Mixed Signals:

Central Bank Independence, Coordinated Wage-Bargaining,

and European Monetary Union

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ABSTRACT:

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Plans for European Monetary Union are based on the conventional postulate that increasing the independence of the central bank can reduce inflation without any real economic effects. However, the theoretical and empirical bases for this claim rest on models of the economy that make unrealistic information assumptions and omit institutional variables other than the central bank. When the signaling problems between the central bank and other actors in the political economy are considered, we find that the character of wage bargaining conditions the impact of central bank independence by rendering the signals between the bank and the bargainers more or less effective. Greater independence can reduce inflation without major employment effects where bargaining is coordinated, but it brings higher levels of unemployment where bargaining is uncoordinated. Thus, currency unions like the EMU may require higher levels of unemployment to control inflation than their proponents envisage; they will have costs as well as benefits that will be distributed unevenly among and within the member nations based on the changes they induce in the status of the bank and of wage coordination.

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The nations of the European Union are taking a major step toward greater economic and political integration through the creation of a monetary union to be administered by a European Central Bank that is formally independent of political control. There is broad consensus among the governing elites of Europe, informed by an extensive literature in economics, that the independence of the new central bank will confer important economic advantages on the new European Monetary Union (EMU).[1] As one influential financial publication concluded: "The argument for central bank independence…appears overwhelming."[2]

The object of this article is to question that consensus and to present a new perspective on the economic effects of EMU.[3] We focus on three issues. How should the effects of central bank actions on the economy be conceptualized? Do higher levels of central bank independence invariably result in better economic performance? Will the establishment of a European Monetary Union equipped with such a bank improve economic well-being in its member states? The analysis carries implications for what can be expected from currency unions more generally.

Our core contention is that many of the effects of central bank independence operate via a signaling process that takes place between the bank and economic actors. Most analyses assume an effective signaling process but we suggest that this is unrealistic and that the effectiveness of the process is likely to depend on a broader set of institutional conditions including, most notably, the organization of wage bargaining. We argue that, where wage bargaining is more coordinated, this signaling process is likely to be more effective so that increasing the independence of the central bank can lower the long-run rate of inflation at relatively-low

unemployment costs. Where bargaining is less coordinated, however, increases in central bank independence may lower the rate of inflation only at the cost of substantially-higher levels of unemployment. The analysis carries substantial implications for the relative value that European Monetary Union will have for the nations that join it.

We proceed in three steps. First, we develop the theoretical underpinnings of the argument through an examination of existing theories about central bank independence.[4] Second, we explore the applicability of the analysis to the Federal Republic of Germany, a crucial case often cited in support of plans for an independent European Central Bank.[5] Third, we test the theoretical contentions developed here against those more commonly found in the literature through empirical analysis of the experience of the OECD nations.[6]

This article is an effort to bring the insights of international political economy to bear on an issue that is often treated in more 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 institutional interaction within political economies.

II. Theories of Central Bank Independence

A standard neoclassical 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, while the rate of unemployment is affected by the level of real wages and unanticipated changes in policy.[7] Within this framework, a variety of theories currently attribute advantages to central bank independence. Some argue that an independent central bank can stimulate the economy more effectively because economic actors are less likely to anticipate monetary expansion from it than they would from a central

bank more dependent on politicians.[8] Others argue that central bank independence may reduce the political business cycles that result from pre-electoral manipulation of monetary policy or post-electoral partisan shocks.[9] However, the claim on which we focus here is the one most frequently cited in favor of central bank independence, namely one that derives from the time-inconsistency problem associated with monetary policy in the context of nominal-wage contracting.

This theory specifies that, given nominal wages and/or prices which must be fixed for some duration 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 future inflation will lower real wages and returns. As a result, wage/price settlements will be more inflationary than might otherwise be the case. Although the central bank can offer assurances that it will refrain from generating such inflation, the credibility of those assurances will be undermined to the degree the bank is responsible to politicians who are known to be sensitive to electoral pressures that might incline them toward more expansionary policy. Thus, rendering the central bank more independent of political control will increase the credibility of its assurances that monetary policy will remain tight, thereby allowing wage/price bargainers to lower their nominal contracts by reducing their fears about the real-wage and real-return losses that would be generated by unanticipated inflation. The result will be a lower rate of inflation without any adverse effects on the real economy.[10]

This theory is now one of the most widely-accepted in economics. However, it has both strengths and weaknesses that can best be appreciated by seeing the central issues here as ones about signaling and coordination. In short, this is a theory about the effectiveness of the process

whereby signals transmitted from the central bank lead economic actors to coordinate on Pareto-superior forms of equilibrium behavior. 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 (a 'conservatism effect') and (ii) the credibility of those signals (a 'credibility effect').[11] If credible signals are sent from the bank and the relevant economic actors are able to coordinate their behavior in light of them, nominal wage/price settlements will be lower than they would otherwise be and the bank can pursue the monetary policy it has announced without dampening the economy. On the other hand, if these signals do not inspire appropriate wage/price behavior, either because they lack credibility or because the relevant actors cannot coordinate on appropriate behavior, the monetary policy announced by the bank will occur in a context of relatively excessive nominal wages and prices, thereby dampening the economy and generating unemployment. Therefore, the conventional theory of central bank independence has the great merit of drawing our attention, first, to the importance of signaling in central bank behavior, second, to the importance of the credibility of those signals and, third, to the significance of independence for such credibility.

However, the model of signaling and coordination underpinning this theory is deficient in some other important respects. In general, it models the process of signaling as a highly diffuse one in which the central bank's announcement of a monetary rule will by itself lead a vast number of actors in the economy to modify their wage/price settlements. This is based on standard rational-expectations assumptions that each actor will be able to predict the effects of an announced monetary policy on the economy, the behavior of all other relevant actors in the face of such an announcement, and the effects of that behavior. Under these conditions, rationality alone leads actors to coordinate their behavior on the optimal equilibrium. But such a model may

not be appropriate for many of the cases it is meant to cover. It suffers from two problems. First, it assumes that the actors have unrealistically-high levels of prescience and information. As Eichengreen has observed in another context, the effects of monetary policy are often the subject of considerable disagreement even among experts.[12] When there are many wage and price bargainers[13] in the economy, it is highly unlikely that they will all be able to predict the multiple effects of monetary policy with precision, let alone predict the behavior that will follow from the predictions made by other actors. Second, this approach assumes away the collective-action problems often present when the behavior of a large number of actors, facing some uncertainty about the behavior of others, must be coordinated. Such problems are well-known to be endemic to wage bargaining in particular.[14] In the circumstances of most industrial economies, we think it more realistic to posit actors (a) with bargaining power so that they must condition their wage and price settlements on expected settlements elsewhere but (b) with less-than-complete information about the effects of monetary policy and/or other's reactions to it. This means that there will be substantial collective-action problems associated with securing coordination on a Pareto-optimal equilibrium, which rationality alone will not address. In such circumstances, the achievement of an effective signaling and coordination process will depend more heavily on the presence of an appropriate set of institutional arrangements of the sort to which the 'new political economy' draws our attention, *i.e.* institutions that provide the actors with a basis for making credible commitments, monitoring the behavior of each other, and the like.[15] From this perspective, the problem with most conventional analyses of central bank independence is that, by considering the characteristics of only one institution, *i.e.* the central bank, they fail to appreciate the role that other institutions might play in the overall signaling and coordination process.

