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Is corporatism feasible?*

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Abstract. This paper investigates the effects of cooperation (corporatism) on macroeconomic performance by considering a rather standard policy game between the government and a monopoly union. We stress the shortcomings of the traditional way used to model cooperation in policy games (the maximization of the weighted sum of players' preferences), which only approximates the Nash product solution. We find that it is difficult to implement corporatism, although it generally increases social welfare, since it often reduces the union's utility. In particular, we show that an inflation-neutral union will never find it profitable to cooperate with the government, unless side-payments are considered. The study of this issue is however beyond the scope of this paper.

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1. Introduction

Corporatism is an ambiguous concept, which has been defined in a variety of ways. In this paper we focus on one specific aspect of corporatism and define it as 'institutional arrangements that involve negotiation, bargaining, collaboration and accord between major economic groupings in the society, and especially, for our present interests, between unions and governments.'[1]

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[1] This largely corresponds to definitions of 'corporatism' in Cameron (1984) and Bruno, Sachs (1985) and is the same as Cubitt's 'Corporatism 4' (see Cubitt, 1995) and the definition of the term given by Burda (1997). This

Recent policies of some European countries demonstrate a continuing tendency for many unions to be actively involved in the formulation of economic policies both at the national and the European level, by drawing up employment pacts aimed at safeguarding or creating employment.[2] The richness of practical cases of cooperation is however in sharp contrast with the reduced number of theoretical analyses aimed at checking its benefits and the conditions for its feasibility.[3]

An initial attempt to show these benefits was made by Ezio Tarantelli. He argued that cooperatively determined wages ensure the same disposable income for wage earners while resulting in a higher level of employment and a reduced inflation rate. He also presented no formal model in relation to this statement, but strengthened it by some empirical tests (see Tarantelli, 1982; 1986; and 1987).

After Tarantelli only a few papers and books have appeared on the subject. Among them there are Bruno and Sachs (1985), Gylfason and Lindbeck (1994), Acocella and Ciccarone (1995), Cubitt (1995), Burda (1997), and Di Bartolomeo (2004). The common result obtained by these papers is one of (sometimes) conditional positive effects of cooperation on both inflation and unemployment, much in Tarantelli's vein. The effects of cooperation depend on a number of assumptions (*e.g.*, see Burda, 1997). A crucial role among these is played by the specification of the objectives of both governments and unions.

The starting point of our paper is closely related to Gylfason and Lindbeck (1994) and Cubitt (1995), who consider implicitly or explicitly the same definition of corporatism used in our paper. Gylfason and Lindbeck (1994) show that joint maximisation of the union preference function, quadratic in real wages, income and price stability, and the government's utility function, quadratic in both income and prices, implies zero inflation, while maintaining an unemployment bias. Cubitt (1995) finds the possibility of reducing unemployment conditional on a sufficiently high bargaining power of the government while having a lower inflation, by initially assuming preference functions of both players quadratic in income and inflation.

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definition of corporatism stresses the nature of 'the rule of the game' whereas other definitions can refer to the number of existing unions (the degree of centralisation of wage setting) or to the values of their objectives or the weights put on them (see Cubitt, 1995).

[2] See OECD (1997), Regini, (1997), Visser (1998), Traxler and Kittel (2000), Rhodes (2001), Visser (2002).

[3] The 'formal reticence' of researchers to develop models of corporatism is noticed also by Burda (1997), who relates it to the remarkable imprecision with which the concept is defined. The reticence is even more pronounced with reference to the kind of corporatism we are interested in here.

In this paper, by considering an usual way to model cooperation in policy games, we first show the positive macroeconomic consequences on unemployment and inflation associated with corporatism under a broad spectrum of assumptions, including the type of non-cooperative solution considered as a benchmark for assessing the consequences of corporatism and the type of the union preference function.

The usual approach to cooperation in policy games however nests some shortcomings – at least in our setting. In fact superiority of the macroeconomic performance[4] associated with corporatism does not guarantee that corporatism will be accepted by the parties involved, in particular by the union. We must in fact consider that the union's preference includes – in addition to employment and (possibly) inflation – the real wage rate, which is inversely related to employment. The higher level of employment guaranteed in many cases by corporatism on the hand tends to raise the union utility level, but, on the other hand, it reduces utility, since a lower real wage rate is associated to the higher employment. The net effect could be negative.

The main purpose of this paper is to extend the analysis of corporatism to issues of feasibility, i.e. of acceptability of this institutional device. A formal analysis of feasibility represents a novelty in the literature, since most previous papers only consider the macroeconomic consequences of corporatism without checking its feasibility.[5] We show how feasibility is strictly conditional on the weights of different objectives in the preference function of both the union and the government.

