

Mixed Signals:
Central Bank Independence, Coordinated Wage-Bargaining,
and European Monetary Union

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ABSTRACT:

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The conventional postulate underpinning plans for European Monetary Union and many recent national reforms holds that increasing the independence of the central bank can reduce inflation without any (real) economic effects. However, the theoretical and empirical substantiation of this claim turns on models of the economy that omit institutional variables other than the central bank. When the character of wage bargaining is included, we find that it conditions the economic impact of central bank independence by altering the efficacy of the signaling mechanism between the bank and the economy. Greater independence can reduce inflation without major employment effects where bargaining is coordinated but brings higher levels of unemployment where bargaining is uncoordinated. Thus, inflation control in the EMU may entail relatively high levels of unemployment and the costs and benefits of the move to EMU will be distributed unevenly both across nations and within them.

Mixed Signals: Central Bank Independence, Coordinated Wage-Bargaining,
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In recent years, economists, financial journalists and policy-makers have been swept up in a wave of enthusiasm for reforms to make central banks more independent from national governments. In economics, there is now a vast literature that endorses central bank independence as a costless means of lowering inflation. The international financial press has ardently concluded that: "The argument for central bank independence...appears overwhelming."¹ Therefore, it is not surprising that many nations, such as Belgium, France, New Zealand and Sweden, have recently made their central banks more independent and many other nations are considering a similar move.²

Some of the most consequential steps in this direction have been taken by the European Union. Its plans for European Monetary Union (EMU) call for the creation of an independent European Central Bank, whose executive board is to be appointed for eight-year terms and forbidden to receive instructions from other EU or national institutions. Although difficulties in meeting the convergence criteria have delayed its implementation, plans for EMU are still proceeding on the premise that an independent central bank will unambiguously enhance Europe's economic well-being.³

The case for an independent central bank rests on three pillars. First, a substantial body

¹ The Financial Times 12 November 1992, 20.

² The Financial Times 6 January 1993, 2; 14 September 1993, 3.

³ Indeed, some European nations are enhancing the independence of their central banks because the Maastricht Treaty requires such a step in the second stage of movement toward EMU. See: Eichengreen 1990, 117-87; de la Dehasa et al. 1993; Gros and Thygesen 1992; Goodhart 1995, 448-506; Fratianni, von Hagen, and Waller 1992; and Fratianni and von Hagen 1992, 187-88.

of economic theory now suggests that the independence of the central bank enhances economic performance.⁴ Second, several national cases are frequently cited to support this view. Among the most prominent is the Federal Republic of Germany, whose ability to secure low rates of inflation at relatively low rates of unemployment is often associated with the independence of the *Bundesbank* and plans for the new European Central Bank are clearly modeled on it.⁵ Third, an influential set of empirical investigations advance the proposition that, by making the central bank more independent, a nation can secure lower rates of inflation without any adverse economic effects.⁶

The object of this article is to question several features of the consensus that has emerged in favor of independent central banks.⁷ We focus on three questions. How should the way in which a central bank affects the economy be understood? Does making the central bank more independent invariably result in better economic performance? Will the creation of a European Monetary Union equipped with such a bank improve economic well-being in its member states? We proceed by considering each of the pillars on which the case for a more independent central bank now rests, beginning with the theoretical rationale, following with a reconsideration of the German case, and concluding with the analysis of cross-national empirical data.

Our analysis is driven by the contention that most existing analyses of central bank independence fail to specify properly the way in which central banks operate on the economy

⁴ Some of the basic literature is collected in: Persson and Tabellini, eds., 1994; for the most extensive treatment, see: Cukierman 1992.

⁵ Fratianni et al. 1992; Alesina and Grilli 1993.

⁶ Among the best of these is Alesina and Summers 1993. See also Grilli, Masciandaro, and Tabellini 1991.

⁷ For a much earlier version of these arguments with more limited data analysis see: Hall 1994. See also Franzese 1994 for a more formal statement of these arguments and the extension of them to consideration of sectoral differentiation among the economic actors along with more extensive data analysis.

because they ignore the broader organization of the political economy. In this respect, this article is an effort to bring the insights of comparative political economy to bear on an issue that is often treated in overly-narrow economic terms. It can be read as a critique of the central bank independence literature, as a reevaluation of the consequences of European Monetary Union, and as an argument about the importance of interaction effects within the organization of the political economy.

II. Theories of Central Bank Independence

A standard neo-classical model underpins most of the literature on central bank independence. It assumes that the rate of inflation is determined primarily by the rate of growth of the money supply, which is controlled by the central bank, although wage pushfulness may affect the rate of inflation or unemployment and only policy changes that are unanticipated will affect the latter.⁸ Within this framework, a variety of theories currently attribute advantages to central bank independence. Some argue that an independent central bank may be able to stimulate the economy more effectively because economic actors are less likely to anticipate a monetary stimulus from it than they would from a central bank more dependent on politicians.⁹ Others argue that central bank independence will reduce the monetary instability or political business cycles that may result from pre-electoral manipulation of monetary policy or post-electoral

⁸ Although some of these postulates may be contentious, we do not take issue with them here as our own arguments hold under a variety of economic assumptions including those of the standard neo-classical framework.

⁹ See Cukierman 1992 on this argument and a variety of others that go somewhat beyond the present discussion.

partisan shocks.¹⁰

However, the claim on which we focus here is the one most frequently cited in favor of central bank independence. It is the claim that, by making the central bank more independent, a nation can secure lower rates of inflation without any adverse effects on the real economy, such as an increase in unemployment. This is the magical achievement on which the widespread appeal of central bank independence primarily rests.

The theory from which this claim is most prominently derived turns on the time-inconsistency problem associated with monetary policy in the context of nominal-wage contracting. Given nominal wage (and price) contracts which must be fixed before monetary policy is set, uncertainty about the future stance of monetary policy (and hence the rate of inflation) will lead contractors to agree on higher nominal wages (and prices) than they desire in order to guard against the possibility that unanticipated inflation will lower real wages (and returns). As a result, wage (and price) settlements will be more inflationary than might otherwise be the case.

Although the central bank may offer assurances that it will refrain from generating such inflation, the credibility of those assurances will be undermined if the bank is responsible to politicians who are known to be sensitive to electoral pressures which might incline them toward more expansionary policy. Thus, rendering the central bank more independent of political control will increase the credibility of its assurances of tight monetary policy, thereby allowing wage (and price) contractors to lower their nominal wage (and price) contracts without fear of any loss of real wages (or returns). The result will be a lower rate of inflation without any

¹⁰ Cf. Nordhaus 1975; Beck 1982; Alesina 1988; and, most recently, Clark, Lomas, and Parker 1995.

adverse effects on the real economy.¹¹

Although it has been subjected to some criticism,¹² this theory is now one of the most widely-accepted in economics. We too find it important and convincing. The principal shortcoming lies not in its basic logic but in the anemic image of the institutional landscape to which it is coupled. In general, this theory and many of the studies that are based on it operate from a standard view of competitive markets to which they add only one institutional variable, the independence of the central bank.¹³ As a result, these studies suffer from two central problems.

First, although the general thrust of their analysis emphasizes the way in which the behavior of economic actors, such as wage and price contractors, can be coordinated, these studies do not acknowledge the presence of other institutions in the economy, apart from conventional market mechanisms and the central bank, that may coordinate such behavior.

Second, although these analyses suggest that the effect of the central bank derives largely from the signals it sends to other economic actors, they do not consider how other institutional features of the political economy might condition the effectiveness of these signals. Instead,

¹¹ The classic source is Rogoff 1985, which builds on Barro and Gordon 1983 and Kydland and Prescott 1977. Cf. Lohmann 1992; and Cukierman 1992.

¹² For one example of such criticisms, see: Posen 1995a; and 1995b.

¹³ Typically, despite the centrality of nominal wage and price contracting to these analyses, the assumption of perfect competition is maintained. Thus, for example, workers in these models have no incentive to attempt to set wage inflation higher than expected price inflation plus expected productivity growth. Any success in doing so under perfect competition merely leads (with certainty) to unemployment. However, introducing wage and price bargaining implies some degree of market power; thus, such incentives do exist. Cukierman 1992 is once again the notable exception in that he does consider trade unions, but he associates them only (and monotonic positively) with wage pushfulness. We know however from previous work in comparative political economy that the effect of wage and price bargaining depends on the institutional setting in which it is conducted. Cf. Cameron 1984; Bruno and Sachs 1985; and Calmfors 1993.

they model the signaling process as a highly diffuse one: each signal from the central bank is sent simultaneously to all the individual actors in the economy, is received by each, and is appropriately acted upon without benefit (or detriment) of any further institutional intermediation.

This signaling process deserves more attention than it often receives. It is central to the mechanism whereby the central bank may secure lower inflation without adverse (real) economic consequences.¹⁴ We contend that the full range of the signaling process must be considered if the effects of central bank independence are to be fully appreciated.

To be effective, a signal must be believed, so credibility is rightly stressed in the economics literature. Yet credibility alone is not enough to make a signal effective. It must also be clearly received by the actors to whom it is addressed, and these actors must, in turn, have both the incentive to respond appropriately and the *strategic capacity*¹⁵ to do so. Our contention is that these necessary (and, together with credibility, sufficient) conditions for the effectiveness of signals are not assured merely by the presence of a credibly independent and conservative central bank but rather also depend critically upon other institutional features of the economy and polity. Let us briefly justify this view.

