Monetary Policy and Wage/Price Bargaining:
Macro-Institutional Interactions in the Traded, Public, and Sheltered Sectors

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Abstract: This chapter considers the politico-economic management of unemployment and inflation in developed capitalist democracies, focusing on the institutional and structural features of labor and goods markets and the credibility and conservatism of the monetary-policy authority. It reviews the central-bank-independence (CBI) and coordinated-wage-/price-bargaining (CWB) literatures and then offers a synthesis and extension which emphasizes that the degrees of CBI and CWB interact, with each other and with the sectoral structure of the economy, to structure the incentives facing the politico-economic actors involved in monetary policy and wage/price bargaining. The empirical records of 21 OECD countries in the post-Bretton Woods era are then used to evaluate the emergent hypotheses. The conclusion addresses two questions of pressing intellectual and practical concern: the likely impact of an independent European central bank and the roots of the “collapse” of CWB.

I. Introduction

Political economists interested in the institutional and structural features of the politico-economic management of unemployment and inflation have heretofore been confronted with two disparate and somewhat contradictory literatures. One approach, deriving from the modern neoclassical economics of monetary policy, focuses on the degrees of anti-inflationary conservatism and of credible independence (from the government) of the monetary authority. The central claim is that a credibly independent and conservative central bank can achieve nominal benefits (e.g. low inflation) at no real (e.g. employment) costs on average.\(^1\) Another approach, deriving from the study of interest intermediation in developed capitalist democracies, focuses on the institutional features of labor (and recently goods) markets. The central claim there is that coordination of wage/price bargaining facilitates wage/price restraint by internalizing externalities inherent in the wage/price bargain and thereby provides real (employment) and perhaps nominal (inflation) benefits.

Each argument has focused on a particular institutional feature of the macro political economy: the degrees of central bank independence from the political authority (CBI) and of coordination across the economy in wage/price bargaining (CWB). These exclusive focuses contributed to the early development of these literatures, now two of the most influential in political economy, both academically and practically. Monetary policy and wage/price bargaining are intimately related exercises, however, so the sorts of institutional interactions emphasized in this volume are likely to be especially important in this setting.

Building on these well-developed arguments and on a set of recent contributions which aim to combine their insights (Hall 1994, Iversen 1994, 1996, Franzese 1994, 1996 ch. 4, Garrett and Way 1995a, 1995b, Hall and Franzese 1997; and Cukierman 1997), I argue that the institutions of CBI and CWB interact, with each other and with sectoral structure, in macroeconomic regulation. Specifically, CBI, CWB, dominant traded- and dominated public-sectors are generally substitutes in producing low inflation and complements in producing low unemployment. More broadly, the incentives facing actors within a political economy are structured by the interaction of the set of institutions present with each other and with the structure of that economy and polity. Macroeconomic regulation of unemployment and inflation, therefore, rests not on any one institution–CBI or CWB–but on the configuration of the set relevant institutions operating within the existent structure of the political economy.

In making these arguments, I proceed (a) by synthesis, arguing that the insights of the CBI and CWB literatures are valuable but derive from contradictory foundations and suggesting a resolution, and (b) by extension, arguing that explicit consideration of the impact of sectoral structure on the functioning of these institutions is necessary and revealing. First, in sections II and III, I briefly review the CBI and CWB literatures, providing a pair of simple heuristic models designed to represent their principle theoretical contentions and to be congruent with their core empirical predictions. I then reconsider the arguments and findings, highlighting some lingering issues. In section IV, I offer an analysis which merges the insights of CBI and CWB and suggest a sectoral-structure extension of that synthesis, again relying on a heuristic model to organize and guide the argumentation. Section V then analyzes the post-Bretton Woods

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\(^1\) Loosely speaking, real economic variables are those adjusted for inflation while nominal variables are unadjusted. Roughly, real variables are quantities—e.g., (un)employment, (adjusted) output, (adjusted) income, etc.—and nominal variables are prices—e.g. inflation, price levels, (unadjusted) wages and interest rates, etc. Relative prices and wages are however real while average price and wage levels are nominal.
macroeconomic experiences of developed capitalist democracies to evaluate the emergent hypotheses. Section VI, finally, summarizes and considers the implications of the arguments and evidence for the proposed European Central Bank and for the recent “collapse” of CWB.

II.A. CBI: Reviewing the Neoclassical Argument

Institutional political economists in the 1980s and 1990s developed a convincing argument that CBI can achieve low inflation (Kydland and Prescott 1977; Bade and Parkin 1982; Barro and Gordon 1983a, 1983b; Rogoff 1985, 1989; Alesina and Tabellini 1987; Alesina 1988; Grilli et al. 1991; Lohmann 1992; Cukierman 1992; Alesina and Summers 1993; Cukierman et al. 1993; Persson and Tabellini 1994; Eijffinger and De Haan 1996). Due to a credibility advantage such central banks enjoy over elected governments, this inflation benefit is argued to come without real economic costs such as unemployment on average. Simplifying and summarizing, the argument proceeds as follows.

First, given nominal wage contracts (Lucas and Rapping 1981 [1969]) and/or sticky nominal prices (Mankiw 1985) and/or “near-rationality” or calculation costs in optimization (Akerlof and Yellen 1985), the monetary authority has the incentive to create “surprise” inflation, thereby lowering real wages and returns and thus spurring employment and real demand. Second, private-sector actors are, however, aware of this incentive and incorporate its inflationary consequences into their wage and price setting. Accordingly, in rational-expectations equilibrium, the private sector is not systematically surprised by the monetary authority, so real wages and prices and therefore output and employment are unaffected on average while inflation is higher. Third, if, on the other hand, the monetary authority could credibly promise to refrain from inflationary policy, the private sector could set lower wages and prices without fear of being surprised so that once again real wages and prices and therefore output and unemployment would be unaffected on average, while inflation could now be lower than without credible commitment. Finally, institutionalizing a conservative central bank with relative independence from political officials is held to provide this sort of credible commitment; thus, CBI reduces inflation without adverse real effects on average.