The paper is organised as follows. In section 2 the structural model of the economy, its reduced form and the players' preference functions are presented. A rather standard model is considered. Section 3 describes the macroeconomic performance associated with non-cooperative regimes under different assumptions on the players' information sets. Section 4 introduces corporatism. We first model it in the manner that is usual in the policy game literature, i.e. the maximization of the sum of players' preferences. Afterwards, we consider the conditions for the acceptability of corporatist solutions to both the government and the

[4] In the case when cooperation implies a reduction in both unemployment and inflation are lower, obviously it is positively judged on the basis of any social welfare function decreasing in these variables. From a social point of view, cooperation can raise problems only insofar as it involves a better performance in terms of one such variable. From the point of view of the various agents (the government and the union, in our case), however, problems can rise as they can put different (even zero or positive) weights on these variables, See Di Bartolomeo (2004) for a discussion.

union . Finally, we consider the more rigorous Nash product approach. Section 5 discusses our results in the light of the recent debate about non-neutrality of monetary policy in a strategic context. The final section presents our conclusions and some general remarks.

2. The model of the economy and the preference functions of the agents

We consider a simple economy where the government interacts with a monopoly union.[6] Our economy is described by an AD/AS model expressed in terms of labour:[7]

$$l^D = a(m - p)$$

$$l^S = -b(w - p) \tag{1}$$

$$l^D = l^S$$

where l^D and l^S are, respectively, aggregate demand and supply (in terms of employment), m is the nominal money supply, w is the nominal wage and p is the price level. By hypothesising some "prior" level of prices, p_{-1}, we may talk of inflation and current prices interchangeably (Cubitt, 1995: 247). All the variables are in logs.

The reduced form of the above model is:

$$l = \frac{ab}{a+b}(m - w)$$

$$p = \frac{a}{a+b}m + \frac{b}{a+b}w \tag{2}$$

$$u \cong \bar{n} - l$$

where u is the unemployment rate and $\bar{n}$ is the given labour force.

The government's and monopoly union's preference functions are respectively indicated by the following expressions:

$$W_G = -\frac{\beta}{2}(\pi - \pi_G)^2 - \frac{1}{2}(l - n_G)^2 \tag{3}$$

$$W_U = \alpha(w - p) - \frac{1}{2}(l - n_U)^2 - \frac{\vartheta}{2}(\pi - \pi_U)^2 \tag{4}$$

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[5] Acocella and Ciccarone (1995) is an exception.

[6] Our model is a generalisation of a seminal contribution of Gylfason and Lindbeck (1994). Recent developments of this literature are surveyed by Cukierman (2004) and discussed in Acocella and Di Bartolomeo (2004). Differently from Gylfason and Lindbeck (1994) we use linear-quadratic preferences for the union. However, our results hold also with those used by them, see the Appendix.

[7] The model is not expectation augmented since we directly model nominal wage policy.

where $\pi = p - p_{-1}$ is the inflation rate; $\pi_G = p_G - p_{-1}$ and $\pi_U = p_U - p_{-1}$ are the players' desired values of inflation ($\pi_G \leq \pi_U$); n_G and n_U are the desired values of employment of the two players ($n_G \geq n_U$). As usual, government's utility depends on inflation and employment. The monopoly union's utility depends on the same arguments and on the real wage.

Equation (4) is rather standard in the literature. However, we find it useful to distinguish two different cases according to the union's preference for inflation.

1. The union preference does not depend on inflation, if $\vartheta = 0$. We refer to this case as the inflation-neutral union case.[8]
2. The union preference depends on inflation, if $\vartheta \neq 0$. We refer to this case as the inflation-averse union case.[9]

For a more accurate description of such functions we refer to Acocella and Ciccarone (1997), Cukierman (2004) and the references therein contained.

3. Non-cooperative policy regimes

3.1 Description of the policy regimes

We consider three usual non-cooperative regimes. They differ in so far as the players' information settings are concerned.

a. Our benchmark is the standard Nash non-cooperative regime (regime 1). In this regime, the union and the government simultaneously set the nominal wage rate and the nominal supply of money. Then firms set the labour demand and outcomes can be computed.

In addition to the Nash regime, we also consider two common sequential games (solved by sub-game perfect Nash equilibrium).

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[8] In line with the recent literature that has micro-founded the union's preferences (see Oswald, 1986; and followers), we could also refer to this case as the micro-founded one. In fact, one general result of this literature is that a micro-founded union preference does not include inflation in addition to real wage and employment. The union's micro-foundations are surveyed by Sapsford and Tzannatos (1993: Ch. 10) and Booth (1995: Ch. 4). However, the discussion on the objectives of trade unions is old, starting from the debate between Dunlop (1944) and Ross (1948), and probably not yet concluded. See Booth (1995) and also the next footnote for additional references.