From the perspective of time-inconsistency problems, the independence of the central bank matters primarily because it alters (i) the content of the signals that the bank sends about the course of monetary policy and/or (ii) the credibility of those signals. The general presumptions, which we share, are that the more independent the central bank, the more

¹⁴ Theories that emphasize pre-electoral and/or partisan manipulation of monetary policy put more emphasis on the trajectory of policy over the electoral cycle, but there too issues associated with central bank independence and signaling are directly relevant. See Clark et al. 1995 on the former point.

¹⁵ The illuminating terminology is from Iversen 1994.

restrictive monetary policy is likely to be and the more credible its commitment to such policy is likely to be.¹⁶ This is important because the principal contention in the literature (with which we agree) is that, if such signals are sent *and heeded*, the central bank can alter the expectations and thus the behavior of economic actors in such a way as to reduce nominal wage (and price) settlements in the economy (and thus lower inflation). It can then pursue a relatively tight monetary policy without actually dampening the economy. If, on the other hand, the signal does not inspire action because those receiving it lack the ability or incentive to respond appropriately, the tight monetary policy promised by the bank will occur in a context of relatively excessive nominal wage and price contracts. The result will then be dampening of the economy: slower or negative growth and higher unemployment--in short, a recession.

In this context, the quality of the entire signaling mechanism is important, from the character and construction of the signal to the receptivity and responsiveness of its audience. The metaphor is a radio broadcast. To date, most of the literature on central bank independence has focused on the content and credibility of the signal sent by the bank; *i.e.*, the focus has been on the characteristics of the sender as they determine the substance of the message and its believability. A little attention has been paid to the quality of the transmission, *i.e.* to the possibility that uncertainty and/or incomplete information may add static to the broadcast.¹⁷ Questions about how the characteristics and structural context of the audience may affect their receptivity to these signals and their ability to respond to them appropriately have so far largely been ignored. The assumption has been that once sent (credibly), such signals will automatically (correctly) influence the behavior of most actors in the economy.

¹⁶ Wooley 1984; Goodman 1992.

¹⁷ Again, Cukierman 1992 is the pioneer. He explores the impact of central bank independence under differing assumptions about the expectation structures of the actors.

By contrast, we contend that the receptiveness of economic actors to signals from the central bank can vary and may be affected in particular by a range of ancillary institutional conditions which latter thereby condition the effectiveness of the overall signaling process itself. If this is correct, it is crucial to bring additional institutional variables into the analysis. In this paper, we take a step in that direction by incorporating the institutional character of wage bargaining into the analysis of central bank independence.¹⁸

III. The Role of Coordinated Wage Bargaining

Our choice of variables is not coincidental. A review of the literature in comparative political economy reveals that the institutional variables most often said to affect economic performance are those associated with the character of wage bargaining.¹⁹ To date, scholars seeking institutional explanations for the rate of inflation have been confronted with two quite separate literatures, one emphasizing central bank independence and the other focused on wage bargaining. It is time to integrate the two more fully.

We focus here on *the coordination of wage bargaining*, a phrase that refers to the degree to which the determination of wage settlements is actively coordinated across the economy by trade-union and/or employer organizations. That, in turn, depends heavily on the organizational structures for wage bargaining which vary from country to country.

¹⁸ Franzese 1994 adds variation in the sectoral (structural) position of the actors to this sort of analysis. Iversen 1994 analyzes a similar set of considerations in a somewhat different framework.

¹⁹ Cf. Cameron 1984; Calmfors 1993; Calmfors and Driffill 1988; and Lange and Garrett 1985. The other variable most often cited as important in this literature is the partisan composition of the government, which we also include in our regression models but, strictly speaking, it is not an institutional feature of the political economy.

The early literature on this subject associated wage coordination entirely with highly centralized trade-union movements bargaining with employer confederations at the peak level. In recent years, however, two important amendments have been made to this view. First, it has been shown that employers' organizations can play a role in the coordination of wage bargaining as important as that of trade unions.²⁰ Second, it has been noted that effective coordination can take place within either of two organizational structures. In one, the principal locus of bargaining is at the economy-wide or peak level, where negotiations occur among highly-centralized trade union and employers confederations. In the other, wage negotiation takes place primarily among trade unions and employer organizations highly concentrated at the sectoral level but equipped with sufficient economy-wide linkages to transmit the settlement reached in a leading sector across the economy.²¹

The organizational setting is important to the process of wage bargaining because the latter involves a series of collective-action dilemmas in which cooperative action can produce Pareto superior outcomes, characterized here by low levels of inflation at low levels of unemployment, but these outcomes are unlikely to be achieved without a framework of institutions conducive to cooperation. In their absence, the dominant strategy for individual actors is to defect from cooperative behavior. The relevant institutions make Pareto-superior outcomes possible in classic fashion, by providing the actors with mechanisms for communicating about their preferences and for making credible commitments to each other, thereby reducing uncertainty and altering each actor's expectations about the behavior of others

²⁰ Thus, wage bargaining can be coordinated in Japan, where the unions are company-based, because bargaining is concentrated into a single "spring offensive" and employers can utilize their dense network of business associations to coordinate the negotiations. See: Soskice 1990; Swenson 1989; and Thelen 1994.

²¹ Golden 1993; Iversen 1994.

enough to make cooperative action possible. Although the institutional arrangements that accomplish the task vary from one case to another, all have this general character.

The full set of institutional arrangements required to support coordinated wage-bargaining are complex because they must generate cooperative outcomes in five sets of strategic interactions that are all intrinsic, as nested games, to successful wage coordination.²² The first is the interaction that takes place within each dyad of bargainers between the organizations representing workers and those representing employers. The second takes place between the bargainers in each dyad and their counterparts in other dyads. The third is the interaction between the leaders of bargaining organizations and the rank and file members whose support they must retain. The fourth occurs between wage bargainers as a group and the authorities controlling economic policy. The fifth appears between the authorities who control monetary policy and those who control fiscal policy. The analysis that follows emphasizes some of these interactions more than others.

To appreciate the impact of coordinated wage-bargaining on the economy, consider initially the case in which bargaining is not coordinated but conducted by many units acting separately. In this setting, each bargaining unit, generally a dyad of employer and union, must reach a settlement in the context of considerable uncertainty about what the settlements reached by other bargaining units will be. This sort of bargaining structure is conducive to three behavioral consequences.

First, the union in each dyad will be tempted to seek an extra “inflation increment” on top of the real wages it desires in order to protect itself from the real-wage losses it will incur if other settlements are more inflationary than its own. If uncertainty about the level of other settlements

²² Cf. Scharpf 1988; and Tsebelis 1990.

is high, this inflation increment may be quite large. Because employers can expect such inflation to erode any nominal wage concessions they make, they will also be more likely to accede to high settlements.

Second, in this setting, the actors in any one bargaining unit are unlikely to let considerations about the effects of their settlement on the overall economy (on inflation, unemployment, national competitiveness, *etc.*) influence their decision-making, because any one bargaining unit is normally too small to have a noticeable impact of its own on the economy. This posture will be reinforced by the fact that other bargaining units can be expected to take a similar view; hence, if one union moderates its nominal-wage settlement in the national economic interest, it may suffer real-wage losses from the failure of other units to do so.²³

Third, when the economy-wide level of wage settlements proves inflationary, the fiscal or monetary authorities may respond with deflationary policies. In an uncoordinated setting, however, the actors in any one of the many bargaining units are unlikely to let the prospect of such a policy-response influence their own settlement very much because they know that the government will be producing a policy in response not to it but to settlements across the economy as a whole, which they cannot control. Again, if any one union moderates its nominal-wage settlement with this in mind, it may suffer substantially from the likely failure of other dyads to do so. *Thus, in uncoordinated settings, wage bargainers are unlikely to be highly responsive to threats from the fiscal or monetary authorities to respond to inflationary settlements with deflation.*

Compare now the case in which wage bargaining is coordinated. In such settings, a central or lead bargain has great influence over the level of wage settlements in the economy as a

²³ This parallels the arguments in Olson 1965; and 1982.

whole as subsequent bargains generally follow the pattern it sets with small adjustments for local conditions. Several implications follow from this.

First, since the members of each bargaining unit, and especially the one negotiating the lead settlement, know what the level of subsequent wage settlements is likely to be once they have settled on their own, (either because their bargaining organizations represent most employers and most of the workforce or because the bargaining system is organized in such a way as to generate similar settlements across the economy,) they need not build an increment for unanticipated inflation, arising from other settlements, into their own agreement.

Second, because the lead bargaining unit knows that its settlement is likely to be generalized to the whole economy, the actors within it have strong incentives to take the impact of their settlement on the overall economy into account when negotiating it. After all, they can predict that impact because their settlement is likely to produce similar settlements elsewhere; and the aggregate economic effects will fall on their own members. For this reason, we can expect general concerns about the levels of inflation, unemployment and national competitiveness to influence wage settlements more strongly in coordinated systems of wage bargaining (in the *parlance* of the literature, the aggregate effects are “internalized” by coordinated bargainers).