Let us take a closer look. The argument begins with the quantity theory of money:

\[ m + v = \pi + y \]  

(1)

I.e., money-supply growth \( (m) \) plus percentage change in the velocity of monetary exchange \( (v) \) equals inflation \( (\pi) \) plus real-output growth \( (y) \). In the abstract, \( m, v, \pi, \) and \( y \) can be defined so that the quantity theory is an accounting identity. The theory thus amounts to the assumption that velocity and real output are fixed or exogenous, so that money growth is inflation by definition and then maintaining that money growth (and hence inflation) is directly controlled by the monetary authority. Obviously, the monetary authority does not directly control inflation; inflation is the rate of change of prices set in the market not of money “printed” by the central bank. Prices may be intimately affected by money, but the former are not identically determined by the latter. The assumption is merely a useful simplification in the neoclassical context; however, it turns out to be a detail of considerably greater importance to the proposed synthesis and extension.

The next step is to specify the utility function, \( V^m(\cdot) \), for the monetary policy-maker:

\[ V^m = -\frac{A}{2}(N^*-N)^2 + \frac{\pi^2}{2} \]  

(2)

The policy maker derives disutility from deviations of employment \( (N) \) from some target level \( (N^*) \) and deviations of inflation from its target level (set to zero for simplicity). The parameter \( A \) reflects the weight on employment relative

\(^2\)Ball and Romer (1990) show that nominal rigidities, such as those stressed in the Lucas supply model or Mankiw’s menu-costs, are insufficient by themselves to produce real policy-effectiveness on the scale suggested in the CBI literature (though CBI is not their example). However, they continue, small real rigidities plus small nominal rigidities can produce the necessary effectiveness. Akerlof and Yellen’s near-rationality is both. Any degree of bargaining power in labor or goods markets also generally implies both.

\(^3\)I follow Cukierman (1992: 27-45) here.

\(^4\)I am not suggesting that inflation and money growth can diverge for long periods of time—that is also self-evidently incorrect—merely that it is important to the synthesis to remember that the monetary authority “controls” inflation by affecting wages and prices set (bargained) in the market.

\(^5\)Replacing employment with some other real quantity such as output growth (unemployment) and its target level and natural rate would be straightforward. Further, notice that (2) indicates that policy makers derive disutility from too high growth or employment. To avoid this, Cukierman (1992, p. 28) stipulates that \( N^* \) is greater than \( N \). Alternatively, simply assume the target is 0% unemployment, 100% employment, or arbitrarily high growth.
to inflation in policy-maker utility; conservative can therefore be defined as having lower $A$.

Next, because there are nominal contracts and market power, unexpected money-growth spurs employment beyond the natural rate ($N_n$). Actual employment ($N$) is accordingly given by:

$$N = N_n + \alpha(\pi - \pi^e)$$  \hspace{1cm} (3)

where $\pi^e$ is expected inflation. Finally, given rational expectations and no uncertainty, and abstracting from real shocks, growth, and changes in velocity, the equilibrium money-growth $cum$ inflation-rate in the absence of any commitment devices can be found. Substitute (3) into (2) and differentiate with respect to $\pi$, then set $\pi=\pi^e$ (i.e., apply rational expectations):

$$m = \pi = \pi^e_d = A \alpha (N^* - N_n)$$  \hspace{1cm} (4)

This is the *discretionary-equilibrium inflation-rate*, $\pi^*_d$: the equilibrium inflation rate in the absence of commitment. $\pi^*_d$ involves only parameters known with certainty by the private sector ($A$, $\alpha$, $N^*$, and $N_n$), so expected inflation ($\pi^e$) will be actual inflation ($\pi^*_d$) and employment ($N$) will not deviate from its natural rate ($N_n$) in rational-expectations equilibrium. On the other hand, if the bank could credibly commit to a lower inflation rate—say, e.g., its desired rate of zero—expected and actual inflation would again be equal—at that lower rate of zero—and equilibrium employment would still be the natural rate ($N_n$). Call this the commitment-equilibrium inflation-rate: $\pi^*_c=0$. The theory then equates CBI with credible commitment to low inflation and thus concludes that CBI lowers inflation without real costs on average.\(^6\)

\(^6\)Cukierman (1992) considerably advanced the theory and empirics. He explored information asymmetry, uncertainty, and incomplete information of various sorts and derives similar conclusions: credible commitment (CBI) lowers inflation leaving real variables unaffected on average. Some costs do now arise in the form of more variant real quantities. I.e., credible commitment to refrain from surprise inflation sacrifices monetary-policy’s use for macroeconomic stabilization, which ability exists in this framework when the bank enjoys private information. Still, the basic conclusion remains that CBI lowers inflation practically costlessly, especially since evidence that CBI is associated with more variant real quantities has not surfaced. (Alesina and Summers 1993 expected but did not find this; Alesina and Gatti 1995 suggest that the omission of partisan fluctuations in fiscal policy may account for that null finding.)

\(^7\)Exceptions do exist. Cukierman (1992) offers some decade-frequency evidence, some evidence from developing countries, and one annual VAR in which central-bank-governorship turnover and inflation are the dependent variables. He finds strong evidence that CBI is associated with low inflation and related nominal phenomena but offers no evidence regarding real
and CBI and no significant bivariate correlation between CBI and virtually any real outcome. Such supporting statistical evidence can be summarized graphically as in Figure 1.

Some prominent real-world examples have also lent support to the hypothesis. Germany, Switzerland, and the US have the most notably independent central banks and they share the experience of relatively low inflation while their unemployment experiences differ considerably. On the strength of such eloquently logical argumentation, such simple but striking quantitative evidence, and such prominent empirical anecdotes which appear to support the logic and statistics, the majority of academic and policy-making audiences have apparently been convinced. The issue of increasing CBI has risen on policy agendas across the world in recent years; and a number of countries have recently made moves in this direction: Italy and New Zealand most notably among developed democracies. Much of the rest of Europe has begun similar reforms as the European Community’s requirements for monetary union and the outlines of the proposed European central bank, were written with these arguments, with this evidence, and with the template of the Bundesbank, in mind.