[9] The reasons why unions may be interested in inflation are indicated by Gylfason and Lindbeck (1994). See, however, Acocella and Ciccarone (1997), for arguments against the inclusion of inflation in the union preference function, and Cukierman and Lippi (1999) and (2001).

b. In the first such game the government is able to pre-commit its policy (fixed monetary rule regime, i.e. regime 2).
c. In the second the union sets its wage in advance taking account of the government's reaction. This regime corresponds to the often called discretionary case where the union sets its expectations and the government acts by using a discretionary monetary policy (discretionary monetary policy regime, i.e. regime 3).

The timing of the game associated with regime 3 is described in the following figure.

Figure 1 about here

The timing of regime 2 is obtained by reversing the order of point 1 and 2.

3.2 The Nash non-cooperative regime (regime 1)

The Nash non-cooperative solution is obtained as follows. Maximising the preference functions of the two agents with respect to their control variables (*m* for the government and *w* for the union) subject to the reduced-form model of the economy (2) gives the following reaction functions:

$$m = \frac{(ab-\beta)b}{a(b^2+\beta)}w + \frac{b(a+b)}{a(b^2+\beta)}\bar{n} + \frac{(a+b)\beta}{a(b^2+\beta)}p_{-1} \tag{5}$$

$$w = \frac{a(ab-\vartheta)}{b(a^2+\vartheta)}m + \frac{a(a+b)}{b(a^2+\vartheta)}\left(\frac{\alpha}{b}-\bar{n}\right) + \frac{(a+b)\vartheta}{b(a^2+\vartheta)}p_{-1} \tag{6}$$

The reader should note that, with no loss of generality for our purposes, in order to make it easier understanding the model, we have assumed that the desired values of employment and inflation of both agents are $\bar{n}$ and zero, respectively. We also assume that all the marginal rates of substitution are finite and positive, unless differently stated.

The Nash non-cooperative solution with respect to control variables is obtained by solving equations (5) and (6):

$$m_N^* = \frac{ab-\beta}{b(a\beta+b\vartheta)}\alpha + \frac{\bar{n}}{a} + p_{-1} \tag{7}$$

$$w_N^* = \frac{a(b^2+\beta)}{b^2(a\beta+b\vartheta)}\alpha - \frac{\bar{n}}{b} + p_{-1} \tag{8}$$

By substituting the latter equations into the reduced form we find:

$$\pi_N^* = \frac{a\alpha}{a\beta + b\vartheta} \tag{9}$$

$$u_N^* \cong \frac{a\alpha\beta}{b(a\beta + b\vartheta)} \tag{10}$$

3.3 The fixed monetary rule regime (regime 2)

The solution of the game can be easily derived backwards by maximising the government preference function subject to the reduced form and (6) as well. This results in the following optimal value for money supply:

$$m_{LB}^* = \frac{a\alpha(\vartheta - \beta)}{b(a^2\beta + \vartheta^2)} + \frac{\overline{n}}{a} + p_{-1} \tag{11}$$

and then the optimal wage is:

$$w_{LB}^* = \frac{a\alpha(a\beta + b\vartheta)}{b^2(a^2\beta + \vartheta^2)} - \frac{\overline{n}}{b} + p_{-1} \tag{12}$$

From equation (11) and (12) the Nash perfect sub-game equilibrium values of the relevant variables can be derived, by substituting such values in the reduced-form model:

$$\pi_{LB}^* = \frac{a\alpha\vartheta}{b(a^2\beta + \vartheta^2)} \tag{13}$$

$$u_{LB}^* \cong \frac{a^2\alpha\beta}{b(a^2\beta + \vartheta^2)} \tag{14}$$

3.4 Discretionary monetary policy regime (regime 3)

The solution is derived in a way similar to that of the previous section, by maximising the union utility function subject to (5) and the reduced-form model. This results in the following optimal value for wage:

$$w_{LU}^* = \frac{\alpha\beta(\beta + b^2)}{b^2(\beta^2 + b^2\vartheta)} - \frac{n}{b} + p_{-1} \tag{15}$$

and then the following optimal money supply is easily derived:

$$m_{LU}^* = \frac{\alpha\beta(ab - \beta)}{ab(\beta^2 + b^2\vartheta)} + \frac{n}{a} + p_{-1} \tag{16}$$

By substituting these values into the reduced form, we have the following sub-game perfect Nash equilibrium values for the outcomes of the game:

$$\pi^*_{LU} = \frac{\alpha\beta}{\beta^2 + b^2\vartheta} \tag{17}$$

$$u^*_{LU} \cong \frac{\alpha\beta^2}{b(\beta^2 + b^2\vartheta)} \tag{18}$$

It is worth noticing that if the union is inflation-neutral, all the non-cooperative regimes imply monetary policy ineffectiveness, i.e. changes in the parameters of the government's preferences do not affect unemployment (Gylfason and Lindbeck, 1994). More in detail, in such a case the standard Barro-Gordon results apply: i) monetary policy is neutral, ii) a decrease in government's conservativeness raises the inflation bias, if government cannot commit its policy; iii) discretion and Nash equilibrium are observationally equal. By contrast, with an inflation-averse union, changes in the government's conservativeness imply a trade-off between inflation and unemployment of a Phillips curve kind.