An important empirical hypothesis follows from these observations. They suggest that the presence of coordinated wage-bargaining should have an impact of its own on the rate of inflation experienced by a nation. *Ceteris paribus*, where wage bargaining is more coordinated, we should see lower rates of inflation, whether or not the central bank is independent.

Even more central to our argument, however, is the way in which the system of wage bargaining interacts with the character of the central bank. This turns on the third point of

contrast between uncoordinated and coordinated systems of wage bargaining. In the latter, because the lead settlement is likely to be copied elsewhere, it will have clear effects on the whole economy. As a result, those negotiating it know that the central bank is likely to respond directly to it. This renders the principal wage-bargainers highly sensitive to the signals being sent from the central bank (and potentially from the fiscal authorities as well) about the appropriateness of potential wage settlements and the potential policy response to them. In short, *the signals sent from the central bank are more likely to affect the level of wage settlements in settings where wage bargaining is coordinated than in settings where it is not.*

This has important consequences. Because the structural sensitivity of those negotiating the lead wage settlement to the potential policy response of the central bank is likely to be greater where wage bargaining is coordinated, the signals sent from the central bank in advance of a settlement are often enough to have a major impact on that settlement. Thus, in such settings, the central bank need not resort so often to deflationary policies that induce wage and price moderation by increasing unemployment. By contrast, where wage bargaining is uncoordinated, small bargaining units have no reason to expect a direct policy response to *their* wage settlement *per se* and disincentives to exercise moderation in response to generalized policy threats because they have no reason to believe that others will also do so. Thus, in such settings, the central bank may have to apply draconian policies that induce substantial increases in unemployment before the relevant wage and price contracts respond.

In sum, we argue that the system of wage bargaining is a key component of the overall signaling mechanism that links the central bank to economic actors. That mechanism will be considerably more efficient where wage bargaining is coordinated than where it is not. Accordingly, we expect to see significant interaction effects between the character of the wage-

bargaining system and the character of the central bank. As standard theory predicts, increasing the independence of the central bank is likely to reduce the rate of inflation in all systems. However, it is likely to do so without large increases in unemployment only in systems where wage bargaining is coordinated because the signaling system works well there. By contrast, in nations where wage bargaining is less coordinated, an increase in the independence of the central bank is likely to reduce inflation only at the cost of corresponding increases in unemployment, because the bank will often have to resort to deflationary policies to bring down the rate of inflation. In short, in terms of overall economic performance, increasing the independence of the central bank will have more salutary effects in some nations than in others.

In the sections that follow, we use a cross-national empirical analysis to test the validity of these propositions. First, however, we examine their plausibility in a crucial (because often-cited) national case, that of Germany.

IV. The German Model Reconsidered

The Federal Republic of Germany has long been one of the most prominent national cases adduced to support arguments for the economic effects of central bank independence. Its *Bundesbank* is considered the most independent central bank in the world and, for most of the postwar period, the German economy has been able to achieve low rates of inflation at relatively low rates of unemployment.²⁴ Thus, it is tempting to conclude, as many do, that the principal factor accounting for this outstanding economic record is the independence of the *Bundesbank*. This may also have been one of the reasons why the design of the central bank for the European

²⁴ Cf. Lohmann 1994.

monetary union is modeled on the *Bundesbank*.²⁵

A closer examination of the German case, however, suggests that the *Bundesbank* is not the only institutional feature of the German economy that has contributed to the achievement of simultaneously low inflation and unemployment.²⁶ In what follows, we argue that the institutional arrangements for wage bargaining have also greatly enhanced the capacity of the German economy to attain low rates of inflation at relatively low rates of unemployment.²⁷ An examination of the German case also allows us to explore in more detail the nature and operation of institutional arrangements for coordinated wage-bargaining, although these will vary to some extent from nation to nation.

We begin by outlining the principal institutions that underpin wage bargaining in Germany. The German workforce is organized into 17 large unions, often covering entire industries, which also belong to an overarching union confederation, the DGB, (*Deutscher Gewerkschaftsbund*).²⁸ These unions bargain with employer associations, also organized by industrial sector, representing 80 percent of German employers. Thus, collective bargaining is relatively centralized at the industry level. Both the unions and the employers associations are strongly positioned *vis-à-vis* their rank and file by virtue of the control they exercise over a range

²⁵ Alesina and Grilli 1993; Eichengreen 1992, 38 ff.

²⁶ Although the focus of this analysis is on the organization of the political economy, other factors may have contributed to Germany's good inflation record, including the strong growth of the economy and a more general cultural aversion to inflation born of the experience of hyperinflation in the 1920s. We are inclined to see these as minor contributors to the outcome, but others accord them a more prominent role. For general arguments about such points, see; Hirsch and Goldthorpe, eds., 1978; and Lindberg and Maier, eds., 1985.

²⁷ For analyses that explore the German case more fully than we can here, see Soskice 1990; Scharpf 1991; and Streeck 1994. See also: Hall 1986, ch. 9 for an early formulation of these arguments.

²⁸ Two smaller union confederations, the DAG and DBB, are not in a position to have much influence on the overall outcomes, particularly the former which is very small, while the DBB represents civil servants whose pay is set by legislation.

of resources important to their members, such as skill certification and vocational training schemes.

The system is supported by a legal framework that regulates many aspects of the bargaining process, specifies that only legally-recognized unions can conclude collective wage-agreements, and allows industry settlements to be extended to cover all companies in a sector by agreement between the union, the employers association and the regional governments. At the plant level, the system is underpinned by a system of elected works councils on which the unions are generally represented, which can negotiate local working conditions and, informally, local pay structures.²⁹

Equally central to the operation of the system is the less-formal arrangement whereby the settlements of most industries follow the precedent set by the bargain reached in a leading sector each year. For most of the postwar period, these leading bargains have been concluded between *IG Metall*, the massive metalworkers union which organizes a range of industries including automobiles, engineering and steel, and the corresponding employers federation, *Gesamptmetall*.³⁰ A variety of factors converge to give *IG Metall* this role and to ensure that other industries will follow its lead. Since it is the largest and one of the strongest German unions, the others can follow its lead knowing they would be unlikely to improve on its settlement, and the powerful employers' associations tend to resist increases beyond what it secures.³¹

²⁹ On the importance of works councils in the overall system, see Thelen 1992; and Streeck 1984. More generally, see Markovits 1986; Katzenstein 1987, ch. 3; and Berghahn and Karsten 1987.

³⁰ The notable exception occurred in 1974 when, ÖTV, the public sector union, took the lead in the negotiating round with less-than-ideal results. For a description of the events, see Goodman 1992, 71.

³¹ Cf. Flanagan, Soskice, and Ulman 1983, ch. 5; Markovits 1986; and Thelen 1991.

It should be apparent that these institutional arrangements constitute a system for highly coordinated wage-bargaining; and it should be apparent how the system tends to promote low rates of inflation. Since the lead bargainers in the metalworking industries know that their settlement is likely to be generalized to the whole economy, *IG Metall* need not seek an additional increment to guard against unanticipated levels of inflation that might follow from subsequent settlements. Both *IG Metall* and the corresponding employers' federation, *Gesamptmetall*, have strong incentives to take the overall economic impact of any potential settlement into account when determining it. Thus, the system of wage bargaining itself tends to reduce rates of inflation.

In addition, the German system also makes possible a particular kind of interaction between wage bargainers and the central bank. The highly-public *pas de deux* between the *Bundesbank* and the principal wage bargainers, which occurs at the time of every annual wage round in Germany, is a prominent feature of politics there. The bank often issues pointed comments on the initial wage demands made by the union involved in the leading settlement, accompanied by detailed commentary about the state of the economy and warnings about the policy consequences of overly-inflationary wage settlements. Because bargaining is relatively centralized, the principal negotiators are not left in much doubt about whether the bank intends to respond to their particular settlement; and it is not uncommon for them to issue counter-statements about the likely effect of their demands on the state of the economy.³²

In short, the coordination of German wage-bargaining renders the process of signaling that takes place between the central bank and wage bargainers highly effective. The bank can respond directly to a leading settlement; and it behooves those negotiating it to take seriously the

³² Cf. Streeck 1994; Scharpf 1991, ch. 7; and Berghahn and Karsten 1987.

bank's threats to do so. The system does not work perfectly: at times, wage bargainers defy the bank, whether to test its resolve or to satisfy their rank and file; but there can be no doubt that over the long run they have paid careful attention to its threats. It is clear that, as a result, the *Bundesbank* has been able to use this signaling mechanisms on many occasions to induce more moderate wage settlements without having to resort to draconian monetary policies or sharply higher levels of unemployment.

It is likely that the independence of the *Bundesbank* also enhances the effectiveness of this signaling process, as conventional theory suggests, by rendering the threats that the bank issues more credible than they might be if monetary policy were controlled by elected politicians. Indeed, as Iversen has suggested, central bank independence may be especially useful in a system where wage bargaining is coordinated but takes place primarily at the industry-level, like that of Germany.³³ In such a system, the added credibility that independence confers on the threats emanating from the central bank may help to ensure that subsequent industry agreements do not exceed the leading bargain.