II.B. CBI: Lingering Issues and Anomalies

Notice first that the model indicates more than that CBI reduces inflation. Equation (4) also states that anything that (i) increases the weight the government puts on employment (A), or (ii) increases the effectiveness of surprise money in increasing employment (c), or (iii) increases the desired level of employment (N*), or (iv) decreases the natural rate of employment (Nn), increases discretionary inflation. CBI, then, lowers inflation from this discretionary level toward the bank’s target level (here zero). Accordingly, it lowers inflation more (less) the higher (lower) discretionary inflation would have been. Points (i) and (iii), e.g., suggest that CBI should reduce inflation more (relative to what it would be under discretion) when left parties are in office than right since the left has greater weight on unemployment relative to inflation in their utility functions (higher A). Points (ii) and (iv), e.g., begin to suggest one possible avenue for synthesizing the CBI and CWB literatures since the institutional features of the wage/price bargain are directly relevant to the effectiveness of monetary expansion (c) and the natural rate of employment (Nn). I pursue this further below.8

These implications have gone virtually unnoticed not to mention untested in the literature.9 Previous estimations of the impact of CBI on inflation, accordingly, were somewhat mis-specified.10 Defining CBI as the degree of central bank independence, ranging from 0=none and 1=complete, the theory more precisely predicts:

\[ \pi = CBI \cdot \pi^*_c + (1-CBI) \cdot \pi^*_d \]  

where \( \pi^*_d \) is given by (4) and \( \pi^*_c \) can be assumed a small positive constant or zero. Therefore, the argument suggests that the effect of CBI on inflation depends on everything that determines the discretionary-equilibrium level of inflation, i.e. everything that might be expected to affect A, c, N* and Nn, such as those factors briefly mentioned above.

Thus, even the neoclassical theory of CBI and inflation, correctly conceived, suggests that the impact of CBI on inflation depends on a whole range of other political, economic, structural, and institutional features of the political economy in which the bank is operating. There is no disagreement on this point between the neoclassical theory of CBI, the theory of CWB, and the synthesis and extension to be offered here.

Consider also the behavior and public announcements of central bankers which, we will see, are anomalous from the neoclassical perspective. E.g., the US Federal Reserve chairman frequently announces that the Fed will raise interest rates to defuse “incipient inflationary pressures,” which it then proceeds to do. However, incipient inflationary effects. Cukierman et al. (1993) find some beneficial relationships between CBI and real variables in developing countries. Al-Marhubi and Willett (n.d.) and Havrilisky and Granato (1993) estimate the nominal effects of CBI controlling for corporatist structures. See also Eijffinger and De Haan’s review (1996).

8 Another interpretation of (4) is that it gives the anti-inflationary benefit to the nation of instituting full CBI. As such, the theory suggests that nations which have high A, c, and N*, and low Nn should be more inclined to increase CBI, ceteris paribus.

9 Romer (1993) is a partial exception in that (4) is the theoretical basis for a prediction that trade openness, by lowering the real effectiveness of surprise monetary expansion, lowers inflation. The supportive empirical test, however, does not allow that this should hold only to the extent monetary policy is discretionary. Many authors (Clark et al. 1995 recently e.g.) have emphasized that CBI should reduce partisan fluctuations in monetary policy but generally without noting the direct link to (4) and the precise empirical form which follows therefrom (see below and Franzese 1997).

10 They should have provided reasonable estimates of the average impact of CBI across various configurations of other relevant factors which obtained in their particular sample though.
pressures do not exist in the theory since inflation is money-supply growth which the bank completely controls. Nor does relaxing the strict quantity theory—which was merely simplifying and known to be false anyway—correct matters. Inflation is theoretically the CBI-weighted average of $\pi_f^A$ and $\pi_r^A$ as in (5). Discretionary inflation, in turn, is a function of $A$, $\alpha$, $N^*$ and $N_e$ as in (4), but none of these vary cyclically in a manner consistent with the Fed’s behavior. Consider that by incipient inflationary pressures the Fed means that the real economy is strong. If $A$ and $N^*$ (the government’s weight on employment and its target level), $\alpha$ (monetary-policy real-effectiveness), and $N_e$ (the natural rate) vary at all cyclically it would be to lower $A$, $\alpha$, and $N^*-N_e$ in booms. I.e., when the economy is pushing capacity: (a) governments tend to be more concerned over inflation than employment ($A$ lower), (b) the real-effectiveness of monetary policy ($\alpha$) must be lower by the law of diminishing returns, and (c) $N^*-N_e$ the gap from target to actual rate of employment, must be lower. All of this means that, according to the theory, central banks have less incipient inflationary pressures to concern them in booms than in busts. Their behavior completely to the contrary must therefore be seen as anomalous.\footnote{Furthermore, the “financial-stability-motive” explanation for the observed counter-cyclical policy (see Cukierman 1992, ch. 7) cannot explain the justification the Fed offers for its behavior even if we considered it to explain the actual counter-cyclicality.}

The Bundesbank behaves somewhat differently, but equally anomalously, in that its pronouncements are frequently directed specifically to wage/price bargainers and/or the government. More or less overtly, the Bundesbank threatens to respond to upcoming wage/price settlements or government budgets which it views as inflationary by raising interest rates.\footnote{The Fed has rarely if ever mentioned wage/price bargainers. Examples of the Bundesbank’s quite different announcements are easily found: e.g., Kennedy (1991:27-53) or Financial Times (24 June 1993:14).} Thus the Bundesbank identifies the sources of the incipient inflationary pressures it perceives: the government and wage/price bargainers. Again, though, the neoclassical theory cannot explain the bank’s behavior. First, inflation in the theory cannot be caused by government budgets, so there is no reason to address the government except as a price-setter for public goods and as the employer of public-sector workers. Second, wage/price bargainers in the theory simply add expected money growth to desired real-wage growth. No need to threaten a response then, the bank should simply announce its fixed intended money-growth.