In this article, we seek, first, to render the analysis of central bank independence more realistic by assuming actors with less-than-complete information about the effects of monetary policy and the behavior of other actors and, second, to broaden the analysis by including other institutions relevant to this signaling and coordination process. We focus, in particular, on the institutions associated with wage bargaining.[16]

III. The Role of Coordinated Wage Bargaining

Our choice of variables is not coincidental. A substantial literature in comparative political economy suggests that the institutional variables associated with wage bargaining can have large effects on economic performance.[17] To date, scholars seeking institutional explanations for the rate of inflation have been confronted with two separate literatures that deserve to be integrated, one emphasizing central bank independence and the other wage bargaining.

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. The full set of institutional arrangements required for coordinated wage-bargaining are complex because they must support cooperative outcomes in five nested sets of strategic interactions.[18] The first is the interaction that takes place within each dyad of bargainers between the organizations representing workers and those representing employers. A second takes place between the leaders of bargaining organizations and the rank and file members whose support they must retain. We focus here on the third interaction between the bargainers in each dyad and their counterparts in other dyads and on a fourth interaction between wage bargainers as a group and the authorities controlling

economic policy. A fifth interaction occurs between the authorities controlling monetary policy and those controlling fiscal policy.

With regard to the interactions examined here, an early literature 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 an equally important role in the coordination of wage bargaining.[19] 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 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.[20]

To appreciate the impact of wage coordination 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 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. 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, the actors in any one bargaining unit are unlikely to let considerations about

the effects of their settlement on the overall economy 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; such that, 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.[21] 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 bargaining units are unlikely to let the prospect of such a response influence their own settlement very much because they know that the monetary authority will be producing a policy, not in response to it, but to settlements across the economy as a whole, which they cannot control. *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 whole. Several implications follow from this. First, since the members of each bargaining unit, especially the lead unit, know what the level of subsequent wage settlements is likely to be once they have settled on their own, they need not build an increment for unanticipated inflation arising from other higher 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 a strong incentive to take the impact of their settlement on the economy into account when negotiating it. Thus, we can expect their concerns about levels of inflation, unemployment and national competitiveness to influence wage settlements more strongly in

coordinated systems of wage bargaining. An important empirical hypothesis follows from these observations: where wage bargaining is more coordinated, we should see lower rates of inflation, whether or not the central bank is independent.

Most central to our argument, however, is the way in which the system of wage bargaining interacts with the character of the central bank. Because the lead settlement in a system of coordinated wage bargaining is likely to be copied by other bargaining units, with direct effects for the entire economy, those negotiating it know that the central bank is likely to respond directly to it. This renders the principal wage-bargainers highly sensitive to signals from the central bank about the appropriateness of pending wage settlements and the likely stance of monetary policy in the face of 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.*

The important implication of this is that, where wage bargaining is coordinated, the central bank may be able to influence the level of settlements and reduce inflation simply by signaling its policy intentions so that monetary policy does not raise the level of unemployment. Where wage bargaining is uncoordinated, however, such that small bargaining units have no reason to expect a direct response to *their* settlement and disincentives to exercise general moderation lest others fail to do so, the central bank may have to apply very tight monetary policies that induce substantial increases in unemployment before wage and price contracts will respond.

In sum, we contend (i) that the effectiveness of the signaling and coordination process that links the central bank and wage contractors is an important determinant of national levels of inflation and unemployment and (ii) that the character of the wage-bargaining system is intrinsic

to the effectiveness of this process. Increasing the independence of the central bank is likely to reduce the rate of inflation in all systems through a combination of 'conservatism' and 'credibility' effects.[22] However, this analysis suggests that credibility effects, which allow an increase in the independence of the central bank to reduce inflation without large increases in unemployment, are likely to dominate only where the signaling and coordination process is effective, namely in systems where wage bargaining is coordinated. 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.

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 national case, that of Germany.

IV. The German Model Reconsidered

The Federal Republic of Germany has long been one of the most prominent cases adduced to support arguments for the economic effects of central bank independence. Its *Bundesbank* is considered one of the most independent central banks 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.[23] 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 have been one of the reasons why the European Central Bank is to be modeled on the *Bundesbank*.[24]

A closer examination of the German case, however, suggests that the *Bundesbank* is not the only institutional feature of the German economy contributing to the achievement of low inflation and unemployment.[25] 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.[26] An examination of the German case allows us to explore in more detail the institutional arrangements for coordinated wage-bargaining and how they operate in conjunction with monetary policy, although these details will vary, of course, to some extent from nation to nation.

We begin by outlining the principal institutions that underpin wage bargaining. 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*).[27] 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 employers associations are strongly positioned *vis-à-vis* their rank and file by virtue of the control they exercise over a range of resources important to their members, such as skill certification, vocational-training schemes, and strike funds.

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. Works councils can negotiate local working conditions and, informally, local pay structures.[28]

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 lead bargains have been concluded between *IG Metall*, the massive metalworkers union that organizes a range of industries including automobiles, engineering and steel, and the corresponding employers federation, *Gesamptmetall*.[29] 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.[30]

It is clear that these institutional arrangements constitute a system for highly coordinated wage-bargaining and tend to promote low rates of inflation. Since the lead bargainers in metalworking 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 *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 features 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 wage demands of the unions, accompanied by detailed commentary on the state of the economy and warnings about the likely monetary-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.[31]

In short, the coordination of German wage-bargaining helps to make the process of signaling that takes place between the central bank and wage bargainers highly effective. The system does not work perfectly: occasionally, wage bargainers defy the bank, whether to test its resolve or to satisfy their rank and file; but, over the long run, they have paid careful attention to its pronouncements. As a result, the *Bundesbank* has often been able to use this signaling mechanism to induce more moderate wage settlements, limiting the extent to which it has had to rely on *real* monetary constriction.

Two other factors also enhance the effectiveness of the signaling process in Germany. First, the independence of the central bank increases the credibility of its pronouncements, which in turn helps to ensure that subsequent industry settlements do not exceed the lead bargain. This suggests that there may be a reciprocal effect between central bank independence and wage coordination, whereby each augments the impact of the other, especially when bargaining is coordinated at the industry level.[32] Second, the effectiveness of the signaling mechanism may also be enhanced by the fact that a sector with high export concentration, metalworking, negotiates the lead bargain in most years. Wage bargainers in export sectors tend to favor lower settlements because they are concerned to maintain unit labor costs at internationally-competitive levels. However, they are also especially sensitive to signals from the central bank because the restrictive monetary policies that the bank wields tend not only to depress general economic activity but also to appreciate the exchange rate, thereby threatening the level of economic activity in export sectors especially severely.[33]

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 cannot be attributed solely to the independence of the *Bundesbank* but derives, instead, from that presence of an effective signaling process that is based on 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 for contemporary enthusiasm about central bank independence is a set of simple yet influential empirical studies which, using postwar-average cross-sections, conclude that a nation can reduce its rate of inflation without any adverse real economic consequences simply by increasing the independence of its central bank. One such article concludes that "having an independent central bank is almost like having a free lunch; there are benefits but no apparent costs in terms of macroeconomic performance."[34]

However, most of these studies suffer from a serious flaw. In keeping with neoclassical models that portray the economy as largely institutionally-homogenous across nations, the only institutional variable included in them is one reflecting the degree of independence of the central bank.[35] Here, we propose including a further institutional variable, representing the degree to which wage bargaining is coordinated. Once it is brought into the analysis, two new possibilities arise. We may find that the independence of the central bank is only partially responsible for the effects hitherto attributed to it and/or 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. The analysis presented in the preceding section suggests three specific hypotheses.