There is also evidence that the effectiveness of the signaling mechanism in Germany is further enhanced by the pivotal role that the export sector plays in wage bargaining. Metalworking, the sector which produces the leading bargain in most years, has a high export concentration. In itself, this induces lower settlements because wage bargainers in export sectors are especially concerned to maintain unit labor costs at internationally competitive levels. However, actors in such sectors are also especially sensitive to signals from the central bank because, as well as more generally depressing economic activity, the restrictive monetary

³³ Iversen 1996. Note that the rationale he provides for this observation differs to some degree from ours.

policies that the bank wields also tend to appreciate the exchange rate, thereby threatening the level of economic activity in export sectors especially severely.³⁴

In sum, there are good reasons to believe that the capacity of postwar Germany to secure low rates of inflation at low rates of unemployment is not attributable solely to the independence of the *Bundesbank*. Germany also has a highly coordinated system of wage bargaining that is conducive to lower rates of inflation. Moreover, in order to secure low rates of inflation without high rates of unemployment, the *Bundesbank* has been able to rely on a signaling mechanism in the German political economy whose effectiveness derives from the *combination* of central bank independence and coordinated wage-bargaining.

V. A Cross-National Analysis

We turn now to cross-national empirical investigation of the propositions advanced here. As noted above, one of the most important bases on which the enthusiasm for central bank independence is founded has been a set of simple yet influential empirical studies which conclude that, by increasing the independence of its central bank, a nation can reduce its rate of inflation without any adverse real economic consequences. One such article concludes, “having an independent central bank is almost like having a free lunch; there are benefits but no apparent costs in terms of macroeconomic performance.”³⁵

However, most of these empirical studies suffer from a serious flaw. In keeping with a neo-classical model that portrays the economy as largely homogenous across nations, virtually

³⁴ For elaboration and empirical evidence, see Franzese 1994.

³⁵ Grilli et al. 1991, 375.

the only institutional variable included in their analyses is one reflecting the degree of independence of the central bank.³⁶ Thus, they are founded on an image of the economy that is strongly contradicted by three decades of research in comparative political economy. The latter suggests that national economies display a variety of systematic organizational differences, extending well beyond the nature of the central bank, each of which can have significant economic effects.

As a result of this flaw, the most prominent existing studies tend to attribute to the independence of the central bank a set of economic effects that may actually be conditioned by a much wider array of institutional variables left unspecified by their analyses. Once the equations are respecified to bring such variables into the analysis, two new possibilities open up. First, we may find that the independence of the central bank is only partially responsible for the effects hitherto attributed to it. Second, we may find that the precise impact of increasing the independence of the central bank depends on the configuration of other institutions in the political economy.

In the theoretical sections of this paper we have argued that it is especially important to include in such analyses an institutional variable representing the degree to which wage bargaining is coordinated. Four specific empirical hypotheses follow from the analysis developed there.

First, nothing in our account contradicts the conventional proposition that an increase in the independence of the central bank will lower the rate of inflation experienced by a nation. Thus, we expect to see a negative relationship between central bank independence and the rate of

³⁶ For two notable exceptions, see: Havrilesky and Granato 1993; and Al-Marhubi and Willett n.d.

inflation in cross-national data.

However, for reasons adduced in section III, our second hypothesis is that the level of wage coordination will also have an effect on the rate of inflation independent from any effects of central bank independence. This follows from the argument that, where wage bargaining is more coordinated, individual bargaining units will face more institutional incentives to avoid inflationary wage settlements than will their counterparts in settings where wage bargaining is less coordinated.

Third, our theoretical perspective leads us to expect interaction effects between the level of central bank independence and the level of wage coordination. Since we expect that both central bank independence and coordinated wage-bargaining lower the rate of inflation and that the unemployment cost at which each does so depends on the level of the other, we anticipate some interaction effects between these two variables with regard to the rate of inflation. Where one is at a high enough level to have reduced inflation considerably already, we expect the marginal effects of increases in the other to be relatively small. Conversely, where one of these institutional variables is small, we expect an increase in the other to have large (negative) marginal effects on the inflation rate. This should show up as a positive coefficient on the interaction term in a regression, coupled with negative coefficients on the non-interactive terms, such that the marginal effect of each on inflation is everywhere negative but decreasingly so as the other increases. This is our third hypothesis.

Fourth, and perhaps most important, we have argued that the economic effects of central bank independence depend on the quality of the signaling mechanism linking the bank to economic actors and that the quality of this mechanism turns heavily on the character of the wage bargaining system. The clear implication of this is that the conventional view, which holds

that increasing the independence of the central bank will lower the rate of inflation without any negative real economic effects, is wrong. Instead, such effects may arise and their incidence will vary across nations depending on the character of the wage-bargaining system. To simplify slightly, we can distinguish between two kinds of nations. In those where wage bargaining is coordinated, our hypothesis is that increasing the independence of the central bank may indeed reduce the rate of inflation without adverse real economic consequences because the signaling system connecting the central bank to economic actors is highly efficient there. In nations where wage bargaining is less coordinated, however, we expect to find that increasing the independence of the central bank lowers the rate of inflation only at the cost of substantially higher rates of unemployment, because the signaling mechanisms there are not efficient enough to allow the bank to reduce the rate of inflation without actually implementing restrictive monetary policies that raise unemployment. Thus our final hypothesis is that the unemployment cost of central bank independence may not be zero. Instead, it should increase as the coordination of wage bargaining decreases. The corollary is that the unemployment benefits of coordinating wage bargaining should increase with the independence of the central bank.

In order to test these hypotheses, we have assembled a data set covering all the OECD nations for which comparable data could be secured for the period from 1955 to 1990.³⁷ To measure central bank independence, we use an average of five available indices, which assess both the legal status of the central bank and its reputation for independence.³⁸ To measure the

³⁷ These 18 cases represent all the major developed democracies from which Greece, Spain, and Portugal are excluded because they had regimes for much of the period that were undemocratic for which reason it was too difficult to code the coordination of wage bargaining in a manner comparable with the others.

³⁸ The five indices averaged here are those most commonly employed in the literature: LVAU, an unweighted average of several legal characteristics and QVAU, an unweighted average of survey results for CBI from Cukierman 1992; EC, the rating of the economic independence of the

degree to which wage bargaining is coordinated, we construct an index based on the one devised by Soskice, extrapolated to a wider range of cases using the assessments Layard, Nickell and Jackman make of trade union and employer coordination and standard accounts of industrial relations systems.³⁹ This index codes each nation at one of four points (0, .25, .50, 1.0) based on the degree to which wage bargaining has been coordinated by trade unions or employer associations over the course of the 1955-1990 period.⁴⁰

We have deliberately taken a cross-sectional approach to the data analysis. Although this approach limits the degrees of freedom, we think it especially appropriate for assessing the impact of structural variables, such as central bank independence and the coordination of wage bargaining, which are long-lived and do not change dramatically over the period.⁴¹ Our premise

central bank, and POL, the rating for political independence from Grilli et. al. 1991; and the frequently cited index in Bade and Parkin 1982.

³⁹ Soskice 1990, 55; Layard, Nickell, and Jackman 1991, 52; Flanagan, Soskice, and Ulman 1983; Ferner and Hyman, eds., 1992; Baglioni and Crouch, eds., 1990; Crouch 1993.

⁴⁰ Some scholars prefer to employ an index based on union organization for these purposes, which has the advantage that the index can be derived from quantitative data on memberships. However, this violates the principal proposition of Soskice, Swenson and others that employers associations as well as trade unions contribute to wage coordination; and cross-national quantitative data on employer organizations do not exist. Thus we developed an index for the degree to which wage bargaining is coordinated prior to the data analysis and based as closely as possible on the indices developed independently by Soskice 1990 and Layard *et al.* 1991. To test the robustness of our findings against possible alternative specifications of wage coordination, we included a variable measuring union density in some runs of the regression and excluded Japan and Switzerland, which are sometimes seen as controversial cases, from others. In each case, the substantive conclusions to be drawn from the signs, size, and significance of the coefficients which we report here remained unchanged.