4. Corporatism, macroeconomic outcomes and "social welfare"

4.1 Modelling corporatism

In the policy game literature, cooperation is usually modelled as the joint maximization of the sum of players' utilities (utilitarian approach).[10] This approach is explicitly or implicitly introduced as a computational simplification of the most rigorous Nash product,[11] since it is a way to internalize the negative externalities stemming from the decentralization of policy decisions. Although usual, the utilitarian approach may nest some contradictions – at least in our contest – since it does not take account of its feasibility, i.e. it does not compare the resulting payoffs to those of the non cooperative solution to check if players can support cooperation.

We proceed as follows.

1. We compute the cooperative results as usually by considering the maximization of the sum of players' utilities without taking account of outside options and analyse the associated results.
2. We consider under which conditions the above results are feasible, i.e. we investigate if the maximization of the sum of players' utilities leads to utilities levels higher than

[10] See, among many others, Rogoff (1985), Andersen and Schneider (1986), Gylfason and Lindbeck (1994) or Jensen (1997).

those emerging from the non cooperative regimes, which are assumed to be the players' outside options.

3. We discuss the Nash product cooperative solution. For the sake of exposition, we limit our analysis to the graphical case.

The above issues are investigated in the following subsections.

4.2 The usual approach

In macroeconomic policy games, the cooperative (corporatist) solution is usually obtained by maximising a linear combination of the preference functions of the two agents:

$$W = \gamma W_G + (1-\gamma) W_U \tag{19}$$

where parameter $\gamma \in (0, 1)$ may be interpreted as an indicator of the bargaining power of the government.[12] We consider γ as exogenously given. The possibility of an endogenous indicator of the bargaining power will be later briefly discussed, by computing the set of γ supporting a cooperative equilibrium.[13]

By minimising equation (19) with respect to the nominal wage and money supply under the constraint (2), we obtain:

$$m_C^* = -\frac{\alpha}{ab}(1-\gamma) + \frac{\overline{n}}{a} + p_{-1} \tag{20}$$

$$w_C^* = \frac{\alpha}{b^2}(1-\gamma) - \frac{\overline{n}}{b} + p_{-1} \tag{21}$$

Corresponding optimal values for target variables are:[14]

$$\pi_C^* = 0 \tag{22}$$

$$u_C^* \cong (1-\gamma)\frac{\alpha}{b} \tag{23}$$

In commenting the above outcomes, let us first consider the case in which the union is inflation-averse ($\vartheta > 0$). In this case, all non-cooperative solutions show a positive inflation

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[11] More rigorous in the sense of its axiomatic derivation, see Mas Collel *et al*. (1995) for a discussion.

[12] See Di Bartolomeo (2004) for an exhaustive discussion on this point.

[13] Indeed, we will discuss the conditions according to which a cooperative solution is more likely to be feasible. We will thus approach the problem only indirectly. Analysing the endogenous determination of the bargaining power is outside the scope of this paper.

[14] The reader should note that the cooperative solutions for employment and inflation are independent of the degree of inflation aversion of the union. Inflation is however independent of the players' inflation-aversion, simply because both players can reach their common bliss point. With different bliss points, inflation would be a weighted average of the players' bliss points, where the weights are a function of the players' inflation-aversion.

rate, whereas the corporatist regime implies zero inflation. Therefore, when the union is inflation-averse, only the cooperative solution guarantees the lowest possible (i.e., zero) inflation. In economic terms this might mean that, when the union cares about inflation, corporatism would eliminate the inflation bias due to the lack of credibility of non-inflationary monetary policies as in Barro and Gordon (1983).[15]

As to unemployment, equation (11) can be written as:

$$u_N^* \cong \frac{a\beta}{a\beta + b\vartheta}\frac{\alpha}{b} \tag{24}$$

This value is lower than that corresponding to the Nash cooperative regime represented by equation (23), according to whether:

$$\frac{a\beta}{a\beta + b\vartheta} < (1-\gamma) \Leftrightarrow \gamma < \frac{b\vartheta}{a\beta + b\vartheta} = \Gamma(\beta, \vartheta) \tag{25}$$

This means that the non-cooperative solution for unemployment (employment) tends to be lower (higher) than the cooperative one the higher the union inflation-aversion, the lower the inflation aversion and the bargaining power of the government.[16]

When the government plays in the fixed monetary regime (regime 2) we obtain the following condition:

$$\frac{a^2\beta}{a^2\beta + \vartheta^2} < (1-\gamma) \Leftrightarrow \gamma < \frac{\vartheta^2}{a^2\beta + \vartheta^2} \tag{26}$$

and a similar result holds for the discretionary monetary regime (regime 3):

$$\frac{\beta^2}{\beta^2 + b^2\vartheta} < (1-\gamma) \Leftrightarrow \gamma < \frac{b^2\vartheta}{\beta^2 + b^2\vartheta} \tag{27}$$

Conditions (26) and (27) can be commented in a way similar to (25).