First, nothing in our account contradicts the 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 inflation in cross-national data.

Second, we expect the level of wage coordination to have an effect on the rate of inflation independent from the 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.

Third, our theoretical perspective leads us to expect interaction effects between the level of central bank independence and the level of wage coordination with respect (especially) to the rate of unemployment. In nations where wage bargaining is coordinated, increasing the independence of the central bank may reduce the rate of inflation without adverse real economic consequences because the signaling system connecting the central bank to economic actors should be 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 *real* monetary policies that increase unemployment. Thus we expect the unemployment cost of central bank independence to increase as the coordination of wage bargaining decreases. The corollary is that the unemployment benefit of coordinated wage bargaining should increase with the independence of the central bank.[36]

In order to test these hypotheses, we have assembled a data set data 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 the five most commonly used

indices, which assess both the legal status of the central bank and its reputation for independence.[38] To measure the degree to which wage bargaining is coordinated across the economy, we construct an index based on the one devised by Soskice, extrapolated to a wider range of cases using the assessments Layard *et al.* make of trade-union and employer coordination and standard accounts of industrial-relations systems.[39] This index codes each nation at one of five points (0, .25, .50, .75, 1.0) based on the degree to which wage bargaining has been coordinated by trade unions and/or employer associations over the course of the 1955-1990 period.

The studies from which the central bank independence literature has drawn its empirical support have been cross-sectional analyses of the average postwar experience of the developed democracies. Accordingly, in order to ensure comparability with such analyses, we adopt the same approach in the first part of this investigation. Although this obviously limits the degrees of freedom, we think the argument underlying the approach—namely that postwar-average cross-sections are especially appropriate for assessing durable relationships between economic outcomes and structural variables that exhibit little or no temporal variation over the time-period studied—has considerable merit in this case, since the independence of the central bank and the coordination of wage bargaining are clearly such variables.[40] The premises are 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 if they persist 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. Still, to the degree that cross-temporal variation which can be usefully measured and modeled exists, disaggregating the data may improve the empirical analysis. Accordingly, we

extend previous enquiry by considering decade-frequency and annual data as well.[41]

We begin with some simple cross-tabulations that display the broad patterns in the data. Table One reports the rates of GDP-deflator inflation and (internationally comparable) unemployment for nations that feature different levels of central bank independence and wage-bargaining coordination. It is apparent that countries with more independent central banks tend to have lower rates of inflation, as conventional analyses of central bank independence predict. 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, albeit less substantially and only when central bank independence is low.

However, the unemployment effects of increasing the level of central bank independence vary according to 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 (0.5 points). 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 (1.4 points—or nearly three times as much). This is consistent with our third contention that increasing the coordination of wage bargaining improves the signaling and coordination mechanism between the central bank and wage bargainers, thereby making it possible for a nation to secure lower levels of inflation without as much cost in terms of higher levels of unemployment.

[Table One Here]

In order to provide more complete tests of these hypotheses, we turn now to regression analysis which can assess the effects of the institutional 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: (a) 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 (less) unemployment induced by adverse (favorable) fluctuations in the international economy, (b) the natural log of 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; (c) the representation of left parties in the cabinet to reflect the widely-accepted view that social democratic governments are more likely to tolerate inflation and less likely to tolerate unemployment than their conservative counterparts; and (d) union density (percent of the labor force unionized) on the premise that greater unionization (controlling for coordination) produces less wage restraint and therefore more inflation and unemployment.[42]

The basic format of the regressions to be reported here are:

$$p = a_p{}'C_p + b^p_{cbi}CBI + b^p_{cwb}CWB + b^p_{cc}CBI \cdot CWB + e^p$$

$$U = a_u{}'C_u + b^u_{cbi}CBI + b^u_{cwb}CWB + b^u_{cc}CBI \cdot CWB + e^u$$

where π is inflation and U is unemployment, C is a vector of controls (as mentioned above and including a constant), α is a vector of coefficients on those controls, and CWB and CBI are our measures of coordinated wage-bargaining and central bank independence respectively. Our primary hypotheses, as stated above, are three. First, central bank independence generally reduces inflation $(b^p_{cbi} + b^p_{cc}CWB < 0)$. Second, coordination of wage bargaining also generally decreases inflation $(b^p_{cwb} + b^p_{cc}CBI < 0)$. Third, and most centrally, coordination of wage bargaining reduces the unemployment cost of central bank independence $(b^u_{cc} < 0)$. The view developed here also

leads us to expect three ancillary results. Fourth, we expect, not at all originally, that coordination of wage bargaining generally lowers unemployment $(b^u_{cwb} + b^u_{cc}CBI < 0)$. Fifth, because we have argued that central bank independence has unemployment costs when coordination of wage bargaining is low, this implies that, at least for low values of CWB, the unemployment costs of central bank independence $(b^u_{cbi} + b^u_{cc}CWB)$ are positive, which in turn means that b^u_{cbi} must be sufficiently positive given that b^u_{cc} is expected to be negative. Sixth, our discussion suggests that central bank independence and coordination of wage bargaining may interact in determining inflation as well as unemployment. Thus b^p_{cc} may not be zero, but we do not have strong priors on its sign or magnitude.

Notice that these are interactive models, so the estimated effect of a unit increase in CWB or in CBI is <u>not</u> given by the estimated coefficient on that variable alone but by $b_{cwb}+b_{cc}CBI$ and $b_{cbi}+b_{cc}CWB$ respectively. The estimated standard errors of these effects, in turn, depend on the standard error of both coefficients, their covariance, and the level of the other variable at which the standard error is being evaluated. Accordingly, a test that the effect of CBI on inflation is negative, say, cannot be read from the usual report of coefficient standard errors and t-statistics but must be calculated separately (and produces a different significance level) at each level of the other variable. For example, our second hypothesis, that CWB reduces inflation, produces an expectation that the estimated effect of CWB on inflation, $b^p_{cwb} + b^p_{cc}CBI$, is significantly negative over all or most of sample range of CBI. Analogous considerations apply to our first, fourth, and fifth hypotheses above.

In the data analysis that follows, we report, first, results from postwar-average data which

regress 1955-90 averages of inflation and unemployment each on a constant, and the 1955-90 averages of the independent variables. The equation is estimated by OLS with White's heteroskedasticity-consistent variance-covariance matrices.