⁴¹ Alesina and Summers 1993 employ a similar approach. Close inspection of time-sensitive indices of central bank independence and trade union concentration suggests that these variables did not shift substantially over time, at least in the 1955-1990 period, and not enough to affect overall country rankings. See: Franzese 1994, Table II; and Golden and Wallerstein (forthcoming). The widespread movement toward more independent central banks came after 1990. The one exception is Italy, where the central bank became more independent in *il divorzio* of 1982. Our measure effectively averages this change over the postwar period; to consider whether this could potentially have had undue effect on the results, we reestimated all relationships for a sample that excludes Italy, and found no important differences in the results.

is that the effects of such variables show up most clearly when assessed over a long period of time and that greater confidence can be placed in any relationships that are revealed if they persist (on average) over a wide variety of economic contexts, extending from the years of postwar growth when inflation and unemployment were generally low, through the high-inflation period of the 1970s, to the high unemployment decade of the 1980s. Moreover, the empirical analyses from which the central bank independence literature has drawn its most influential support have been based almost entirely on the same average postwar experience of the same 15 to 21 developed democracies we examine here. In recognition of the limited degrees of freedom, we conducted a sizable number and variety of tests assessing the robustness of our findings.⁴²

We begin with some simple cross-tabulations that clearly display the patterns in the data. Table One reports the rates of inflation and unemployment as well as an Okun index that sums the two rates to reflect the overall level of “economic misery” for nations that feature different levels of central bank independence and wage coordination. It is apparent that countries with more independent central banks do tend to have lower rates of inflation, as conventional analysis

⁴² These included sequential deletion of cases and re-estimation, checks of robustness to alternative measures of bargaining coordination and/or central bank independence, cross-validation of model selection by out-of-sample predictive power (see Beck and Katz 1995), checks of robustness against alternative (to OLS plus White’s standard errors) means of estimating the equation, running the regressions without any control variables (to maximize degrees of freedom), *etc.* The results are quite satisfactorily robust to these sorts of perturbations; details available from the authors upon request. The alternative, which some prefer, is to address these issues with a cross-sectional, time-series analysis, with the country-year as the unit of analysis, which provides greater degrees of freedom and more sensitivity to period effects. This approach is certainly useful in some contexts. However, it generally entails efforts to measure small temporal variations in the structural variables, which would likely expose the results to more substantial measurement-error and may not be warranted by our conception of the independent variables and their long-run relationships with the dependent variables. For an analysis employing cross-sectional time-series at an intermediate level of time-aggregation (decades) that reaches conclusions substantively supportive of those reported here, see Franzese 1994; see also Garrett and Way 1995 and Iversen 1994; and 1996.

and our first hypothesis predicts. In addition, as our second hypothesis predicts, increasing the level of coordination in the wage bargaining system also seems to reduce the rate of inflation. Looking down the unemployment column now, we see that, within each level of central bank independence, more coordinated bargaining is associated with lower unemployment rates. This is the expectation one derives from the familiar neo-corporatist argument that coordinated wage-bargaining is conducive to (real-)wage restraint and thereby low unemployment.

**Table One: Average Inflation and Unemployment Rates under the
Various Institutional Arrangements of the OECD Countries, 1955-90**

Central Bank Independence	Coordination of Wage Bargaining	Average Inflation	Average Unemployment	Misery Index
LOW	LOW	7.5	4.7	12.2
	MEDIUM	5.5	3.5	9.0
	HIGH	6.3	2.0	8.3
MEDIUM	LOW	5.1	6.4	11.5
	MEDIUM	5.8	4.6	10.5
	HIGH	4.4	2.2	6.6
HIGH	LOW	4.4	5.8	10.2
	MEDIUM	3.9	2.0	5.9
	HIGH	---	---	---

Notes: Inflation and unemployment rates are in percentages. The misery (Okun) index is the arithmetic sum of inflation and unemployment rates so expressed. For the purposes of this table, cases were coded as follows. CWB: low = 0 and 0.25, medium = 0.5 and 0.75, high = 1; CBI: low = below 0.5, medium = 0.5 to 0.75, high = 0.75 and above. There are no (high, high) cases under this categorization. For sources and detailed data see Appendix One.

Furthermore, if we compare the changes in the level of unemployment that occur with increased wage-bargaining coordination at different levels of central bank independence, we see a striking interaction effect. Notice that at low central bank independence, the movement from a “low” level of wage-bargaining coordination to a “medium” level reduces unemployment by 1.2 percentage points. At medium levels of central bank independence, however, such a movement reduces unemployment by 1.8 points, and at high levels of independence by 3.8 points. This accords with our fourth hypothesis that the beneficial impact on unemployment of coordinating wage-bargaining increases as the central bank becomes more independent and its corollary that the unemployment cost of increasing central bank independence will decline as wage bargaining becomes more coordinated.

We can see the effects of this phenomenon even more clearly in Table Two below. Recall that our hypotheses challenge the contention that increasing central bank independence will improve the rate of inflation without any adverse real economic consequences. Instead, we suggest that the aggregate economic effects of central bank independence will depend on the degree to which wage bargaining is coordinated. Where wage bargaining is highly coordinated, we expect an increase in central bank independence to improve the rate of inflation without substantial cost in terms of additional unemployment. Where wage bargaining is largely uncoordinated, we expect that the effects of increasing central bank independence will not normally be nearly so salutary because it will be possible to secure lower rates of inflation only at higher rates of unemployment.

Table Two: Average Inflation and Unemployment Rates Secured in OECD

Countries under Alternative Institutional Arrangements, 1955-90

INFLATION RATES			UNEMPLOYMENT RATES		
Coordination of Wage Bargaining	Central Bank Independence		Central Bank Independence		
	LOW	HIGH	LOW	HIGH	
LOW	7.5	4.8	LOW	4.7	6.1
HIGH	6.2	4.8	HIGH	2.3	2.8

Notes: Cases were coded as follows: CWB: low = 0 and 0.25, high = 0.75 and 1; CBI: low = below 0.50, high = above 0.50.

In Table Two, we divide the OECD nations according to whether they have a low or high level of central bank independence and a low or high level of coordinated wage bargaining and report the average rates of inflation and unemployment for the countries in each cell. The results are striking. In all cases, an increase in the level of central bank independence is associated with a substantial drop in the level of inflation. An increase in the coordination of wage bargaining also often produces a decrease, albeit less substantial, in the level of inflation. However, the effects on unemployment of increasing the level of central bank independence are quite different depending on the degree to which wage bargaining is coordinated. In nations where wage coordination is high, an increase in the independence of the central bank is associated with a very small increase in the rate of unemployment. Where wage coordination is low, however, an increase in the independence of the central bank is associated with a substantial increase in the rate of unemployment. These findings strongly suggest that, while raising the independence of the central bank has no (or even a slightly beneficial) effect on unemployment in countries with highly coordinated wage-bargaining, it might considerably increase unemployment in countries where wage bargaining is uncoordinated.

In order to provide a more complete test of these hypotheses, we turn now to regression analysis which can assess the effects of these structural variables (CBI and CWB) while controlling for a number of other economic and political variables that might be expected to influence the level of inflation or unemployment. In these regressions we control for: the economic openness of the economy, on the premise that more open economies may experience greater pressure to moderate the level of inflation and more unemployment induced by fluctuations in the international economy; the level of real per-capita gross domestic product, on the premise that less-developed nations may be more tempted to rely on seignorage for revenue

and more susceptible to high levels of unemployment; and the representation of left parties in the cabinet to reflect the widely-accepted view that social democratic governments are more likely to tolerate inflation than their conservative counterparts.⁴³

The basic format of the regressions to be reported here are

$$\pi_t = \alpha + \beta_{CWB} CWB_t + \beta_{CBI} CBI_t + \beta_{CC} CC_t + \beta_{CBI} CBI_t + \epsilon_t$$

$$CWB_t = \beta_{CBI} CBI_t + \beta_{CC} CC_t + \beta_{CBI} CBI_t + \epsilon_t$$

$$CBI_t = \beta_{CC} CC_t + \beta_{CBI} CBI_t + \epsilon_t$$

$$\epsilon_t \sim N(0, \sigma^2)$$

$$U_t = \alpha + \beta_{CWB} CWB_t + \beta_{CBI} CBI_t + \beta_{CC} CC_t + \beta_{CBI} CBI_t + \epsilon_t$$

$$CWB_t = \beta_{CBI} CBI_t + \beta_{CC} CC_t + \beta_{CBI} CBI_t + \epsilon_t$$

$$CBI_t = \beta_{CC} CC_t + \beta_{CBI} CBI_t + \epsilon_t$$

where π is inflation and U is unemployment, C

is a vector of controls (described above) plus the constant, β is a vector of coefficients on those controls and constant, and CWB and CBI are our measures of coordinated wage-bargaining and

⁴³ Economic openness is measured by exports as a percentage of gross domestic product (data from the IMF International Financial Statistics); and the representation of the left in the Cabinet is based on an index that uses data from Lane, McKay, and Newton 1991 and the classification of left parties employed by Swank 1989. Per capita GDP is from the Penn World Tables Mach V and OECD Historical Statistics. Unemployment and inflation are the internationally comparable figures compiled from OECD sources by Layard, *et al.* 1991.

central bank independence respectively. Table Three summarizes our hypotheses and gives their mathematical forms from the regression models.

Table Three: The Hypotheses and their Mathematical Representations

Hyp.	Verbal Description	Calculus	Algebra
1	Central Bank Independence lowers Inflation	$\partial / \partial \text{CBI} < 0$	$\text{CBI} + \text{CC} \text{CWB} < 0$
2	Coordinated Wage-Bargaining lowers Inflation	$\partial / \partial \text{CWB} < 0$	$\text{CBI} + \text{CC} \text{CWB} < 0$
3	Each does so at lesser rates as other increases	$\partial^2 / (\partial \text{CBI} \partial \text{CWB}) > 0$	$\text{CC} > 0$
4a	The Unemployment cost of Central Bank Independence increases as bargaining becomes more uncoordinated	$\partial^2 \text{UE} / (\partial \text{CBI} \partial \text{CWB}) < 0$	$\text{CC} \text{CWB} < 0$
4b	The Unemployment benefit of Coordinated Wage-Bargaining increases as Central Bank becomes more Independent	$\partial^2 \text{UE} / (\partial \text{CWB} \partial \text{CBI}) < 0$	$\text{CC} \text{CWB} < 0$

Notes: The calculus column gives the hypothesized signs of the appropriate (partial) derivative of the appropriate regression equation. The algebra column gives the algebraic representation of that derivative.