By comparing the equilibrium unemployment values given by (10), (14) and (18) we notice that when the union is inflation-indifferent, non-cooperative unemployment is always (i.e. in any non-cooperative regime) equal to α/b and that inequalities (25), (26) and (27) are never

[15] This is not a dynamic model; however, the equilibrium values derive from an implicit dynamic adjustment through the reaction functions of the players. Therefore, we can speak of credibility in the following sense: the union, even when it is at its optimal point in terms of the real wage-employment trade-off relation, will push the nominal wage (rising inflation) to the left of the point in which the government will not react to its strategy, i.e. the point in which further increases in money supply to deflate the real wage are not credible (because of the loss for the government's utility).

[16] The reader can easily check that $\partial\Gamma(\beta, \vartheta)/\partial\vartheta > 0$ and $\partial\Gamma(\beta, \vartheta)/\partial\beta < 0$. Then for any given γ, the r.h.s. of equation (31) is higher the higher is ϑ and the lower is β.

satisfied. Therefore, when the union is inflation-indifferent, unemployment in the cooperative regime is always lower than in any non-cooperative one. By comparing the equilibrium inflation rates (9), (13) and (17) it follows that when the union is inflation-indifferent, the cooperative price level is the lowest possible. Summarising, when the union is inflation-indifferent, the cooperative solution is socially Pareto dominant with respect to all the non-cooperative regimes, in the sense that it reduces any social loss function that is increasing in unemployment and inflation. In other terms, when the union is indifferent to inflation, corporatism guarantees an *outcome* that is Pareto superior to the non cooperative one irrespectively of the non-cooperative *equilibrium* considered.[17]

In the case of an inflation-averse union the positive effect of corporatism on unemployment depends on a comparison between the inflation aversion of the union and that of the government. When the former is relatively larger than the latter, the corporatist regime achieves an unemployment rate lower than that associated with the non-cooperative regimes (regimes 1, 2 and 3). Inflation is always lower in the corporatist regime vis-à-vis all non-cooperative regimes, if the inflation aversion of the government is higher than the union's.

The above results, however, may be dramatically affected by the feasibility issue since corporatism, even when it is associated with a higher level of social welfare, may fail to raise the utility of one of the two players, in particular the union. This would make the cooperative solution unfeasible. The next section will investigate questions of feasibility.

4.3 Feasibility constraints

Feasibility of corporatism involves comparing the agents' utilities associated to corporatist outcomes with the utilities the agents derive in the case of a break of bargaining (non-negative conditions). The most intuitive candidates for the outside options are the non-cooperative solutions, but it is also possible to consider a different outside option, as in the case of a binding contract with penalties imposed by law. However, this case is less interesting since the outside options would be exogenously given. Therefore, we will focus on the non-cooperative solutions as outside options.

[17] This kind of result is common to those obtained in settings similar to ours. See Cubitt (1995), Cukierman and Lippi (1999), and Di Bartolomeo (2004).

Non-negative conditions for the policy-maker and the union can be represented as follows:

$$\begin{cases} \Lambda_G = \left(W_G^C - \tilde{W}_G\right) \geq 0 \\ \Lambda_U = \left(W_U^C - \tilde{W}_U\right) \geq 0 \end{cases} \tag{28}$$

where W^C are the utilities associated to the corporatist solution while $\tilde{W}$ are the utilities associated to the breaking bargaining values of the agents' target variables.

By using (1) and recalling that $\pi_U = 0$ and $n_U = \bar{n}$, equation (4) can be re-written as:

$$W_U = -\frac{\alpha}{b} l - \frac{1}{2} u^2 - \frac{\vartheta}{2} \pi^2 \tag{29}$$

Then, after some simple algebra, the non-negative condition for the union can be derived as follows:

$$\Lambda_U = \frac{\alpha}{b}\left(u_C - \tilde{u}\right) - \frac{1}{2}\left(u_C^2 - \tilde{u}^2\right) + \frac{\vartheta}{2}\tilde{\pi}^2 = \left[\frac{\alpha}{b} - \frac{1}{2}\left(u_C + \tilde{u}\right)\right]\left(u_C - \tilde{u}\right) + \frac{\vartheta}{2}\tilde{\pi}^2 \geq 0 \tag{30}$$

This expression is the sum of two terms: the first measures the impact of the unemployment rate while the second measures the impact of inflation.