In short, both the behavior and the pronouncements of both the Bundesbank and the Fed are somewhat at odds with the theory. Moreover, that the Bundesbank speaks differently and to different agents than does the Fed is also inexplicable from the neoclassical perspective. Finally, the theory has not been appropriately tested, in its own terms, on the nominal side especially because the empirical model ought to be interactive as in (5), but also on nominal and real sides because controls have been omitted. I will argue that the proposed synthesis and extension resolves these anomalies and begins to fill the empirical gaps, but first we turn to the institutions of wage/price bargaining.

III.A. CWB: Reviewing the Basic Argument


First, one person’s wage-earnings or output-price is another person’s wage-cost or input-price. Second, therefore, when wage/price negotiations occur in very fragmented (atomistic) units, the externality of one bargaining-unit’s wages (prices) lowering the real value of another’s is ignored; thus atomistic wage and price settlements will be higher than need be since they must include increments to offset expected increases elsewhere in the economy.\footnote{This can be seen as the result of a multiple-player prisoners’ dilemma in which the most preferred outcome is that all units except the one in question exercise restraint, then that all exercise restraint, then that none exercise restraint, and lastly that only the unit in question exercises restraint. Notice that this preference ordering assumes market power since being the only bargaining unit to raise wages (prices) is most preferred which is only likely if employment (demand) is relatively wage (price) inelastic which is the definition of market power.} Third, if, contrarily, bargaining occurs in encompassing or coordinated units, the externality is internalized and such increments are neither necessary nor desirable. Thus CWB induces wage/price restraint and therefore lowers unemployment and inflation.
Developing a heuristic model from these first principles will prove useful. Following the early development of this literature, I begin with the focus on wage bargaining from labor’s perspective. Start by identifying the value functions of the $j$ worker bargaining-units (henceforth unions). The core of the argument is that these $j$ unions derive positive utility from the real consumption value of their wages, $\omega_j^c$, and their employment prospects, $\varepsilon_j$, which latter are a positive function of, among other things, aggregate output-growth, $y$:

$$V_j^u = V^u(\omega_j^c, \varepsilon_j(y, \cdot)) \quad \text{with} \quad V_1^u = \frac{\partial V^u}{\partial \omega} > 0 \quad \text{and} \quad V_2^u = \frac{\partial V^u}{\partial \varepsilon} > 0 \quad \text{(6)}$$

Defining everything in log changes (growth rates) for comparability with the CBI literature, the growth of real consumption-wages for the $j^{th}$ union ($\omega_j^c$) is the difference between its nominal-wage growth ($w_j$) and the growth in consumer prices (inflation, $\pi$):

$$\omega_j^c = w_j - \pi \quad \text{(7)}$$

The marginal value to any union $j$ of gaining higher nominal-wage-growth for itself ($w_j$) is found by substituting (7) into (6) and differentiating with respect to $w_j$:

$$\frac{\partial V_j^u}{\partial w_j} = V_1^u(1 - \frac{\partial \pi}{\partial w_j}) + V_2^u(\frac{\partial \varepsilon_j}{\partial y} \cdot \frac{\partial y}{\partial w_j}) \quad \text{(8)}$$

This reveals the core of the argument. Unions perceive more value from nominal-wage-gains, and so exercise less wage restraint, the larger this expression; conversely, the lower this derivative, the more wage restraint is likely to be exercised. Notice from the first term on the right that the real-wage gains the union expects from a given nominal-wage increase are lower the more aggregate-price inflation, $\pi$, moves in line with that union’s wage-inflation, $w_j$. In one limit, when the bargain is all-encompassing, this relationship is one-for-one ($\partial \pi/\partial w=1$), and there are no perceived real-wage gains since the union knows that its own nominal gains will be matched across the economy. At the other limit, when the bargain is too small for the union’s gains to have noticeable effect on national aggregates, no single union perceives aggregate inflation to respond to its own settlement ($\partial \pi/\partial w=0$). In short, nominal wage-gains are perceived to produce real wage-gains in proportion to the fragmentation of wage bargaining.

From the second term in (8), notice that the aggregate-output effects of aggregate (or average) wage-gains, $\partial y/\partial w$, are negative. Thus, the union perceives its employment prospects to decline with aggregate wage-gains. Once again, though, the response of aggregate output to an individual bargain’s settlement ($\partial y/\partial w_j$) is more negative and the response of the union’s employment prospects to aggregate output ($\partial \varepsilon_j/\partial y$) is larger the more encompassing the union. In sum, on both accounts—the real-wage-gain side and the employment-prospect-cost side—unions are more disposed to deliver wage restraint the greater is coordination across bargaining units.

As with CBI, an impressive amount of evidence has been amassed to support the CWB argument (see, e.g., Cameron 1984 and Bruno and Sachs 1987). Once again, the quantitative evidence has typically involved regressing postwar averages of unemployment and inflation (or some other real and nominal variables) on an index of CWB. Figure 2 illustrates (the CWB index is described later). Again, some prominent real-world examples added to the argument convincingly. The Scandinavian countries and Austria were well-known to exhibit considerable CWB, and they also had admirable unemployment records and fair inflation performance. As with CBI a bit later, the intuitive argumentation, striking evidence, and real-world examples put the issue of coordination in bargaining on several economic-policy agendas. Some countries (e.g., the United Kingdom, Italy) scrambled for a time, though unsuccessfully for the most part, to institute such bargaining in their economies (Regini 1984).

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14 The incentive for wage restraint in the standard model comes from this sensitivity of the union’s members’ employment prospects to the economic performance of the nation which in turn is sensitive to individual union’s wage-settlement in proportion to the encompassingness of that bargain. The assumed monotonicity of these relationships has been much criticized recently (see the discussion below).

15 More precisely, more or less wage restraint is exercised the lower or higher the $w_j$ (wage inflation) at which (8) is zero.

16 The economics of this relationship were usually unspecified. The model may be specified more precisely and still retain this general relationship though (see, e.g., Bruno and Sachs 1987; Carlin and Soskice 1990; or Layard et al. 1991).