The principal results, reported in Table Four, provide strong confirmation for our first and second hypotheses. The level of central bank independence and the level of wage coordination both display an independent and statistically significant negative relationship⁴⁴ to the average rate of inflation experienced by nations over the 1955-90 period. For example, holding CWB fixed at its sample mean, an increase in CBI from 0.25 (about the level of Norway) to 0.75 (about the level of the US) reduces inflation by about 1.74 percentage points (at the mean of CWB, the effect is statistically significant at better than the .01 level by a Wald test). Likewise, at the sample mean of CBI, an increase in CWB from 0.25 (the level of France, Italy, Australia, and New Zealand) to 0.75 (the level of Germany, Japan, Denmark, Finland, and Switzerland) reduces inflation by about 1.63 percentage points (significant at about the same level by the analogous test).

⁴⁴ The inflation effect of CBI is $-5.5+4.1CWB$, and the inflation effect of CWB is $-5.3+4.1CBI$. Each of these effects is negative over the entire possible range of the indices not to mention over the entire sample range (the former being stricter consideration). They are also each individually significant and jointly significant with the interaction. However, the estimated effect of CBI is different for each level of CWB and so the test of whether “the effect on inflation of CBI is negative” depends on the level of CWB at which it is performed. We suggest integration of the proportion of the likelihood of the effect line which lies above zero as tests of general propositions like those in hypotheses one and two. (See Franzese 1996, Appendix MA1 for more detail.) The results of that more exact test in these two cases were strongly favorable ($p<.05$).

Table Four: Parameter Estimates for Cross-Sectional Regressions**on Average Inflation and Unemployment 1955-90**

Independent Variables	Dependent Variable	
	Inflation Rate	Unemployment Rate
Intercept	24.13	35.00
	(9.38) ^{.00}	(7.11) ^{.00}
GDP per Capita (in natural logs)	-1.61	-4.05
	(1.06) ^{.16}	(0.82) ^{.00}
Openness (exports/GDP)	-2.68	+4.99
	(2.24) ^{.26}	(2.21) ^{.04}
Left Cabinet Participation	+3.75	+3.24
(left party proportion of seats in cabinet)	(1.58) ^{.04}	(1.37) ^{.04}
Level of Central Bank Independence (CBI)	-5.50	+11.97
	(1.52) ^{.00}	(2.11) ^{.00}
Degree of Coordinated Wage-Bargaining (CWB)	-5.33	+0.34
	(1.66) ^{.01}	(1.45) ^{.82}
Interaction Term (CBI x CWB)	+4.14	-13.07
	(2.44) ^{.12}	(2.43) ^{.00}
Number of Observations (Degrees of Freedom)	18 (11)	18(11)
Adjusted R-Squared	.5954	.8243
Standard Error of the Regression	1.001	.8250

Note: White's Heteroskedasticity-Consistent Standard-Errors in parentheses; approximate significance (p-level) from two-sided t-test superscripted to standard error.

The coefficients on the interaction terms, which are statistically significant, negative for unemployment and positive for inflation (though only marginally significant for the latter), conform to the expectations of our third and fourth hypotheses. They suggest that the effects of central bank independence and of wage coordination on both inflation and unemployment depend critically on the level of the other. The overall effects can be seen most clearly in Table Five, which reports contingent coefficients displaying the impact that a unit change in the level of central bank independence has in different settings, each characterized by a different level of wage coordination. The coefficient representing the effect of an increase in central bank independence on inflation is negative at all levels of wage coordination, but strongest in systems where wage coordination is too low to have a major impact of its own on inflation. Even more important, the coefficient representing the effect of an increase in central bank independence on the rate of unemployment is relatively small and even marginally negative in settings where wage bargaining is coordinated but large and positive in settings where wage bargaining is relatively uncoordinated.

**Table Five: The Impact of Increasing Central Bank Independence at
Various Degrees of Coordination in the Wage-Bargaining System**

Level of Wage Coordination	Conditional Parameter		
	Estimates for Effect of Unit		
	Increase in Central Bank Independence on...		
	Inflation	Unemployment	Misery Index
0.00 (US, UK, Ireland)	-5.50 (1.52) ^{.00}	+11.97 (2.11) ^{.00}	+6.47 (2.98) ^{.05}
0.25 (France, Italy, New Zealand)	-4.46 (1.19) ^{.00}	+8.70 (1.57) ^{.00}	+4.23 (2.27) ^{.09}
0.50 (Belgium, Netherlands)	-3.43 (1.13) ^{.01}	+5.43 (1.11) ^{.00}	+2.00 (1.80) ^{.29}
0.75 (Japan, Germany, Denmark, Finland, Switzerland)	-2.39 (1.37) ^{.11}	+2.16 (0.86) ^{.03}	-0.23 (1.78) ^{.90}
1.00 (Austria, Norway, Sweden)	-1.36 (1.79) ^{.46}	-1.11 (0.99) ^{.28}	-2.47 (2.20) ^{.28}

Notes: Conditional (White's) standard-errors in parentheses; p-level of two-sided t-test at that point superscripted to standard errors. Misery-index standard-errors come from non-reported regression with inflation plus unemployment as the dependent variable and the same set of independent variables as in the unemployment and inflation equations of Table Four.

Table Six reports the estimated rates of inflation and unemployment that can be expected to occur at different levels of central bank independence and wage coordination, at the means of the other variables. The first columns in the table indicate that, when wage bargaining is entirely uncoordinated, a 0.25 increase in central bank independence (about the gap from, say, Denmark to the US or from Austria to Germany) reduces the rate of inflation by about 1.4 points but at the cost of increasing the rate of unemployment by about 3 points. By contrast, as the last two columns indicate, in settings where wage bargaining is highly coordinated, a similar increase in the independence of the central bank brings smaller marginal reductions in the rate of inflation but does so without increasing the rate of unemployment (in fact it may lower unemployment a little).

Table Six: Estimated Inflation and Unemployment Rates at Different Levels

of Central Bank Independence and Wage Coordination (at means of other variables)

<i>Central Bank Independence</i>	<i>Level of Coordinated Wage- Bargaining</i>					
	<i>0.00</i>		<i>0.50</i>		<i>1.00</i>	
	<i>Infl</i>	<i>Unem</i>	<i>Infl</i>	<i>Unem</i>	<i>Infl</i>	<i>Unem</i>
<i>0.00</i>	<i>11.5</i>	<i>0.9</i>	<i>8.8</i>	<i>1.1</i>	<i>6.1</i>	<i>1.3</i>
<i>0.25</i>	<i>10.1</i>	<i>3.9</i>	<i>7.9</i>	<i>2.5</i>	<i>5.8</i>	<i>1.0</i>
<i>0.50</i>	<i>8.7</i>	<i>6.9</i>	<i>7.1</i>	<i>3.8</i>	<i>5.5</i>	<i>0.7</i>
<i>0.75</i>	<i>7.3</i>	<i>9.9</i>	<i>6.2</i>	<i>5.2</i>	<i>5.1</i>	<i>0.5</i>
<i>1.00</i>	<i>6.0</i>	<i>12.9</i>	<i>5.4</i>	<i>6.5</i>	<i>4.8</i>	<i>0.2</i>

We interpret the findings reported in Table Six as follows. Starting from some level of central bank independence and some level of coordinated wage-bargaining, an increase in coordinated wage-bargaining improves the signaling process thereby providing the central bank with the opportunity to get a lower unemployment rate at the same inflation rate, or to secure a lower inflation rate at the same unemployment rate, or to obtain some intermediate combination of these outcomes. In short, increases in the coordination of wage bargaining expand the “possibility frontier” in unemployment-inflation space for the better (and it appears that, in practice, the banks take a little of both). This implies that increases in coordinated wage-bargaining are necessarily Pareto-improving.^{45, 46}

Similarly, when wage bargaining is highly coordinated, so that the bargainers have the incentive and capacity to respond effectively to signals from the central bank, an increase in the independence of the bank is also *Pareto-improving* because, by rendering the signals more credible, it can reduce the rate of inflation without increases in unemployment. However, when wage bargaining is uncoordinated, increasing the independence of the central bank is not *Pareto-improving* because, although it lowers the rate of inflation, it does so only at some substantial unemployment cost because the bargainers lack the incentive and capacity to respond effectively to the signals however credible they may be.

As described briefly in note 42, we undertook a series of tests for the reliability of these results. The substantive conclusions to be drawn from the sign, size, and statistical significance of the key institutional variables’ coefficients in these equations remain consistent under different estimation procedures, when a measure for union density is included, and under sequential deletion of

⁴⁵ Precisely, the estimates imply that increasing CWB at CBI=0 decreases inflation, and increases unemployment slightly. The sample minimum of CBI is about 0.14, however, so the estimate is of questionable relevance in this range (see also note 44).

⁴⁶ By Pareto improvement we mean simply that both unemployment and inflation are lowered (or one is unchanged) which is not, strictly speaking, what it means in microeconomics but which is nonetheless an intuitively appealing macro-political-economy translation of the concept.