When considering the case of a union indifferent to inflation, corporatism unambiguously increases the policy-maker's utility. Hence the non-negative condition for the government is always satisfied. Corporatism feasibility therefore only concerns the unions' outside option. Formally, since unemployment takes the same value for all the non-cooperative solutions, for all the possible outside options considered:

$$\Lambda_U^* = -\frac{1}{2}\gamma^2\left(\frac{\alpha}{b}\right)^2 < 0 \tag{31}$$

Thus, the condition of non-negativity for the union never holds and the corporatist solution is not feasible. However, notice that cooperation improves the government's utility, making it possible to grant transfers to the union. Later we will take this point again.

By contrast, for an inflation-averse union, we can re-write the union non-negative condition (30) as:

$$\Lambda_U = \frac{1}{2}\left[\left(1+\gamma\right)\frac{\alpha}{b} - \tilde{u}\right]\left(u_C - \tilde{u}\right) + \frac{\vartheta}{2}\tilde{\pi}^2 \geq 0 \tag{32}$$

It is worth noticing that $\left[\left(1+\gamma\right)\frac{\alpha}{b} - \tilde{u}\right]$ is positive for all non-cooperative solutions. Regarding $\left(u_C - \tilde{u}\right)$, let us analyse two different cases.

1. Let us assume $u_C > \tilde{u}$. In this case – which tends to hold for high values of the union inflation-aversion and low values of the government bargaining power and inflation aversion – the non-negativity condition for the union is satisfied, but the one for the policy-maker does not necessarily hold.
2. If we assume $u_C < \tilde{u}$, the non-negativity condition for the policy-maker always holds, whereas the union's one can hold only if the union puts much emphasis on price stability

Thus a union neutral with respect to inflation or with a low preference for price stability is not interested in cooperating with the government, since this would lower its utility. However, cooperation unambiguously increases the government's utility. Therefore, there could be an interest for the government to compensate the union for the reduction in its satisfaction deriving from acceptance of corporatist solutions implying a lower wage rate. A mechanism of transfers in terms of public tariffs, higher pensions, welfare state provisions, etc. might be devised. These transfers could be used by the government for a "political exchange" to gain union's cooperation, a possibility already emphasised by Tarantelli (1982), who proposed to link a housing price regulation and other real wage-enhancing policy measures to wage bargaining (see also Acocella and Ciccarone, 1995).

4.4 The Nash product

As said, the utilitarian approach can be considered as an approximation to the cooperative solution based on the Nash product since it also permits to internalize the negative externalities stemming from decentralization of policy decisions.[18]

In this section we directly consider the Nash product case. We limit our analysis to a graphical illustration and only consider non-cooperative Nash equilibrium as the outside option.

The Nash product is defined as:

$$W_{NP} = \left(W_G - \tilde{W}_G\right)^{\gamma} \left(W_U - \tilde{W}_U\right)^{(1-\gamma)} \tag{33}$$

Equation (33) has an interpretation similar to that of equation (19).

The game is represented in figure 2. Panel (a) illustrates the inflation-neutral union case, while panel (b) depicts the case of the inflation-averse union. In both panels *SS* and *RR*

[18] Notice that, in line with the discussion of previous section, the union is assumed to be less inflation-averse than the government.

represent the reaction curves of the union and the government, respectively.[19] Thus their intersection, *N*, is the non cooperative Nash equilibrium. The indifference curves of the union are different according to the different case (panel) considered. The indifference curves of the government are the same in both panels.

Figure 2 about here

The cooperative solution (33) lies within the feasibility set along the contract curve according to the value of γ, as e.g. point C in panel (b). The feasibility set is determined by the intersection of the outside options ($\tilde{W}_G$ and $\tilde{W}_U$). It is useful to discuss the two cases separately.

1. For an inflation-neutral union the intersection is empty since it has no interest in cooperating as $\tilde{W}_U > W_U$. The union, in fact, can never improve its utility.
2. By contrast, in the case of an inflation-averse union, the feasibility set is not empty. The cooperative solution always implies a lower inflation rate, but it is more likely to be associated with higher unemployment as far as the government bargaining power and/or the union's (government's) inflation aversion are low (high), This result can be commented in a similar manner as that of the previous subsection.

5. Feasibility of corporatism and non-neutrality of monetary policy.

The results obtained in the previous section need some explanations. Let us first consider the case of an inflation-neutral union. In a framework like ours this makes monetary policy neutral: the equilibrium level of employment does not depend on the government's preferences (Gylfason and Lindbeck, 1994)[20] and the union can always maximise its preference function without being conditioned by its opponent since it is not interested in inflation. In other words, by using equation (1), the inflation-neutral union's preference can always be expressed in terms of employment (*or* real wages) only. Cooperation with the government can add nothing to the union's satisfaction, as the latter is unable to influence

[19] The same reactions previously derived in Section 3.
[20] The issue of neutrality is more extensively discussed in Acocella and Di Bartolomeo (2004).

employment (and real wages). The only constraint the union faces in its maximisation is the labour demand, which cannot be affected by monetary policy.