17 Exceptions are less rare in the CWB case (e.g., Alvarez, et al. 1991 and Layard, et al. 1991).
III.B. CWB: Recent Extensions

The CWB literature has recently been extended in two directions. Swenson (1989, 1991), Soskice (1990), and Layard et al. (1991) have drawn our attention to the employer side of the wage/price bargain which previously had been virtually ignored (call this the employer-side amendment) while Calmfors and Driffill (1988), Layard et al. (1991), and Calmfors (1993) have drawn our attention to the implicit market-power assumption in the preference ordering assumed by the early CWB literature (call this the market-competition amendment).

To consider these amendments, I reformulate the simple CWB model from above slightly. First, wages are not unilaterally set by unions, but rather wage/price settlements emerge from the bargain between unions $j$ and their counterpart employer-groups (henceforth firms) $j$. Thus, whereas before we could focus on the marginal utility unions perceived from a nominal-wage gain, we must now consider that relative to the marginal disutility firms suffer from ceding such a gain and the relative bargaining strengths of the two. Start as before with $j$ unions that care about the real consumption value of their wages ($\omega^c$) and their members’ employment prospects ($\epsilon^j$) which latter are now more sensibly modeled as increasing in the output of group $j$ firms. Those $j$ firms care about profits which are a function of product real-wages (input costs, $\omega^p$) and demand for their firm’s product ($y_j$) among other things. The value functions implied could be written:

$$ V^u_j = V^u(\omega^c_j, \epsilon_j(y_j, \cdot)) \text{ with } V^u_1 > 0 , V^u_2 > 0 , \epsilon^j > 0 \quad (9) $$

$$ V^e_j = V^e(\omega^p_j, y_j, \cdot) \text{ with } V^e_1 < 0 , V^e_2 > 0 \quad (10) $$

(9) and (10) clarify that when employers and workers bargain over wages (with the understanding that prices will be mark-up over wages), they are bargaining over how to make the trade-offs (a) between wages and employment, (9), and (b) between prices and demand, (10), and (c) between the former pair and the latter pair. Equivalently, whereas before research centered on the institutional and structural organization of the labor market, we now know that the institutions and structure of goods markets are jointly relevant.

To proceed, assume that each of the $j$ unions and firms Nash bargain with each other over nominal-wage growth. Nash-bargaining solutions are found by maximizing the bargaining-power-weighted product of the bargainer’s utility functions, maximizing with respect to the variable over which they bargain, here: nominal-wage growth ($w_j$):

$$ \text{Max}_{w_j} \left[ V^w(\omega^c_j, \epsilon_j(y_j, \cdot)) \right]^a \left[ V^e(\omega^p_j, y_j) \right]^b $$

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18 I am assuming exogenous productivity growth for simplicity; given that, assuming it is zero and dropping it from these formulations is no further loss of generality. Endogenizing productivity growth remains for future research.

19 Rubinstein (1982) showed that Nash bargaining, though itself a cooperative-game solution-concept, produces equilibria identical to a non-cooperative game of offers and counter-offers such as wage/price bargaining. Thus Nash bargaining is both convenient and especially appropriate.
Thus, as price competition among firms increases or decreases, the persistence of employers in resisting wage restraint and labor markets interact to structure the incentives facing bargainers. The increases or decreases.

amount of output demanded at that price. This facet, in fact, has been central in collective bargaining in recent years, but now another consideration is reflected in the third terms of the wage/price bargain. One difference is the relevant real-wage: consumption for unions and product for firms. Moreover, unions derive utility from consumption-real-wage growth while firms derive disutility from product-real-wage growth. It follows that firms are more disposed to demand restraint than workers to offer it in this respect.

Now, substitute (7), (13), and (14) into (9) and (10), and differentiate with respect to \( w_j \). This gives the marginal utility (disutility) unions (firms) perceive from attaining (ceding) a nominal-wage gain:

\[
\frac{\partial V_j^u}{\partial w_j} = V_1^u (1 - \frac{\partial \pi_j}{\partial w_j}) + (V_2^u \frac{\partial \pi_j}{\partial Y_j} \frac{\partial Y_j}{\partial w_j}) + (V_2^e \frac{\partial \pi_j}{\partial w_j} \frac{\partial w_j}{\partial \pi_j} \frac{\partial \pi_j}{\partial w_j})
\]

\[
\frac{\partial V_j^e}{\partial w_j} = V_1^e (1 - \frac{\partial \pi_j}{\partial w_j}) + (V_2^e \frac{\partial \pi_j}{\partial Y_j} \frac{\partial Y_j}{\partial w_j}) + (V_2^e \frac{\partial \pi_j}{\partial w_j} \frac{\partial w_j}{\partial \pi_j} \frac{\partial \pi_j}{\partial w_j})
\]

First, consider the differences between the employer and union sides. One difference is the relevant real-wage: consumption for unions and product for firms. Moreover, unions derive utility from consumption-real-wage growth while firms derive disutility from product-real-wage growth. It follows that firms are more disposed to demand restraint than workers to offer it in this respect.

Second, note that the employment concerns of workers are virtually identical to the output concerns of employers. The difference, interestingly, is the term \( \frac{\partial \pi_j}{\partial w_j} \) which describes how employment responds to output growth. It follows, therefore, that an important part of the wage/price bargain is what amount of labor will be input for the amount of output demanded at that price. This facet, in fact, has been central in collective bargaining in recent years in the OECD.

Third, consider the term \( \frac{\partial \pi_j}{\partial w_j} \) which indicates the response of \( j \)'s price-growth to \( j \)'s wage-growth. I.e. it reflects adjustments to the mark-up, a fixed mark-up yielding \( \frac{\partial \pi_j}{\partial w_j}=1 \). Part of the wage/price bargain, then, is the battle over how much of the product-price increases the market might bear will trickle down into wage increases: i.e., the battle over how to distribute productivity growth and extra-normal profits between workers and employers. The leeway or slack in this particular battle will be considerably determined by the competitive situation of group \( j \) firms. Thus, as price competition among firms increases or decreases, the persistence of employers in resisting wage restraint increases or decreases.

These points may be obvious, but they serve to emphasize that the institutional and structural features of goods and labor markets interact to structure the incentives facing bargainers. The wage bargain is more correctly conceived as the wage/price bargain; the labor-market position of unions, their institutions and structure are no more central to wage/price restraint than the goods-market position of firms, their institutions and structure, as the employer-side amendment suggests.