Second, we estimate regressions with decade-frequency data which provides 72 observations. Dummy variables for each decade are included to allow for cross-nationally shared time-trends and decade-specific supply shocks. To allow for the temporal dependence in the observations, we incorporate an AR(1) process in the residuals.[43] This temporal disaggregation now permits us to model the impact of international economic conditions on unemployment more accurately by controlling for the terms of trade (ToT = export-price index divided by import-price index) and terms of trade times trade openness (ToT⊗OPEN).[44] The equations are estimated using weighted least squares and White's heteroskedasticity-consistent variance-covariance matrix.[45]

Finally, although we consider the post-war average and decade-level analyses most appropriate given the temporal invariance of our key institutional variables, we also report regressions employing annual-frequency data. This allows us to use the annual variation present in all but the institutional variables. Annual dummies are added to treat the data set as a pooling of cross-sections rather than as a pooling of time-series, increasing comparability of the estimates with those obtained from the other two levels of analysis. We estimate these equations by OLS as "pseudo-error-correction" models with Beck-Katz panel-corrected covariance (PCSE) matrices.[46]

[Table Two Here]

The results for all three sets of regressions are reported in Table Two. They exhibit remarkable stability across the various units of temporal aggregation and, together, provide strong confirmation for most of our hypotheses. In all models, the level of central bank

independence and the level of wage coordination both have a negative and statistically-significant relationship to the rate of inflation over the 1955-90 period (our first and second hypotheses).[47] For instance, taking the decade-level data as a base for estimates, if Belgium or the Netherlands (CWB=0.5) had increased CBI by 0.3 points (an increase roughly equivalent to the distance between the Bank of England and the U.S. Federal Reserve), we estimate that they could have reduced their rate of inflation by about 1.16 percentage points. Conversely, if Denmark or Finland (CBI≈.5) had increased CWB by .25 points (to the level of Norway or Sweden), we estimate they could have reduced their inflation rate by about 0.44 points.

Similarly, our third, and most important hypothesis—namely that the unemployment costs of increasing central bank independence are not zero but rather depend (negatively) on the degree of coordination of wage bargaining—receives very strong support here. The coefficients on the interaction term for CBIxCWB are negative, of substantial magnitude, and statistically significant in all three equations (p≈.0001 in the "decade" equation, p≈.0025 in the postwar-average equation, and p≈.047 in the annual equation).[48]

Although a less central hypothesis from this analysis, one further implication of these regressions should be noted. They suggest that there is a tendency for increases in central bank independence to raise the level of unemployment in at least some settings. We interpret this as the 'conservatism' effect noted above; namely, more independent central banks may give more weight to securing low inflation over securing low unemployment than more dependent banks. As Tables Two and Three suggest, however, these effects are likely to be more pronounced in settings where wage bargaining is relatively uncoordinated. Where it is highly coordinated, we have argued that an increase in central bank independence may actually help to lower

unemployment by reinforcing the process of wage coordination, although these figures provide only weak support for that contention. In general, Table Three, which reports the estimated long-run impact of a unit increase in central bank independence in settings that vary according to the level of wage coordination, shows that central bank independence tends to lower the rate of inflation in all settings but has the greatest effects where wage coordination is too low to have an impact of its own on inflation. Conversely, central bank independence tends to increase the rate of unemployment, but this cost diminishes as coordination increases, perhaps even becoming a benefit at very high coordination.

[Table Three Here]

Finally, the general patterns in these results can also be seen in Table Four, which reports the estimated rates of inflation and unemployment (according to the decade-level equations of Table Two) that can be expected to occur at different levels of central bank independence and wage coordination and at the sample 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 the Danish to the US bank or from the Austrian to German) reduces the rate of inflation by about 1.5 points but at the cost of increasing the rate of unemployment by about 2.4 points. By contrast, where wage bargaining is more coordinated, as the last two columns indicate, a similar increase in the independence of the central bank brings smaller reductions in the rate of inflation but without such large increases in the rate of unemployment.

[Table Four Here]

We interpret the findings reported in Tables Two through Four as follows. Starting from some level of central bank independence and some level of wage coordination, an increase in the

coordination of wage-bargaining improves the signaling process thereby providing the central bank with the opportunity to get a lower unemployment rate at the same rate of inflation, or to secure a lower inflation rate at the same unemployment rate, or to obtain some intermediate combination of these outcomes (and it appears that, in practice, the banks tend to take a little of both). In short, increases in the coordination of wage bargaining expand the "possibility frontier" in unemployment-inflation space for the better.

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 possibility-frontier-improving because, by rendering those 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* possibility-frontier-improving because, although it lowers the rate of inflation, it does so only at some unemployment cost since the bargainers lack the incentive and capacity to respond effectively to signals from the bank however credible they may be.

VI. The Implications for Political Economy

These findings have important implications for our understanding of the political economy. First, they lend strong support to the contention that economic performance is deeply affected by the institutional organization of the political economy and cannot be explained well without reference to variation in it.

Second, this analysis speaks to the problem of how coordination may be secured in the economy. Many neoclassical analyses assume that the behavior of economic actors will be coordinated almost exclusively by competitive market mechanisms and that non-market organizations should be seen primarily as factors that interfere with effective coordination.

However, by 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. Our analysis suggests that approaches to economic problems that posit highly competitive markets and assume they will generate cooperative outcomes are empirically fragile at best. Instead, more attention should be paid to the way in which diverse sets of institutional arrangements resolve the coordination problems of the economy and, in particular, to the kinds of interaction effects that occur among them.[49]

More specifically, 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. Once the character of the wage-bargaining system is incorporated into the analysis, we find that this proposition holds only for nations with coordinated wage-bargaining systems. 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. We arrive at this conclusion by considering the signaling process between bank and economy more closely, and we support it with a close inspection of the critical German case and results from an analysis of cross-national data at three levels of temporal aggregation.

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. Independence of the bank may provide the full gains it promises only when it is combined with coordinated wage-bargaining.[50] But, unlike central bank independence, which can be legislated relatively easily, wage coordination is difficult to secure and substantially beyond the control of government policy. A nation's capacity for wage coordination depends on

the character of a variety of societal organizations, such as trade unions and employer confederations, which emerge out of a long historical process and may not be highly amenable to political engineering.[51] Thus, many governments that enhance the independence of their central bank may find the results somewhat disappointing.

VII. The Implications for European Monetary Union

This analysis also has especially interesting implications for the monetary union that Europe is currently contemplating. EMU is to be built around a European central bank whose general structure and level of independence are modeled on the German *Bundesbank*. Many hope that, as a consequence, the new union will emulate the historic performance of the German system.

Our analysis suggests that such aspirations are unlikely to be realized, because German levels of performance have depended on levels of wage coordination that the European Union is unlikely ever to acquire. On the one hand, its leaders have yet to show any real interest in acquiring such institutions, as the halting nature of the steps toward a Social Charter indicates.[52] On the other, even if they did so, such institutions would be difficult to secure. Wide disparities in the organization of workers and employers across the EU mean that wage bargaining could not be coordinated across the continent without large-scale reorganization; and the few efforts made by trade unions or employers to reorganize wage bargaining on a European level have been singularly unsuccessful.[53] As a result, in order to secure low rates of inflation, a European central bank may have to resort to relatively high levels of unemployment because it will lack the effective signaling process provided by a continent-wide system of wage coordination.[54]

More important yet, the common view that all nations will gain from European monetary union may be wrong.[55] Our analysis suggests that the move to EMU may improve the economic

performance of some nations relative to their past experience but is likely to erode the economic performance of others. The precise effects experienced by each will be determined by the effectiveness of its existing institutions relative to those it acquires by virtue of joining the monetary union.

