage setting is a process of bargaining, there is a very simple explanation for not observing an escalator contract (despite the above two assumptions). It is sufficient for rejecting the clause that the union's wage bargaining power is heterogeneous amongst

[83] See Shavell (1976), Blanchard (1979), Dazinger (1980, 1983), Ehrenberg et al. (1983), Card (1986) and, more recently, Gottfries (1992).

[84] See Dazinger (1980) for an exposition of the arguments in favour of such maintained assumption. The main argument relies on the fact that there are less opportunities for diversifying human capital against risk than for diversifying a similar amount of other kind of capital.

[85] In fact neither of both assumption is strictly necessary. Recently, Gottfries (1992) showed, in an extension of the Baily (1974) and Azariadis (1975) standard labor contract model, an equilibria in which, provided all other contracts do not are contingent, there is no indexation.

contracts with and without the clause. In particular, if the union's wage bargaining power without the clause is sufficiently lower (in the manner we will show in the next section) than with it, the firm will prefer not to accept the clause. Thus, rejection of the escalator contract can arise regardless of high transaction costs and the relative higher risk aversion of the firm.

It is not our purpose to investigate on the determinants of bargaining power in negotiation[86], but on the reason of different bargaining power with and without indexation clause. The reason for observing such a heterogeneity in negotiation power is twofold. On the one hand, it maybe the case that some unions (worker councils) are not able to motivate their rank and file to fight against high unexpected inflation values (i.e., far away from inflation target); so, it is difficult to incorporate them into the negotiated wage without a revision clause (on the contrary, it is not very difficult to do so when the union has a escalator contract). In this sense, we will be distinguish between *weak* unions (those with low capacity to motivate their rank and file) and *strong* unions (with high capacity to motivate their rank and file). Note that under this assumption the expected wage of workers with a protection clause is, *ceteris paribus*, higher than the expected wage of employees without it (opposite to the intuition).

On the other hand, as far as the underlying bargaining structure is dynamic and there is, at least in Spain, renegotiation of wages (increase) almost yearly, it could be the case that some unions prefer not to ask for a COLA clause but to establish a mechanism for incorporating the deviation of

[86]For a recent investigation see the excellent work of Doiron (1992).

inflation from their expectation into the next wage negotiation round. That is, for some bargaining pairs the inflation coverage is given not through COLA coverage but through what is usually called price catch-up (PCU). For weak unions PCU inflation coverage may be an alternative to avoid costly negotiations. The firm may also prefer PCU setting because in most cases it will imply a new bargaining process, though examining the ex-post conditions, and in many cases, from the point of view of the firm, will imply a better adjustment (for instance, if the past year was a bad year for the firm, it could negotiate relatively lower wages).

Taking the above facts into consideration we will formulate a simple decision model about which kind of contract is binding (COLA contract or not) and which is the ex-ante wage increase. Firms are assumed to be risk neutral (not crucial) and the union maximizes a standard risk averse utility function. It will be assumed, for simplicity, that the bargaining solution is sequential. Agents decide first whether or not there will be an indexation clause in the contract and, second, they set the ex-ante wage increase to hold in each contingency. They take the decision, both having the right to *veto*, about the revision clause by comparing the utility levels they get in both regimes (with and without COLA). Finally, we will also assume that the solution to the negotiation process, in each regime, is represented by a generalized Nash bargaining (GNB) program, in which the weights on the respective utilities in the GNB are the bargaining powers of the two parties.

There are few examples of applied work on this field, mainly, because of the difficulty of getting the data that this kind of model requires (particularly, the lack of information about several key variables, such us the wage-inflation elasticity) and the extreme difficulty of linking any theoretical framework with an econometric setup. Among the recent papers, we highlight Christofides et al. (1980), Hendricks and Kahn (1985), Card (1986), Christofides (1987) and Prescott and Wilton (1992). The empirical part of this chapter is related, in some sense, to the last paper, a recent work using Canadian data on collective agreements. The structure of Spanish data on collective bargaining is close to Canadian data so that their empirical methodology is easily applicable, although we would like to emphasize several topics not considered there, especially with respect to price variables and the provisions of the COLA contract (i.e, wage-inflation elasticity and inflation threshold -if any-), substantially different in the Spanish case.

Moreover, the consideration of the COLA provisions faces several empirical difficulties, since they are only observable if the contingent event occurs (normally inflation rate above a given ceiling). In this case, the information set only includes the ex-ante and the ex-post wage (if any). Hence the wage-inflation elasticity is only known[87] for the share of COLA clauses that are triggered. Given the fact that the wage-price elasticity might be crucial in the determination of COLA contracts, ignoring this empirical restriction might lead to a serious bias. We will undertake this problem by considering a reduced form model of wage-price elasticity determination. The estimates of such a model will be used to forecast the wage-price elasticity for the whole COLA sample. I will also pay attention to the problem of measuring implicit wage differentials among indexed and

[87] And not in a exact form but proxied by using the following formula:
Wage-inflation elasticity= (ex_post wage - ex_ante wage)/(inflation rate).

non-indexed contracts. In our context, wage increase differentials provide a measure of the cost (or premium) workers must pay to obtain a COLA clause. Apart from their inherent utility, wage increase differentials will be compared with the ex-post contingent compensation to obtain an indirect evaluation of the ex-post wage increase differentials among both kinds of contracts in the sample period.