Regarding the market-competition amendment, compare (8) with (15) and (16). Note that the first two terms of (15) are the same as those in (8). Thus, all the (dis-)incentives for labor to exercise wage restraint emphasized in (8) are still present, and employers share or exceed them, but now another consideration is reflected in the third terms of
specifically, the employment prospects of group j’s workers and the profits of group j’s firms respond positively to group j’s output which in turn responds negatively to increases in the relative price of group j’s products (\(\partial y/\partial p < 0\)). So, the more nominal-wage increases for group j lead to price increases for group j’s products which are less than matched by its competitors (i.e., the more positive is \(\partial p/\partial w\)), the more workers (employers) will have the incentive to exercise (demand) restraint. As Calmfors and Driffill (1988) suggest, the incentives for workers and employers to exercise restraint also depend on their expectations regarding the responsiveness of competitor’s prices to their own.

Both very competitive and very coordinated market structures can therefore be conducive to wage/price restraint. At one extreme: under perfect competition in labor or goods markets, competitor’s prices do not respond at all to one’s own, so firms cannot pass on the cost increase of wage gains, and workers cannot garner wages greater than the marginal value of their product. Thus employment prospects and profits are drastically reduced by any nominal wage-gains in excess of productivity growth (i.e. any lack of restraint). The strength of this incentive makes the externality consideration previously stressed by the CWB literature irrelevant under these conditions. If atomized workers (employers) facing perfect competition in labor (goods) markets fail to exercise restraint, they simply become unemployed (lose all their market)—with certainty. At the other extreme: under perfect coordination of bargaining across the entire (domestic) economy, all concerns about prices relative to (domestic) competitors vanish since all (domestic) wages will be rising with one’s own. Thus, the incentives to exercise restraint stem (only) from considerations of national economic performance exactly as argued in previous CWB literature. Between the extremes, some mix of incentives applies.

Calmfors and Driffill (1988) argue, more specifically, that industry-level bargaining allows workers and firms some shelter from competitive-pricing considerations since all their competitors are within the industry and so will have the same wage/price settlement. However, at the industry level, national-level concerns will still mostly be ignored since no industry is terribly large relative to the whole. Thus, they conclude that intermediate levels of coordination in bargaining are inferior both to zero coordination and to 100% coordination—the now-famous hump-shaped hypothesis: low and high coordination produce wage/price restraint while intermediate coordination does not.

Summarizing, modern CWB theory focuses on economy-wide coordination; institutional and structural aspects of both the union and the firm sides, i.e. of both labor and goods markets, are at issue. Modern theory also hypothesizes a hump-shaped relationship between CWB and wage/price restraint. 0% and 100% coordination achieve restraint, but intermediate levels do less well. However, much remains to be considered theoretically and established empirically.

III.C. CWB: Lingering Issues and Controversies

Several long-standing controversies continue to plague the CWB literature. First, considerable disagreement remains over the degree of coordination actually existing in certain country-times, e.g. the debate between Soskice (1990) and Calmfors and Driffill (1988) centers on the degree of CWB in Japan and Switzerland. Second, a related but wider debate continues over whether and how union-membership structure might reasonably proxy for effective coordination (compare Garrett and Way 1995a, 1995b, Iversen 1994, 1996, Hall 1994, Franzese 1994, 1996 ch. 4, and Franzese and Hall 1997 in this regard). Clearly, the resolution of these empirical disputes remains of central importance to any future theoretical and empirical progress.

Another lingering issue is (a) whether the “hump” exists and what shape it takes and (b) where empirically nations have been and are on that hump. I.e., while the theoretical relationship between coordination and restraint might be curvilinear, we do not know whether the hump rises very quickly from 0% coordination and then gradually declines, vice versa, or anything in between. We also do not know very precisely where OECD countries have lain and currently lie on that hump whatever it looks like since however we resolve the measurement issue it remains unknown how the resulting empirical index of CWB places relative to theoretical 0% and 100% coordination.

Notice in this regard that bargaining ipso facto implies some degree of market power. Under perfect competition in labor and goods markets anything other than the market-clearing wages and prices is unsustainable: there can be no bargaining. Yet, every economy exhibits collective bargaining to some degree, so we know that theoretical 0% coordination has never existed. Inversely, theoretical 100% coordination has never existed since, even where a single economy-wide bargain exists, at least some wages and prices are finalized outside of it. E.g., any degree of international mobility in goods or labor excludes 100% coordination since wage/price bargaining has never been coordinated across borders. The relationship between CWB and wage/price restraint over the empirically relevant range also remains an important but unresolved empirical issue.

Toward resolution of these issues, current theory suggests that our empirics should (a) use a measure of CWB
incorporates the coordination of bargaining between employers and workers across the economy as opposed to indices derived solely from the membership structure of unions\(^{20}\) and (b) allow the estimated relationships to reflect both the competition and coordination effects of labor and goods market institutions and structures.\(^{21}\) One remaining task, then, is to estimate the curvature of the relationship between effective, economy-wide CWB and wage/price restrain or, alternatively, to separate better the competition-impacting and coordination-impacting features of wage-/price-bargaining institutions. Another is to continue that analysis for the purposes of resolving the remaining empirical disputes over the degree of effective CWB in contentious country-times.\(^{22}\)

A pair of important theoretical omissions also remain in the CWB literature. In section II, I suggested that the quantity theory of money as applied in the CBI literature hindered consideration of the interaction of wage-/price-bargaining institutions with the monetary authority. Conversely, the CWB literature has not allowed monetary policy much of a role in the economy and so is equally ill-positioned to consider the interaction of CBI and CWB. Yet when wage/price settlements are inflationary, an independent and conservative central bank would certainly react to them, but then bargainers must consider this reaction when bargaining (as the CBI literature emphasizes). Thus, wage/price bargaining and monetary policy interact and so should be considered jointly. Moreover, the CWB literature generally portrays workers (and employers) homogeneously, having similarly structured interests across the economy. Yet traded-sector actors have considerably different interests, both in general and vis-à-vis monetary policy, than do their sheltered-\((i.e., \text{private-non-traded})\) and especially public-sector counterparts. Accordingly, I turn now to consider this critical institutional and structural interaction.