[Table Five Here]

Some sense of these effects can be gleaned from Table Five, which reports the average postwar performance of nations possessing different combinations of institutions. Although realized performance under EMU will differ from these historical levels, the table does suggest how performance under the institutional conditions it provides is likely to compare relative to the performance that can be secured under the different institutional conditions found in its member states.[56] EMU will create an economic unit characterized by a highly independent central bank and uncoordinated wage-bargaining. That is the situation represented by quadrant II in Table Five whose figures display the average historical performance of OECD nations with that mix of institutions. Whether a nation will gain or lose over the long run 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 in terms of 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 probably also fall into this category. However, if they expect to replicate Germany's historic levels of performance, even these countries may be disappointed because they are moving to quadrant II rather than to quadrant IV.

By contrast, the 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 from this perspective will be Germany, a prime mover behind the establishment of EMU. It has long benefited from the smooth interaction between its independent central bank and its 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 French or Dutch bargainers[57]. 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 uncoordinated bargaining units. In the German case, Table Five suggests a relative deterioration in economic performance equivalent to the movement from an Okun score of about 7 to one that is closer to 11. Thus, the move to EMU may not be an unmitigated blessing: its effects on economic performance will be distributed unevenly across countries.

Aside from such cross-national effects, the establishment of EMU may also have significant distributive consequences across the different social groups inside each nation. It is well-established that changes in rates of inflation and unemployment have more adverse effects on some groups than on others. Although it is difficult to identify all such effects with precision, lower-skilled manual and clerical workers tend to suffer disproportionately from rising rates of unemployment.[58] 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, from an institutional perspective, there is reason to expect EMU to conduce toward rates of unemployment higher than those that most of its member nations have historically enjoyed, either because the new European central bank will be more independent than their own has been (and thus more likely to privilege inflation over unemployment) or because it will seek rates of inflation commensurate with past experience but without the efficient signaling mechanism provided by systems of coordinated wage bargaining. This suggests that those at the margins of the labor market may 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 distributive consequences on which we focus; and, because the figures in Table Five are based on historical levels of performance, the actual levels of economic performance that will be realized in the EU may diverge from them for a variety of reasons. However, the theory and evidence provided here suggest that 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 better guide to what we can expect from EMU is not the familiar image of *Modell Deutschland* but the experience that Germany had with unification in the years just after 1989. After all, the creation of a European monetary union is analogous in some respects 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 did in Germany, albeit to a lesser degree.

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 was high levels of industrial conflict, notably in the spring of 1993 when employers challenged the extension of the wage-bargaining system to the East.[59] Second, unification also provoked conflict between the federal government and the *Bundesbank*, which customarily responds not only to wage bargains, as we have emphasized here, but also to the fiscal policies of the government. When the efforts of the latter to finance unification resulted in fiscal and monetary 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.

European monetary union will pose similar, if less severe, challenges. It will disrupt the processes of signaling and coordination long-established between central banks and wage bargainers in some nations, which may inspire broader changes in their industrial relations systems. It will require the development of new relationships between the European central bank and the fiscal authorities of each nation, which have already been the subject of considerable controversy.[60] Moreover, in the context of continuing high unemployment, many member governments may seek more expansionary policies precisely when the new European central bank is seeking to establish its credibility with relatively-rigorous monetary policies. One effect is likely to be higher levels of unemployment than many proponents of European monetary union

currently envisage.[61] Another may be intensified pressure for further institution building to cope with the dilemmas of coordinating fiscal and monetary policy.

The larger point here is that the creation of a European monetary union will generate a variety of new coordination problems that 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 depends on the development of a larger system of institutional arrangements. An independent central bank trying to impose its will on a reluctant government or recalcitrant workforce may be only a second-best solution to problems that could be tackled more effectively through a broader range of institutions. In this respect, the creation of a European Monetary Union is likely to be only the first step in a more extensive process of institution-building, bearing on both the coordination of monetary and fiscal policy at the European level and the character of collective bargaining within its member states.[62] It is on this wider process that the success of European Monetary Union will ultimately depend.

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Table One: Average Inflation and Unemployment Rates Secured in OECD Countries under Alternative Institutional Arrangements, 1955-90

		INFLATION RATES				UNEMPLOYMENT RATES	
Coord-inated		Central Bank Independence		Coord-inated		Central Bank Independence	
		LOW	HIGH			LOW	HIGH
Wage	LOW	7.5 (6)	4.8 (2)	Wage	LOW	4.7 (6)	6.1 (2)
Barg.	HIGH	6.2 (4)	4.8 (4)	Barg.	HIGH	2.3 (4)	2.8 (4)

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. Cases where CWB = medium (0.5) are omitted here. The number of countries in each category is given in parentheses.

Table Two: Parameter Estimates for Our Models of Inflation and Unemployment in OECD Countries from 1955-90

	DEPENDENT VARIABLE					
	Inflation Rates			Unemployment Rates		
INDEPENDENT VARIABLES	**avg.**	**dec.**	**ann.[63]**	**avg.**	**dec.**	**ann.[63]**
Real GDP per Capita (RGDPC) (in natural logs)	–2.1 (1.5)$^{.19}$	–1.3 (0.8)$^{.11}$	–2.6 (1.1)$^{.02}$	–4.9 (1.4)$^{.01}$	–3.5 (0.5)$^{.00}$	–3.1 (1.3)$^{.01}$
Trade Openness (OPEN) ((exports+imports)/GDP)	–1.8 (1.4)$^{.23}$	–2.1 (1.1)$^{.06}$	–1.2 (1.0)$^{.24}$	+2.0 (1.0)$^{.06}$	+19.5 (6.9)*	+28.9 (13)*
Terms of Trade (ToT) (Export Prices / Import Prices)	-------- --------	-------- --------	-------- --------	-------- --------	+4.3 (2.1)*	+8.0 (4.7)*
Interaction Term (ToT x OPEN)	-------- --------	-------- --------	-------- --------	-------- --------	–14.6 (6.4)$^{.03}$	–24.9 (12)$^{.04}$
Left Cabinet Participation (LCAB) (left party percent of cabinet seats)	+1.87 (2.7)$^{.51}$	–1.4 (0.7)$^{.05}$	+0.8 (0.8)$^{.30}$	+2.3 (1.4)$^{.12}$	+1.4 (0.6)$^{.02}$	+1.0 (0.8)$^{.21}$
Union Density (UDEN) (percent of labor force unionized)	+3.2 (2.8)$^{.28}$	+6.6 (1.8)$^{.00}$	+4.5 (2.0)$^{.02}$	+0.9 (3.1)$^{.79}$	+1.1 (1.8)$^{.54}$	+2.2 (2.2)$^{.31}$
Degree of Central Bank Independence (CBI)	**–4.2** (1.7)*	**–6.2** (2.1)*	**–3.9** (2.8)*	**+11.5** (2.8)*	**+9.7** (1.9)*	**+8.3** (4.2)*
Degree of Coordination in Wage Bargaining (CWB)	**–4.6** (2.3)*	**–4.1** (1.6)*	**–4.4** (2.6)*	**+1.0** (1.5)*	**–1.4** (1.5)*	**–1.6** (2.0)*
Interaction Term (CBI x CWB)	**+3.2** (2.7)$^{.25}$	**+4.7** (2.8)$^{.10}$	**+3.3** (3.8)$^{.39}$	**–13.1** (3.3)$^{.00}$	**–10.8** (2.5)$^{.00}$	**–9.3** (4.7)$^{.05}$
Number of Observations (Degrees of Freedom)	18 (10)	72 (60)	612 (566)	18 (10)	72 (58)	612 (562)
Adjusted R^2	0.55	0.73	0.31	0.81	0.86	0.40
Standard Error of the Regression	1.06	1.76	2.31	0.90	1.21	0.59
Durbin-Watson Statistic	------	2.25	1.96	------	1.65	1.94