The basic data source used here is the "Estadística de Convenios Colectivos" (ECC), which has information on *all* the agreements settled in Spain during the 1981-1991 period. From the raw data set we extracted an unbalanced panel data set for the manufacturing sector. We restricted the sample to firms which can be observed for at least four consecutive years. After looking carefully to the data, it must be pointed out that sample selection (by merger, acquisition or missreporting) seems not to be especially important in our data set. To my knowledge, there is only one previous work using this data set[88], although the possibility of following units across time was not used there.

The rest of the chapter will have the following structure. In section II we describe briefly the main characteristics of the manufacturing data. In section III a reference model is developed. The econometric setup and methods are described in section IV. The main results of the analysis and an evaluation (at sample means) of implicit ex-ante wage differentials can be found in section V. In section VI we provide a brief summary. After the tables, the wage-elasticity problem is described in the Appendix A and the variables are defined in the appendix B. The references end the chapter.

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[88] Jimeno (1992), who considers a very simple wage increase determination equation.

II. The data.

From 1981 to 1991 there had been more than forty-two thousand observations on collective agreements which are compiled in the ECC. More than twenty thousand of these agreements correspond to the manufacturing sector. The record has information on wage increases, regular annual hours and cost of living allowance clause to prevent for unexpected inflation, among other variables. Table 4.1 (at the end of the chapter) summarizes the most important results of the bargaining process in those years for the sample. The percentage of COLA contracts ranges from a low of 31.5 to a high of 58.7 per cent in 1990. Notice that there is some evidence for asserting that COLA propensity is related to bargaining unit size (proxied by number of employees). For all the years and both bargaining levels considered, the mean size of bargaining unit under COLA doubles the mean under no COLA.

For all the groups considered the ex-ante wage increase is higher without COLA than with it. Differences are, in general, larger in the 1987-1991 period than in preceding years (1984-1986). However, after revision, ex-post wages under COLA are, except for 1987, higher. This is caused by the high amount of deviation of end of the year inflation with respect to target in those years for Spain (mean 1984-1991: 1.14, with a maximum in 1989 of 3.9 per cent points).

Table 4.2 shows that COLA contracts lower the mean and the variance of the ex-ante wage increases in all the sampling years. Thus, it is confirming the theoretical guess that risk averse workers exchange wage for a lower variance. In Table 4.3 we report the distribution of our sample by duration of the contract, percentage of revision clause, percentage of contracts settled after the expiration of the last agreement and mean delay (days from the expiration date of the last agreement). First notice, that 76.7 per cent of contracts are first year observations and close to 20 per cent are second year observations, the rest, around 3 per cent are third year or more contract observations. Consequently, it seems reasonable to assume that wage increase bargaining takes place almost yearly.

As a final point we like to examine persistence of the COLA and the non-COLA decisions in sample. In Table 4.4 we report the sample percentage of observing a contract with COLA in a given year conditional on having a revision clause in each of the K preceding years. The same concept is reported for the non-COLA contracts. Conditional on a COLA in the previous year, COLA sample percentage (which can be viewed as a sample probability) is 80 per cent. Conditioning to more than one previous COLA contracts increases slowly the conditional sample per cent, to 90 per cent after 6 periods of having a revision clause. The same pattern is observed for non-COLA contracts. Hence, we conclude that although the conditioning probabilities are increasing in time, one period conditioning explains quite well the state dependence in COLA decision.

III. A simplified reference model.

Our main purpose throughout this section is to develop a reference model, under very restrictive assumptions which will allow us to obtain an explicit solution, to justify the special case in which the COLA contract is not accepted by the firm despite the fact that the union is risk averse, the firm is risk neutral and there are not significant negotiation costs. More formal models of several forms of wage indexation can be found in Ehrenberg et al (1983), Card (1986), both dealing with the optimal indexation level and, recently, Gottfries (1992) who worried about indexation to firm's demand in an Insider-Outsider context[89].

Assume we have a competitive firm and a union bargaining over a pay scheme during an annual contract having uncertainty about the level of inflation. The firm, assumed to exhibit constant returns to scale, seeks the maximization of its expected real profits per worker (π):

$$[4.1] \qquad E_P V(\pi) = E_P\left\{\frac{P_j y_i - w_i}{P}\right\}$$

where P_j is the price firm faces, y_i is the level of output per worker, w_i is the wage and P is an aggregate price level (note that the subindex i will always refer to firm, the subindex j to the industry and the absence of subindex to aggregate variables). To simplify [4.1], we assume that the firm's price is related to the aggregate price level as follows: $P_j = \eta_j P$. Where η_j is assumed to be constant in a given industry[90]. Therefore, [4.1]

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[89] In this work it is argued that current employees (insiders) have few incentives to change to a contingent contract, since nominal demand shocks have small effects on real wages and employment variation is mostly given by variation in the rate of hiring.

[90] We assume this to simplify our exposition. For a model relaxing this strong