IV. The Synthesis and Extension

Summarizing, the central prediction of the CBI literature is that CBI produces low inflation without real costs on average. This prediction has been extensively considered empirically with apparently favorable results. However, the theory actually predicts a good deal more, implicitly describing how much CBI reduces inflation under various political, economic, institutional, and structural conditions as shown in (4) and (5). These latter predictions have gone virtually unexplored theoretically and empirically. Moreover, the actions and pronouncements of monetary authorities are somewhat at odds with these more precise predictions. Meanwhile, the central prediction of the CWB literature is that CWB induces nominal and real wage restraint, and thereby helps reduce both unemployment and inflation. This too has been subjected to extensive empirical analysis. Two recent theoretical amendments may have expanded our understanding of CWB, but as yet have been subjected to less revealing empirical examination. However, the literature has evolved largely without consideration either of possible monetary-policy reactions to wage/price settlements or of the sectorally determined interests of bargainers.

Indubitably valuable insights have been gained from both lines of research. Minimally, they draw attention to institutional features of monetary policy-making and wage/price bargaining as key variables in the politico-economic management of inflation and unemployment. However, as we move toward combining their insights, the incompatibility of their underlying assumptions becomes plain. On one hand, the CBI literature has maintained (a) that money growth is price inflation by identity and (b) that, apparently regardless of labor- and goods-market structures, bargainers will set wage growth to equal expected money growth plus productivity growth. However, if wages and prices are bargained, the identity is rather that inflation is given by those settlements; monetary policy matters by affecting those settlements. The distinction is important. Moreover, wage/price bargaining implies market power which leaves some possibility that workers (employers) may desire and obtain nominal wage (price) increases exceeding expected money-growth plus productivity-growth. On the other hand, the CWB literature has maintained the (implicit) assumption that monetary policy does not respond to wage/price bargains.\(^{23}\) However, since monetary policy, whoever controls it, aims to manage


\(^{21}\) One option is to estimate a parabola \(i.e., (i.e., \text{include } \text{CWB and } \text{CWB}^2 \text{ in place of } \text{CWB})\). Another is to distinguish competition-impacting from coordination-impacting factors. My attempt to do the latter will follow Layard et al. (1991), relying on union density to represent competition-affecting and a subjective index of CWB to represent coordination-affecting factors.

Furthermore, the argument is that CWB produces wage/price restraint (possibly according to some curvilinear relationship) which in turn produces real and nominal benefits. Empirically, however, research has skipped to reduced form, simply regressing some real and nominal variable(s) on some index of CWB as I also will do here. To my knowledge, Alogoskoufis and Manning (1988) and Layard et al. (1991) are the only exceptions.

\(^{22}\) For both of these tasks, estimating wage/price equations will serve better than using reduced forms.

inflation, it will obviously be responsive to wage/price settlements and vice versa. Any proposed synthesis, then, must begin by redressing these contradictions.

**IV.A. A Proposed Neoclassical Synthesis:**

One possible avenue, call it a neoclassical synthesis, I began to offer above. Cukierman (1992) notes that, in the standard model, incentives to create surprise inflation only exist and therefore there discretionary monetary-policy has an inflationary bias only if real wages are excessive, possibly due to union monopoly-power. The advancement here is to model the natural rate of employment \((N_n)\) as a function of the excessiveness of real wages \((\omega)\) and the latter as a function of union power \((UP)\). Specifically, (a) union(s) with some monopoly power target(s) real wages which are higher than market clearing, and this creates the incentive for the monetary authority to create “surprise” money. In this framework, unions target some real-wage level and add whatever money growth—which remains identically inflation—they expect. This leads to the additional prediction that under discretion inflation is increasing in union power because, by (4), \(\pi_{d*}\) is increasing in \((N^*-N_n)\), and now \(N_n\) is decreasing in \(\omega\), which finally is increasing in UP.

We could simply add to this the argument that CWB, as opposed to union power, produces wage/price restraint rather than excessive real-wages. Thus, the natural rate \((N_n)\) is increasing in CWB and decreasing in UP:

\[
N_n \equiv N_n(\omega(UP,CWB),\cdot) \quad \text{where} \quad \frac{\partial N_n}{\partial \omega} < 0, \quad \frac{\partial \omega}{\partial UP} > 0, \quad \frac{\partial \omega}{\partial CWB} < 0
\]

(17) This neoclassical additive combination of CBI and CWB logic leads to the predictions that:

- **(a)** Unemployment is decreasing in CWB,
- **(b)** Inflation is decreasing in CBI, but less so the higher is CWB,
- **(c)** Inflation is decreasing in CWB, but less so the higher is CBI, and
- **(d)** Unemployment is unaffected on average by CBI.

The interactive hypotheses (b) and (c) might not have been obvious, though they are merely an application of the weighted-average logic behind (5) above. The reasoning here is as follows. Discretionary inflation is higher the lower the natural rate of employment \((N_n)\) implying that CBI lowers inflation less (because from lower discretionary levels) the higher is \(N_n\) which in turn is higher the higher is CWB. Thus CBI lowers inflation less the higher is CWB. Conversely, CWB raises the natural rate, which lowers discretionary inflation, which implies that CWB lowers inflation but less so the less discretionary is inflation (i.e., the higher is CBI). Such a synthesis is neoclassical in that the real/nominal divide has been retained via the assumptions that wages are set in real levels, with expected inflation appended thereafter, and inflation identically determined by money-growth.

**IV.B. A Fuller Synthesis**

As we have seen, however, the wage/price bargain in the context of market power in labor and goods markets cannot be so compartmentalized. Nominal wages and prices are set in these bargains, leaving the monetary authority discretion over how monetary policy will react to these settlements rather than direct control over inflation. Cukierman et al. (1993) implicitly recognize this by having price inflation determined jointly by money growth and nominal-wage growth. In this framework, they demonstrate empirically that more independent central banks accommodate nominal wage-growth less than do more dependent central banks. The failure of monetary policy to accommodate excessive nominal settlements amounts to real constriction and so produces real effects in terms of output and employment. We (1997), and Franzese (1997) from which this current offering builds.