Notes: Estimated long-run coefficients in bold, standard errors of those estimates in parentheses, p-levels from the two-sided t-test that these long-run coefficients are zero is superscripted to the standard error. That t-test is not directly informative regarding the non-interactive effects of variables involved in interaction terms (see text) and so has been supressed in the table. All other estimates omitted to conserve space; complete results available upon request.[64] The dependent variables are in percentage units (x%); all independent variables potentially vary from 0-1 except ToT and LRGDPC (see Data Appendix for detailed summary statistics).

Table Three: The Estimated Impact of a Unit Increase in Central Bank Independence at Various Degrees of Coordination in the Wage-Bargaining System

Level of Wage-Bargaining Coordination	Conditional Parameter Estimates for Effect of Unit Increase in Central Bank Independence on...					
	Inflation Rates			Unemployment Rates		
	avg.	dec.	ann.	avg.	dec.	ann.
0.00 (US, UK, Ireland)	**–4.6** (2.3)$^{.07}$	**–6.2** (2.1)$^{.00}$	**–3.9** (2.8)$^{.17}$	**+12** (2.8)$^{.00}$	**+9.7** (1.9)$^{.00}$	**+8.3** (4.2)$^{.05}$
0.25 (France, Italy, New Zealand)	**–3.8** (1.8)$^{.03}$	**–5.0** (1.6)$^{.00}$	**–3.1** (2.0)$^{.06}$	**+8.3** (2.0)$^{.00}$	**+7.0** (1.4)$^{.00}$	**+6.0** (3.1)$^{.02}$
0.50 (Belgium, Netherlands)	**–3.0** (1.5)$^{.04}$	**–3.9** (1.3)$^{.00}$	**–2.3** (1.4)$^{.05}$	**+5.0** (1.4)$^{.00}$	**+4.3** (1.0)$^{.00}$	**+3.7** (2.1)$^{.04}$
0.75 (Japan, Germany, Denmark, Finland, Switzerland)	**–2.2** (1.5)$^{.08}$	**–2.7** (1.3)$^{.02}$	**–1.5** (1.2)$^{.12}$	**+1.7** (1.2)$^{.08}$	**+1.6** (0.9)$^{.05}$	**+1.4** (1.5)$^{.17}$
1.00(Austria, Norway, Sweden)	**–1.4** (1.7)$^{.21}$	**–1.5** (1.6)$^{.18}$	**–0.6** (1.7)$^{.35}$	**–1.5** (1.4)$^{.15}$	**–1.2** (1.2)$^{.18}$	**–1.0** (1.6)$^{.27}$

Notes: Estimated long-run effect of a unit increase in CBI at that level of CWB in bold; conditional standard-errors at that level of CWB in parentheses; p-level of one-sided t-test at that point superscripted in italics.

Table Four: Estimated Inflation and Unemployment Rates at Different Levels of Central Bank Independence and Wage Coordination (at means of other variables, using the "decade" equations)

Central Bank Independence	Level of Coordinated Wage-Bargaining					
	0.00		0.50		1.00	
	Infl	Unem	Infl	Unem	Infl	Unem
0.00	10.04	2.50	8.01	1.83	5.97	1.15
0.25	8.50	4.92	7.04	2.89	5.59	0.86
0.50	6.95	7.33	6.08	3.95	5.21	0.58
0.75	5.40	9.75	5.11	5.02	4.83	0.29
1.00	3.85	12.16	4.15	6.08	4.45	0.00

Table Five: National Economic Well-Being under Different Institutional Arrangements Assessed by the Inflation Rate, the Unemployment Rate, and Okun Misery Index, 1955-90

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

Notes: MI = Misery Index, π = Inflation Rate (%), UE = Unemployment Rate (%). See note to Table One for coding of CBI and CWB.

Data Appendix

We list here summary statistics for the data and all the data necessary to replicate the postwar-average results presented in the text. Data analysis conducted in *Econometric Views* 2.0; *Stata* 5.0; and *Gauss-386i* v. 3.01. All of the data are available electronically from http://www-personal.umich.edu/~franzese.

COUNTRY	MI	UE	p	CBI	CWB	GDP	Open	Uden	Lcab
United States	10.17	5.76	4.41	0.75	0.00	9.43	0.11	0.24	0.00
Japan	6.34	1.97	4.42	0.41	0.75	8.49	0.20	0.32	0.00
Germany	6.80	3.13	3.68	0.93	0.75	8.92	0.39	0.34	0.29
France	10.79	4.16	6.63	0.43	0.25	8.91	0.29	0.18	0.17
Italy	14.19	5.576	8.62	0.37	0.25	8.72	0.30	0.34	0.18
U. K.	12.25	4.88	7.37	0.42	0.00	8.95	0.37	0.43	0.33
Canada	11.49	6.43	5.06	0.61	0.00	9.25	0.39	0.30	0.00
Austria	6.57	2.18	4.39	0.65	1.00	8.71	0.46	0.55	0.65
Belgium	9.94	5.48	4.46	0.41	0.50	8.88	0.95	0.48	0.24
Denmark	11.51	4.85	6.65	0.53	0.75	8.94	0.52	0.67	0.64
Finland	10.75	3.10	7.66	0.49	0.75	8.78	0.43	0.54	0.39
Ireland	16.10	8.10	8.00	0.46	0.00	8.38	0.79	0.51	0.09
Netherlands	9.05	4.27	4.78	0.56	0.50	8.91	0.93	0.34	0.16
Norway	8.00	2.23	5.76	0.23	1.00	8.96	0.54	0.55	0.72
Sweden	8.46	1.73	6.73	0.30	1.00	9.03	0.45	0.73	0.85
Switzerland	5.00	0.89	4.11	0.84	0.75	9.32	0.53	0.32	0.23
Australia	10.56	3.95	6.61	0.47	0.25	9.10	0.28	0.46	0.22
New Zealand	9.22	1.34	7.88	0.14	0.25	8.97	0.43	0.58	0.27
Mean	**9.96**	**4.01**	**5.96**	**0.50**	**0.49**	**9.15**	**0.46**	**0.44**	**0.31**
Std. Dev.	**2.88**	**2.038**	**1.578**	**0.20**	**0.37**	**0.20**	**0.23**	**0.15**	**0.24**
Maximum	**16.5**	**8.46**	**8.62**	**0.93**	**1.00**	**9.51**	**0.95**	**0.73**	**0.83**
Minimum	**4.98**	**0.87**	**3.68**	**0.15**	**0.00**	**8.60**	**0.11**	**18.3**	**0.00**

Notes: MI = MIsery Index; UE = Unemployment; π=Inflation; CBI = Central Bank Independence; CWB = Coordination of Wage Bargaining; GDP = Natural Log of Real GDP *per Capita*; Open = (Exports+Imports)/GDP; Uden = Fraction of Labor Force Unionized; Lcab =

Fraction of Cabinet Seats Held by Left Parties. See note 42 for sources.