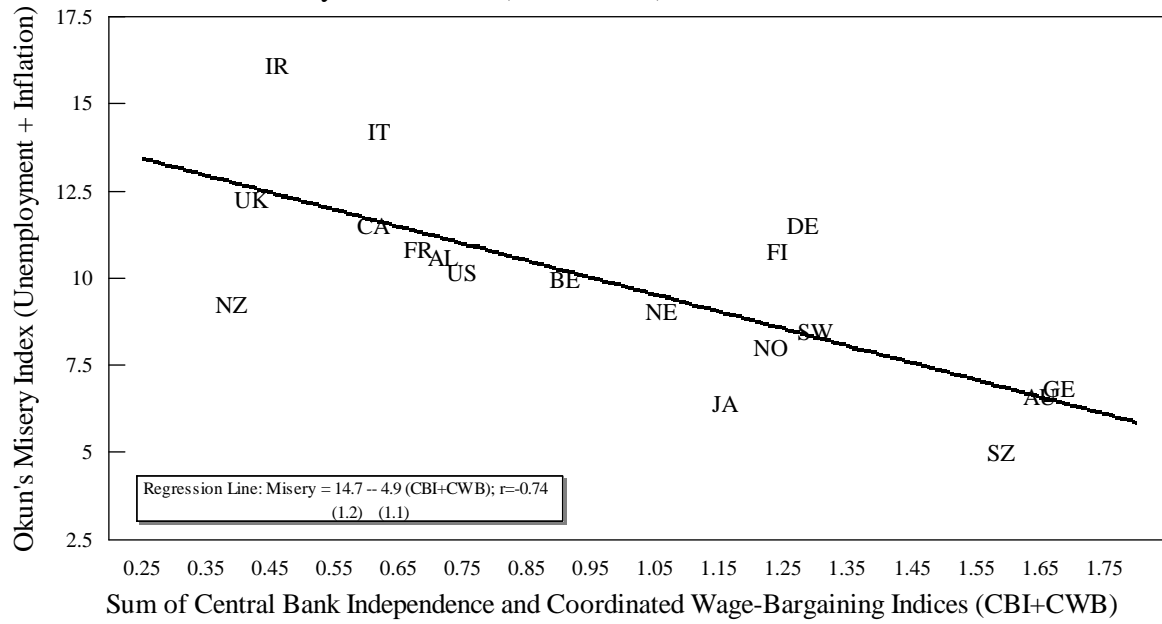
single-country cases, *etc.*⁴⁷ Also, notably, removing the controls to approximate more closely the functional form and degrees of freedom of the previous empirical work on central bank independence only strengthens the conclusions drawn here. Although there are unavoidable limitations to such cross-sectional analyses, the robustness of the key coefficients under this variety of tests and specifications increases our confidence in the results.

VI. The Implications for Comparative Political Economy

These findings have important implications for our understanding of the political economy. First, they lend strong support to the contention, long prominent in political science but frequently neglected by economists, that economic performance is deeply affected by the organization of the political economy. It may be difficult at best, and misleading at worst, to explain economic performance without reference to cross-national variation in the institutional structures of the political economy. Figure One illustrates this point by displaying the close relationship between the overall level of economic well-being (measured by an Okun index) experienced by nations in the 1955-1990 period and the two institutional variables on which we focus here, as measured by an index summing the level of central bank independence and coordinated wage bargaining ($r = -0.74$).

⁴⁷ Since the coefficient for union density, although appropriately signed, was consistently quite insignificant statistically, it was eliminated from the equations reported here.

Figure 1: Economic Well-being and the Institutional Environment
 Misery Indices and (CBI+CWB) in the Postwar OECD



In broader terms, this analysis suggests that a variety of organizational features of the political economy, such as the institutional structures of the wage-bargaining system, may perform crucial coordination functions in the economy. To take this view is to depart from the assumption often made in neo-classical models that the behavior of economic actors will be coordinated almost exclusively by competitive market mechanisms and the commonly-accepted corollary to it that non-market organizations should be seen entirely as factors that interfere with effective coordination in the economy rather than as factors that might contribute to such coordination.

By contrast, focusing on the signaling mechanisms that link central banks to bargaining units and the latter to each other, we have argued that non-market organizations can make a significant contribution to the effective coordination of behavior and thus to economic performance. This is a point with wide ramifications because the problem of securing good economic performance is conventionally and rightly seen as a problem of coordinating the endeavors of economic actors. Our analysis suggests that economic frameworks that approach this problem by positing highly competitive markets and assuming that they will generate cooperative outcomes are empirically fragile at best. Instead, more attention must be paid to the way in which diverse sets of institutional arrangements resolve the coordination problems of the economy.

Our analysis also suggests that, when exploring the impact of institutional variables, we should be especially attentive to the presence of interaction effects among them.⁴⁸ The economic impact of central bank independence seems to depend heavily on the character of a nation's wage bargaining system.

On these grounds we challenge the influential claim that, by increasing the independence of its central bank, a nation can improve its rate of inflation without any other adverse economic effects.

⁴⁸ Cf. Alvarez, Garrett, and Lange 1991; Soskice 1991; and others.

Once the character of the wage-bargaining system is incorporated into the analysis, we find that this proposition holds true only for nations with coordinated wage-bargaining systems. In nations where wage bargaining is not coordinated, increasing the independence of the central bank lowers the rate of inflation only at the cost of significant increases in unemployment. In support of this contention, we provide a theoretical rationale, evidence from close inspection of the critical German case, and results from an analysis of cross-national data.

These findings have important implications for national policy-makers. In particular, they suggest that enhancing the independence of the central bank may not be the economic panacea that many believe it to be. It will work better in some countries than in others. Moreover, to secure the best results, it needs to be combined with coordinated wage bargaining. But, unlike central bank independence, which can be legislated relatively easily, securing a more coordinated system of wage bargaining is difficult and substantially beyond the control of government policy. A nation's capacity for wage coordination depends on the character of a variety of social organizations, such as trade unions and employer confederations, which emerge out of a long historical process and may not be immediately amenable to political engineering.⁴⁹ Thus, many governments that enhance the independence of their central bank may find the results somewhat disappointing.

VII. The Implications for European Monetary Union

We conclude by observing that this analysis has especially interesting implications for the monetary union (EMU) that Europe is currently contemplating. EMU is to be built around a European central bank whose general structure and level of independence is modeled on the German *Bundesbank*. Many

⁴⁹ Cf. Levy 1993; Regini 1984.

hope that, as a consequence, the new monetary union will emulate the performance of the German system.

Our analysis suggests that such aspirations are unlikely to be realized, because German levels of performance have depended not only on an independent central bank but also on a coordinated wage bargaining system and the European Union is unlikely ever to acquire Community-wide institutions for the coordination of wage bargaining. On the one hand, its leaders have yet to show any real interest in acquiring such institutions, as the halting nature of their steps toward a Social Charter indicates.⁵⁰ On the other hand, even if they sought more coordinated labor market institutions, they would be very difficult to secure. Wide disparities in the way in which workers and employers are organized across the EU nations make it difficult to imagine how wage bargaining could be coordinated across the continent without large-scale reorganization; and, indeed, the few efforts made by trade unions or employers to reorganize wage bargaining on a European level have been singularly unsuccessful.⁵¹ As a result, a European central bank may have to resort to relatively high levels of unemployment to secure low rates of inflation because the monetary union will lack a system for continent-wide wage coordination.⁵²

More important yet, the common view that all nations will gain from European monetary union may be wrong.⁵³ Our analysis suggests that the move to EMU may improve the economic performance of some nations but is likely to erode the economic performance of others relative to their past performance. The precise effects experienced by each nation will be determined by the effectiveness of its existing institutions relative to those it acquires by virtue of joining the monetary union.

⁵⁰ Lange 1993; Leibfried and Pierson 1992; and Streeck 1995.

⁵¹ See Streeck and Schmitter 1991; George 1992.

⁵² This conclusion is reinforced by the finding that economies with more independent central banks tend to have higher sacrifice ratios. See Walsh 1995.

⁵³ Cf. Committee for the Study of Economic and Monetary Union, EC 1989; Gros 1996, esp. 26.

Table Seven: National Economic Well-Being under Different Institutional Arrangements

Assessed by the Inflation Rate, the Unemployment Rate, and the Okun Misery Index, 1955-90

		Level of Central Bank Independence	
		LOW	HIGH
Degree of Coordination in Wage Bargaining	LOW	I. MI: 12.2 : 7.5 UE: 4.7	II. MI: 10.9 : 4.8 UE: 6.1
	HIGH	III. MI: 8.9 : 6.2 UE: 2.3	IV. MI: 7.6 : 4.8 UE: 2.8

Notes: MI=Misery Index, =Inflation Rate (%), UE=Unemployment Rate (%). See note to Table

Two for coding of CBI and CWB.

Some sense of these effects can be gleaned from Table Seven. EMU is likely to create an economic unit characterized by a relatively independent central bank and uncoordinated wage bargaining. That is the situation represented by quadrant II in Table Seven, and the figures there display the historical performance of OECD nations with this mix of institutions. Whether a nation will gain or lose from EMU, in terms of both inflation and unemployment, will depend on the quadrant of the table from which it is moving. Nations that have long had relatively dependent central banks and uncoordinated bargaining systems, such as Britain, Ireland and France (in quadrant I), may gain slightly, at least as judged by the Okun misery index, by virtue of acquiring a more independent central bank. Although they are not included in our empirical analysis, Greece, Portugal and Spain should also fall into this category. However, if they expect to replicate German levels of performance, even these countries will not gain as much as they anticipate because they are moving to quadrant II rather than to quadrant IV in Table Seven.