By contrast, in the case of an inflation-averse union, monetary policy is no longer neutral. It can thus influence the unemployment level and be geared according to the regime. In addition, in such a case, the union is also interested in inflation, which is affected by monetary policy. In the cooperative case, the government can thus create externalities for the union and thus improve the union's level of satisfaction. This depends on the nature of externalities, which can be positive or negative

To understand the types of externalities arising from the government's action on the union's preferences, let us refer to the two possible sub-cases envisaged in section 4.3 and first consider the sub-case where corporatism involves an increase in unemployment and a decrease in inflation. The union's preference will certainly rise, whereas the government's satisfaction increases only if it put a very high weight on the price objective. In this sub-case, corporatism may be feasible, but might not induce a social welfare improvement, since the weight of the social welfare function may be different from the government's inflation aversion. Second, when the corporatist solution is associated with a level of unemployment lower than those of the non-cooperative regimes, it is always feasible for the government (and it is always a social improvement), but the union non-negativity constraint will be satisfied only for a (relatively) high degree of inflation-aversion.

The reason for the results obtained in both sub-cases must be found in the non-neutrality of monetary policy that characterises the game when an inflation-averse union is assumed. In the non-cooperative regimes, since monetary policy is not neutral, the employment level is no longer the first best for the union, but will be lower according to how much the government takes account of inflation (which is the cost that the government now faces when reducing unemployment). Therefore, a corporatist solution associated with unemployment rates higher than those of the non-cooperative regimes definitively raises union's utility both because of the higher unemployment (which raises the overall utility associated with the real wage and employment) and the lower prices that are always associated with a corporatist regime. By contrast, corporatist solutions associated with unemployment rates lower than those resulting in the non-cooperative regimes have an ambiguous effect on the union utility, since the low unemployment tends to decrease it whereas the lower prices have an opposite effect. The prevailing force will depend on the relative weight that the union puts on price stability.

Ceteris paribus, the higher the union inflation aversion the higher is the gain in utility with respect to the cost and, therefore, the likelihood of the corporatism to be feasible.

Our results are rather robust since they have been tested for different non-cooperative regimes and different specifications of the union preference in both arguments and form (see, e.g., the Appendix to this paper).

6. Conclusions

This paper has analysed questions concerning both the macroeconomic performance and feasibility of corporatism. Indeed, we have considered a specific aspect of it: cooperation between the government and the union. We have focussed on this kind of cooperation since it has often been observed in recent years, but has been little studied , with only a few exceptions.

We have first considered the usual approach to cooperation in the policy game literature. Modelling it as the result of the maximization of a utilitarian function without taking account of the outside option, we have found that in our macroeconomic setting the following results hold.

1. Corporatism always succeeds in lowering inflation *vis-à-vis* all types of non-cooperative solutions.
2. If the union is indifferent to inflation, corporatism also results in a level of employment higher than in any non-cooperative solution.
3. If the union cares about inflation, superiority of corporatism in terms of employment is more likely to be guaranteed the higher the relative bargaining power and the inflation-aversion of the government and the lower the union's degree of inflation aversion.

In terms of any social loss function increasing in unemployment and inflation, if the union does not care about inflation, the corporatist solution is always preferred to any non-cooperative regime, since it has positive consequences on both inflation and unemployment. By contrast, in the case of an inflation-averse union, the effects on the social loss are indeterminate (unless the government's preferences coincides with the social ones), since inflation would always be lower, but the effects of cooperation on employment are uncertain.

These conclusions are robust with respect to different non-cooperative solutions and union preference functions either quadratic or linear in real wages.

Once feasibility is introduced, some further issues emerge. In fact, by investigating the robustness of our results with the introduction of feasibility and the consideration of the more general Nash product approach to cooperation, we have highlighted the strict restrictions on players' preferences that support them.

More in detail, a corporatist solution is not feasible if the union is indifferent to inflation. This result is due to the neutrality of monetary policy: the union is fully satisfied with non-cooperative solutions and no gain is associated with cooperation. By contrast, corporatism has chances to be feasible in the case of an inflation-averse union, when monetary policy is no longer neutral. Thus the union is not fully satisfied with the outcomes of non-cooperative games and gains from cooperation are possible. Feasibility is however associated with very strict constraints.

Summarizing, corporatism seems to be compatible with a scenario where both the government and the union largely dislike inflation. If the union does not care about inflation (or does so moderately) the only way to support a corporatist solution would be through a compensating system of transfers from the government to the union, which might however be difficult to design.