Notes:

1. See: European Commission 1990; Eichengreen 1990, 117-87; de la DeHesa et al. 1993; Gros and Thygesen 1992; Goodhart 1995, 448-506; Fratianni, et al. 1992; and Fratianni and von Hagen 1992, 187-88. For more general discussion of advanrages and disadvantages of EMU, see: Eichengreen 1992; Eichengreen and Frieden 1997; and Goodhart 1995.

2. *The Financial Times* 12 November 1992, 20.

3. Here we consider only those aspects of economic performance likely to be affected by the independence of the proposed European Central Bank. For a more general discussion of other factors bearing on the performance of EMU, see Eichengreen 1992, 1994.

4. Some of the basic theoretical 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. For preceding analyses, see: Alesina and Summers 1993, Grilli, et al. 1991, Cukierman 1992, and Eijffinger and De Haan 1996 for a review.

7. 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 neoclassical framework.

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

9. See: Nordhaus 1975; Beck 1982; Alesina 1988; and, most recently, Clark et al., 1995.

10. The classic source is Rogoff 1985, which builds on Barro and Gordon 1983 and Kydland and Prescott 1977. See also Lohmann 1992 and Cukierman 1992.

11. The general presumptions are that, the more independent the central bank, the more restrictive monetary policy is likely to be and the more credible its commitment to a given policy announcement is likely to be.

12. Eichengreen 1996.

13. Since prices can be defined as a mark-up on wages, any wage bargaining is by definition also bargaining over the price and profit rate as well. Henceforth, whenever we say "wage bargaining" we mean wage *cum* price bargaining. For simplicity, we will not continue to carry around both terms, but it is important to remember that it is restraint in wage *cum* price bargaining that is essential and that coordination of such bargaining can come as easily (or perhaps more easily) from the employer as from the labor side.

14. For two of the most complete recent treatments, see Layard, *et al.* 1991, esp. ch. 2, and Calmfors 1993.

15. See, e.g., Milgrom and Roberts 1992 and Alt and Shepsle 1990.

16. See also Hall 1994. Franzese 1994 and 1996 adds variation in the sectoral (structural) position of the actors to this sort of analysis. Cf. Iversen 1994 and 1996, which adds consideration of wage disparity and wage-equalization goals on the part of labor within a somewhat different framework.

17. The classic early references are Bruno and Sachs 1984 and Cameron 1984; See also: Calmfors 1993; Calmfors and Driffill 1988; Lange and Garrett 1985; Layard et al. 1991; and Soskice 1990;. 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.

18. See: Scharpf 1988 and 1991; Thelen 1991; and Tsebelis 1990.

19. 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.

20. Golden 1993; Iversen 1994.

21. This parallels the arguments in Olson 1965, 1982.

22. We use the term 'conservatism effects' to refer to the tendency of banks that are more independent to be less tolerant of higher levels of inflation and the term 'credibility effects' to refer to the effects that follow from the greater credibility of a more independent central bank's commitment to announced policy targets, as outlined above.

23. From 1955 to 1990, the average rate of inflation in Germany was 3.7 percent against an average of 6.0 percent for the OECD nations examined here, and its average rate of unemployment was 3.1 percent versus 4.0 percent for the OECD. See also: Lohmann 1994.

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

25. 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 the latter as a minor contributor to the outcome, but others accord it a more prominent role. See Hirsch and Goldthorpe, eds., 1978; and Lindberg and Maier, eds., l985.

26. For analyses that explore the German case more fully than we can here, see: Soskice 1990; Scharpf 1991; Streeck 1984a and 1984b. See also: Hall 1986, ch. 9 for an early formulation of similar arguments.

27. 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, but cf. Franzese 1994, 1996, and Garrett and Way 1995b on public-sector workers and wage bargaining.

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

29. 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. See also Garrett and Way 1995b, and Franzese 1994, 1996.

30. See: Flanagan, et al. 1983, ch. 5; Markovits 1986; and Thelen 1991.

31. See, e.g.: Streeck 1984a and 1984b; Scharpf 1988 and 1991, ch. 7; and Berghahn and Karsten 1987.

32. See also Iversen 1996 on this point (although the rationale provided there for this observation differs to some extent from the present one).

33. See also Franzese 1994 and 1996 on this point.

34. Grilli et al. 1991, 375.

35. For notable exceptions, see Havrilesky and Granato 1993; Bleaney 1996; and Al-Marhubi and Willett n.d. For a survey including a review of previous empirical studies, see Eijffinger and De Haan 1996.

36.As noted above, the reasoning behind the corollary is that, by virtue of being able to make more credible pronouncements, a more independent central bank can place greater pressure on the unions and firms *in a coordinated bargaining system* to exercise restraint, thereby enhancing the effectiveness of the system.

37. These 18 cases represent all the major developed democracies from which Greece, Spain, and Portugal are excluded because they had undemocratic regimes for substantial portions of the period. Comparing a central bank's "independence" across authoritarian regimes and democratic regimes is difficult because the credibility of any nominal/legal degree of central bank independence ought to be discounted when the ruling regime is authoritarian, but it is not clear by how much. Similar considerations plague the coding of wage-bargaining systems comparably across authoritarian and democratic regimes.

38. The five indices 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 central bank, and POL, the rating for political independence from Grilli et. al. 1991; and the original index from Bade and Parkin 1982.

39. Soskice 1990, 55; Layard, et al. 1991, 52; Flanagan, et al. 1983; Ferner and Hyman, eds., 1992; Baglioni and Crouch, eds., 1990; Crouch 1993. Some scholars prefer an index based on union organization but this violates the important observation of Soskice 1990, Swenson 1989

and others that employers associations also contribute to wage coordination. A significant but unavoidable limitation of the data derived from Soskice 1990 and Layard et al. 1991 is that they do not vary over time.

40. Alesina and Summers 1993 employ a similar approach and offer a similar defense. Close inspection of such time-sensitive indices of central bank independence and trade-union characteristics as do exist suggests that these variables did not shift substantially in the 1955-1990 period. (The recent widespread movement toward more independent central banks came after our sample ends in 1990.) For example, 96.6% of the country-decade variance in Cukierman's (1992) LVAU index (the only time-variant index available) is solely cross-sectional (cross-country). Since time-variant measures of wage-/price-bargaining coordination do not exist, we can examine only proxies such as Golden and Wallerstein's (forthcoming) annual-level data for union confederation involvement in wage bargaining in six high-coordination countries. Only 33% of the variation in this index is unique to country-year. Variation in the effective *coordination of wage bargaining* over this period is likely to be lower than variation in *union-confederal involvement* and far lower in low-coordination countries than in these six. Thus, 33% may serve as a very generous estimate of the upper bound on the share of total variation of coordination in wage-/price-bargaining that is country-time unique.