By contrast, this table suggests that virtually all other member states in the EU may experience a deterioration in economic performance as a result of the move to monetary union because they are shifting from the institutional conditions of quadrants III or IV to those of quadrant II. Ironically, one of the biggest losers will be Germany, a prime-mover behind the establishment of EMU. It currently benefits from the smooth interaction between an independent central bank and a coordinated wage bargaining system. But this interaction will be disrupted because the *Bundesbank* will be replaced by a European central bank that faces a wide range of organizationally-disparate and uncoordinated wage bargaining units. It cannot be expected to respond directly to German bargainers any more than to Danish or Dutch bargainers. Indeed, most nations that once had a coordinated wage bargaining system will suffer because they will become part of a common currency area with a multiplicity of new bargaining units that are highly uncoordinated. In the German case, Table Seven predicts a movement from an Okun misery score of about 7 to one that is closer to 11. Thus, the move to EMU may not be an

unmitigated blessing for all the member-nations of the EU; its effects on national economic performance should be distributed unevenly across countries.

Aside from such national effects, the establishment of EMU may also have significant distributive consequences across different social groups inside each nation. It is well-established that changes in the rate of inflation and the rate of unemployment have more adverse effects on some social groups than on others. Although it is difficult to identify all of these effects with precision, lower-skilled manual and clerical workers, for instance, tend to suffer disproportionately from rising rates of unemployment.⁵⁴ In this context, it is important that, even when the move to EMU improves the aggregate economic performance of a nation, as measured by the Okun index, it may shift the mixture of inflation and unemployment experienced there. Even those nations in quadrant I that should gain the most from entry can expect to experience higher levels of unemployment as a result. Indeed, rates of unemployment may rise in virtually all the member states of the European Union, either because a European central bank that is more independent than their own will seek lower rates of inflation or because it will seek rates of inflation commensurate with past rates but without the advantages offered by a coordinated system of wage bargaining. This suggests that the working classes, and especially those at the margins of the labor market, will bear the greatest costs associated with the creation of European monetary union.

Of course, we emphasize that one must treat these inferences with caution. EMU may have other economic effects not modeled here that could offset some of the aggregate and/or distributive consequences on which we focus; and one should bear in mind that, because the figures in Table Seven are based on historical levels of performance, the absolute levels of economic performance experienced by the EU in the future may diverge from them for a wide variety of reasons. However, the table

⁵⁴ On this point there is a large literature. Cf. Hibbs 1977; Wood 1994.

provides a good depiction of the *relative* levels of economic performance that can be expected under a variety of different institutional arrangements and our theory suggests that, even if the precise outcomes diverge from those estimated here, European monetary union should have more uneven distributive effects within and across countries than is conventionally acknowledged.

To return finally to the German case, it may be that the best guide to what we can expect from EMU is not the familiar image of *Modell Deutschland* but the experience that Germany has had with unification after 1989. After all, the creation of a European monetary union is analogous in many ways to the process of German unification. High-wage and highly-skilled economies will be joined to less-developed regions under a single monetary authority. That authority will have to cope with a greater variety of economic shocks than did its national predecessors. New modalities for wage bargaining and fiscal coordination across the disparate regions of the union will have to be developed; and the various kinds of economic integration that should follow from monetary integration may generate substantial economic dislocation, as they have in Germany.

In this context, the lessons that follow from the example of German unification are not altogether encouraging. The German system itself experienced severe strain as a result of unification. Two sources of strain deserve emphasis here. First, efforts to incorporate East Germany into the existing industrial relations system proved highly taxing and only partly successful. One result has been high levels of industrial conflict, notably in the spring of 1993 when employers challenged efforts to extend the system to the East.⁵⁵ Second, unification also provoked considerable conflict between the federal government and the *Bundesbank*, which customarily responds not only to wage bargains as emphasized here but also to the fiscal policies of the government. When the efforts of the latter to finance

⁵⁵ Cf. Webber 1994; Silvia 1994; and Locke and Jacoby 1995.

unification resulted in fiscal (and monetary⁵⁶) expansion, the *Bundesbank* responded with high interest-rates to encourage fiscal restraint and dampen inflationary pressures. The consequences were far from ideal for the German or European economies.

It is possible that European monetary union, if it ever happens, may experience very similar strains. It will disrupt longstanding patterns of wage bargaining in many nations, thereby possibly unleashing inflationary pressures as new equilibrium levels are sought for wages and prices. The result could be higher levels of industrial conflict and higher real interest rates as the new central bank seeks to moderate such pressures. Similarly, many of the member governments in the new union may be tempted to pursue expansionary fiscal policies, especially since their adverse monetary effects will be diffused over the union as a whole, and the provisions of the Maastricht treaty for coordinating fiscal and monetary policy are nebulous.⁵⁷ Since the member governments of the EMU are numerous and thus less-likely to be as responsive as the German government has been to the *Bundesbank*, especially draconian monetary policies may be required from the European central bank in order to restore fiscal discipline and dampen inflationary pressures. One effect may be higher levels of unemployment than the proponents of European monetary union currently anticipate.⁵⁸

The larger point here is that the creation of a European monetary union will generate a variety of new coordination problems; and these will not automatically be solved by the presence of a relatively independent central bank. The principal argument of this paper is that the resolution of such problems

⁵⁶ As is well documented, the German government succeeded in facing down the *Bundesbank* on the issue of the rate at which East-German marks would be converted to West-German marks. The net effect was a de facto massive surge in nominal liquidity. The *Bundesbank*, after losing that battle, set about redressing its impact by the usual monetary-policy channels (raising discount rates in the German case).

⁵⁷ At least some national governments have supported monetary union in the hope that it will make possible more expansionary policies than they have been able to run in a European Monetary System dominated by the *Bundesbank*. Cf. Fratianni and Von Hagen 1992, chs. 8 and 9; Gros 1996, 88 ff.; Frieden et al. forthcoming; and Eichengreen 1992.

⁵⁸ Cf. Kenen 1995, ch. 4; and Gros and Thygesen 1992, ch.8.

depends on the development of a variety of institutional arrangements extending well beyond the structure of the central bank. An independent central bank trying to impose its will on a reluctant government or recalcitrant workforce is often only a second-best solution to problems that could be tackled more effectively with a wider range of institutions. When contemplating institutional reform, it would be wise for national governments and European authorities alike to consider the complete set of coordination problems they confront and the full range of institutional conditions that bear on them.

Data Appendix

We list here all the data necessary to replicate the results presented in the text. (All statistical analysis conducted in Econometric Views 2.0 by *QMS Software*.)

<i>COUNTRY</i>	<i>MI</i>	<i>UE</i>		<i>CBI</i>	<i>CWB</i>	<i>GDP</i>	<i>EXY</i>	<i>LCAB</i>
<i>United States</i>	10.167	5.761	4.406	0.750	0.000	9.429	0.052	0.000
<i>Japan</i>	6.389	1.969	4.419	0.409	0.750	8.494	0.101	0.000
<i>Germany</i>	6.803	3.128	3.675	0.931	0.750	8.924	0.210	0.286
<i>France</i>	10.785	4.160	6.625	0.430	0.250	8.913	0.137	0.170
<i>Italy</i>	14.193	5.576	8.617	0.365	0.250	8.718	0.139	0.181
<i>United Kingdom</i>	12.250	4.881	7.369	0.420	0.000	8.949	0.172	0.325
<i>Canada</i>	11.488	6.427	5.061	0.614	0.000	9.246	0.198	0.000
<i>Austria</i>	6.573	2.184	4.389	0.654	1.000	8.709	0.203	0.647
<i>Belgium</i>	9.942	5.481	4.461	0.409	0.500	8.877	0.462	0.241
<i>Denmark</i>	11.506	4.853	6.653	0.530	0.750	8.941	0.241	0.635
<i>Finland</i>	10.754	3.098	7.656	0.493	0.750	8.782	0.209	0.391
<i>Ireland</i>	16.098	8.098	8.000	0.462	0.000	8.375	0.356	0.093
<i>Netherlands</i>	9.047	4.267	4.781	0.564	0.500	8.909	0.444	0.158
<i>Norway</i>	7.998	2.234	5.764	0.230	1.000	8.957	0.244	0.720
<i>Sweden</i>	8.460	1.729	6.731	0.303	1.000	9.030	0.224	0.846
<i>Switzerland</i>	4.995	0.889	4.106	0.844	0.750	9.324	0.245	0.228
<i>Australia</i>	10.558	3.953	6.606	0.474	0.250	9.104	0.133	0.222
<i>New Zealand</i>	9.224	1.341	7.883	0.143	0.250	8.973	0.212	0.267

Notes: MI=Misery Index; UE=Unemployment; =Inflation; CBI=Central Bank Independence; CWB=Coordination of Wage Bargaining; GDP=Natural Log of Real GDP per Capita; EXY=Exports/GDP; LCAB=Fraction of Cabinet Seats Held by Left Parties

Notes

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