We conclude by emphasising two possible lines of future research. One is related to the extension of our baseline model to more complex environments, which also account for, e.g., public expenditure and other distortions different from those related to the labour market. Another line of future research is related to the explicit modelling of a transfer system, which could be done by inserting taxation and money transfers in the model or considering an issue linkage approach. The latter approach, largely used in environmental policy, seems to be very promising and particularly suited for our context.

Appendix – Robustness to union preferences

All our claims also hold for a union preference function quadratic in the real wage, employment and, possibly, inflation. This is the case considered by Gylfason and Lindbeck (1994). Since these authors are interested in issues of monetary policy neutrality, they stress the result that corporatism does not eliminate the unemployment bias, while doing so for the inflation bias. However, it is easy to show that in their model the unemployment level – while being still positive – is lower in the cooperative case, if the union cares only about the real wage and employment. For the sake of brevity, here we will show cooperative and non-

cooperative results in terms of unemployment only, since Gylfason and Lindbeck (1994)[21] do not stress such results.

Let us substitute the following expression to (4):

$$W_U^{'} = -\frac{\alpha}{2}(w - p - w_U)^2 - \frac{1}{2}(l - n_U)^2 - \frac{\vartheta}{2}(\pi - \pi_U)^2 \tag{A1}$$

In the Nash non-cooperative case we get:

$$u_N^{'} = \frac{\overline{n} - ab\alpha\beta w_U}{a\alpha\beta + b^2(a\beta + b\vartheta)} \tag{A2}$$

whereas cooperation gives:

$$u_C^{'} = \frac{\alpha(1-\gamma)(\overline{n} - bw_U)}{a(1-\gamma) + b^2} \tag{A3}$$

By subtracting (A2) to (A3) we get that the condition for the cooperative unemployment solution to be lower than the non-cooperative one is the same as (25). In the case when the union does not care about inflation, equation (25) can never be satisfied: also for a union preference function quadratic in the real wage, the cooperative solution is Pareto superior to the non-cooperative one.

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[21] Other results are available upon request.

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Figure 1 – Discretionary monetary policy regime

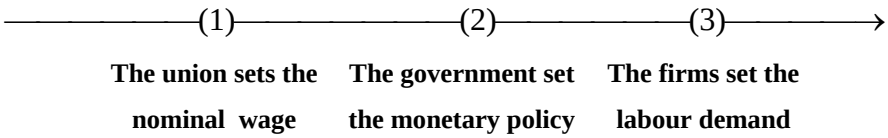
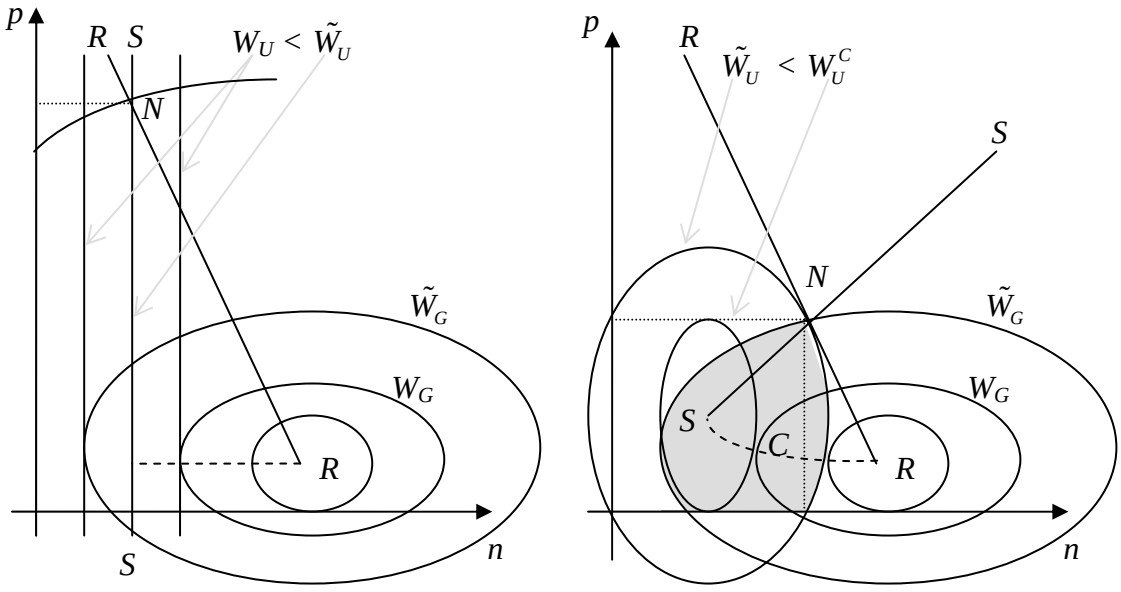


Figure 2 – Nash product and cooperative equilibrium



Panel (a) Panel (b)