41. Time-variant indices for the coordination of wage bargaining do not exist; central bank independence has been measured by 'decade' (Cukierman's LVAU is measured 1950-59, 1960-72, 1973-79 and 1980-89); all the rest of our data can be measured annually. Although none of these levels of analysis is unambiguously dominant on statistical grounds, we view the decade-level analysis as the best compromise over degrees-of-freedom, data-limitations, and match-of-

theory-to-empirical-specification considerations. We nonetheless report the results of all three levels of analysis for comparison.

42. Economic openness is measured by exports plus imports as a percentage of gross domestic product; terms of trade are measured as the export-price index divided by the import-price index (data from the IMF International Financial Statistics, CD-ROM 6/96). The representation of the left in the cabinet is based on data from Lane, et al. 1991 and Woldendorp, et al. 1994 and classification of left parties as in Swank 1989. *Per capita* GDP is from the Penn World Tables version 5.6. Unemployment and inflation are the internationally comparable figures compiled from OECD sources by Layard, et al. 1991. Union density figures are from Golden et al. 1995, who worked from Visser 1992, here supplemented by Lane et al. 1991, Bean 1989, and Traxler 1994.

43.The first period is essentially immediately postwar, so we feel comfortable assuming that the residual from the previous decade does not have much lingering effect on the 1955-9 outcome. Accordingly, we begin the AR(1) process allowing the 1955-9 residual to affect the 1960-72 outcome but being unaffected itself. This intuitively sensible procedure increases the sample size by a full 25%. A more orthodox (but less aggressive) Prais-Winston AR(1) process produces similar results. Both procedures assume a constant serial-correlation parameter which cannot be fully expected here because the adjacent data are averages of differing numbers of years. We have estimated decade-specific AR(1) parameters by Monte Carlo simulation using estimates from the annual data of the year-on-year correlation, but this makes no difference to our substantive conclusions so we opt for the simpler and more familiar procedure.

44. Our expectation is that domestic unemployment benefits (suffers) from positive (negative) terms-of-trade shocks to the degree the economy is open to foreign trade. The interaction captures this expectation; for example, it is an efficient and substantively meaningful way to control for oil booms in Norway and the UK. We omit terms of trade from the (domestic) inflation equations because terms-of-trade movements are essentially defined as movements in domestic inflation relative to foreign inflation.

45. Following standard practice to ease endogeneity concerns, each of the time-variant independent variables are measured in the year prior to the 'decade' start. WLS is employed because the data for the dependent variables are averages over a different number of years (to accommodate the periodization of Cukierman's LVAU index) and so should exhibit heteroskedasticity that is inversely proportional to the number of years in each decade. White's matrix is then applied because the weights may not account for all the heteroskedasticity, although this does not substantively affect the results. (The Monte Carlo simulations mentioned in note 43 simulate the appropriate 'decade' weights in the presence of annual serial correlation, producing similar results.)

46. See Smith 1995 on the interpretation of annual dummies as pooling cross-sections, Beck 1991 on "pseudo-error-correction" and dynamic-model specification, and Beck and Katz 1995 and 1996 on PCSEs. Specifically, the "pseudo-error-correction" model here simply regresses (OLS) the change in the dependent variable on the lagged change and the lagged level of the dependent variable (this being revealed as the appropriate dynamics), changes in the independent variables (with the exception of the institutional variables which do not change), and the first lag of the independent variables.

47. The effects of CBI and CWB on inflation are negative at statistically significant levels (.10 or better) over most or all (62.5%-100%) of the sample range of the other variable in all three inflation equations. The effects of CBI (CWB) on unemployment are generally more significantly positive (negative) over more of the sample range of the other variable in all three unemployment equations (see Table Three).

48 We subjected these statistical estimations to a large number of sensitivity and robustness tests, which included (i) searching for 'influential points' (ii) consideration of alternative empirical measures, and (iii) alternative estimation techniques. Potential outliers were sought using DFbetas, Cook's D, and leverage-to-squared-residual plots. "Robust" estimators which sequentially eliminate such outliers produce little substantive difference in our core findings. Substituting Cukierman's LVAU for our averaged index of CBI or Soskice's EWC and wage-pushfulness indices for our CWB index produced similar findings, as did a variety of alternative estimation techniques (details available from the authors). In general, the results reported in Table Two appear highly robust with the possible exception of those regarding the ancillary hypothesis six, the more marginal statistical support for which is also evident from the table.

49. See, e.g.: Alvarez, et al. 1991; Beck et al. 1993; and Soskice 1991.

50. Conversely, our arguments and evidence also suggest that coordinated wage bargaining may work better when it is combined with an independent central bank.

51. See Levy 1993 and Regini 1984.

52. Lange 1993; Leibfried and Pierson 1995; Streeck and Schmitter 1991; and Streeck 1995.

53. See Streeck and Schmitter 1991 and George 1992.

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

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

56. Since we focus here on the economic effects of institutional context *ceteris paribus*, this analysis ignores other effects, both positive and negative, that the move to EMU may have, such as those following from lower transaction costs or the need to adjust to asymmetrical demand and supply-side shocks. On these and other effects, see Eichengreen 1992 and Kenen 1995.

57. As Soskice 1997 points out, in the absence of a central bank that responds directly to them, the power of the German trade unions relative to employers is likely to be enhanced, which may in turn produce a variety of further effects inside the German system.

58. On this point there is a large literature. See, e.g., Hibbs 1977 and Wood 1994.

59. See: Webber 1994; Silvia 1994; and Locke and Jacoby 1995.

60. At least some national governments have supported monetary union in the hope that it will allow them to implement more expansionary policies than were possible under a European Monetary System dominated by the *Bundesbank,* while others insist on greater fiscal and monetary strictness. See: Fratianni and Von Hagen 1992, chs. 8 and 9; Gros 1996, 88 ff.; Frieden et al. forthcoming; and Eichengreen 1992.

61. The case of the United States in the early 1980s, when the government ran high deficits while the Federal Reserve Bank pursued a tight monetary policy, suggests that significant employment effects, lasting up to ten years, can follow from this combination. See Krugman 1990, and on the political economy of American monetary policy more generally Mayer 1990 and Wooley 1984,

and on potential fiscal/monetary conflict under EMU, Kenen 1995, ch. 4 and Gros and Thyugesen 1992, ch. 8.

62. See Soskice 1997.

63. Since the dependent variable in these pseudo-error-correction equations is the *change* in inflation or unemployment, R^2 is fully expected to be lower than in the decade and postwar-average models which are in levels or, for that matter, than R^2 would be in the mathematically equivalent partial-adjustment model in annual levels. Also, the estimated long-run effects in these models are given by $(b_o/|b_l|)$ where b_o is the coefficient on the lagged level of the variable in question and $|b_l|$ is the absolute value of the coefficient on the lagged level of the dependent-variable. The standard errors of these effects are then calculated as indicated in Greene 1997, 360-3. Details of the estimated short-run dynamics are available upon request.

64. Deleting all insignificant variables from the equations (or all those with $|t|<1$ so as to minimize the standard error of the regression) only strengthens our conclusions. Such a procedure tends to overstate significance levels so we have avoided it.