24 More precisely: “employment [must be] a decreasing function of the real wage rate” which in turn implies that “own effects [must] dominate cross-effects in labor demands or... the supply of labor in the competitive segment of the labor market [must be] relatively irresponsive [sic] to the real wage rate, or... both conditions [must] hold” (p. 41). If at least some unemployment is involuntary, then the supply of labor is effectively in excess. Accordingly, the supply of labor is not effectively wage elastic in the vicinity of this equilibrium, and Cukierman’s conditions hold.

25 Henceforth, “CWB produces wage/price restraint” means “CWB produces wage/price restraint possibly according to some curvilinear function which has yet to be well estimated,” and analogously for similar statements such as the next one.

26 The equation in question is not explicitly derived from the wage/price bargain but rather posited as a heuristic simplification.

27 An intuitive “proof” of real effects: (1) either a nominal wage-price-settlements would accelerate inflation or (b) not; (2) an independent central bank would accommodate (b) but not (a); (3) under (a) the bank produces real constriction while under (b) real variables are unaffected; thus (4) if CBI produces non-accommodation it must also produce real costs on average. Cukierman (1997) begins to address this issue, deriving real effects for CBI from a model in which wage-bargaining
must therefore go beyond the neoclassical synthesis which does not allow for such effects.

I do so by returning once more to the heuristic model of the price-wage bargain, this time allowing the monetary authority to respond to wage-price settlements. The Nash-bargaining solution is, as before, a weighted average of the marginal values of getting (ceding) a nominal wage increase. Leaving aside the weights themselves for the moment, it will suffice once again to examine these marginal utilities (\( \partial V^u_j / \partial w_j \) and \( \partial V^u_j / \partial m_j \)):

\[
\frac{\partial V^u_j}{\partial w_j} = V^u_1 (1 - \frac{\partial \pi_j}{\partial w_j} - \frac{\partial \pi_j}{\partial m_j} \frac{\partial m_j}{\partial w_j}) + V^u_2 (\frac{\partial \pi_j}{\partial Y_j} (\frac{\partial Y_j}{\partial w_j} + \frac{\partial Y_j}{\partial m_j} \frac{\partial m_j}{\partial w_j}) + V^u_2 (\frac{\partial \pi_j}{\partial Y_j} (1 - \frac{\partial \pi_j}{\partial w_j} - \frac{\partial \pi_j}{\partial m_j} \frac{\partial m_j}{\partial w_j})
\]

The new considerations here are the terms involving \( \partial m_j / \partial w_j \) which is how the \( j \)th bargaining unit expects the money supply to respond to its settlement. Call this the monetary threat. I.e., the monetary authority announces that it will not accommodate excessive aggregate settlements. If the authority can make that threat large and credible enough for the expected cost to the bargaining unit of getting (ceding) a nominal-wage gain to be high enough, the bargainers will refrain from being inflationary and the threat will not need to be enacted. This is where the neoclassical synthesis ends: a credible enough bank, wielding a big enough threat, achieves low inflation at no average costs.

Notice, however, that the bank cannot promise to respond to each individual settlement differently since there is only one money supply. Accordingly, the bank can respond only to aggregates, which implies that the perceived monetary threat (the term \( \partial m_j / \partial w_j \)) involves three substantive parts: the magnitude of the central bank’s threatened response to the aggregate (\( \partial m / \partial w \)), the credibility of that threat (\( c \)), and the degree to which bargaining-unit \( j \) expects its settlement to affect the aggregate (\( \partial w / \partial w_j \)):

\[
\frac{\partial m}{\partial w_j} = \frac{\partial m}{\partial w} \cdot c \cdot \frac{\partial w}{\partial w_j}
\]

Obviously, the credibility of the threat (\( c \)) is increasing in CBI, so too, however, is the acceptable employment-inflation trade-off since by independent we mean conservative and independent. I.e., increasing CBI not only shifts the (expectations-augmented) Phillips curve inward by adding credibility but also increases the slope at which the monetary-policy authority’s indifference curve is tangent to the Phillips curve by adding conservatism. This means that while an independent bank, by virtue of its greater credibility, can trade-off inflation and employment at better rates than could a discretionary (political) authority, such a bank will also accept higher unemployment for any level of inflation than a government would if a trade-off must be made. The questions, therefore, are whether the trade-off must be made (i.e., whether the bank must enact its monetary threats) and, if so, what the likely (real) effects thereof would be.

The answers hinge critically on the institutional and sectoral structure of wage-price bargaining. Notice first that \( \partial w / \partial w_j \) is increasing in CWB. When coordination is nearly complete, all wages and prices are being set in the central or lead bargain (\( \partial w / \partial w_j = 1 \)), and so all of the bank’s threat is directly perceived by that one bargaining unit. Contrarily, when coordination is nearly nil, workers and employers do not perceive other wages to rise with their own (\( \partial w / \partial w_j = 0 \)), so little of the announced threat is directly perceived by these atomistic bargaining units. Therefore, when CWB is very low, the threat times the credibility of the threat would have to be extremely high to restrain bargainers without being enacted. In fact, a bit of introspection reveals that the threat would have to be incredibly large if coordination was not moderately high.

Suppose, e.g., that some professors have some market power and bargain with their university, which also has some market power, for raises. By their market power, the professors can demand excessive wages, and, by its, the university can cede them if it must. The settlement is likely to be inflationary. An independent central bank would threaten to respond to aggregate inflationary signs with monetary contraction, but these bargainers are so small relative to the economy as a whole that, from their perspective, however credible the threat, either the bank will contract money or it will not and nothing they do will affect that. Thus an aggregate threat must be catastrophically large to be felt by such atomistic bargainers to the point it would considerably restrain their settlement, but a catastrophic threat

coordination varies and wage bargainers, as savers and consumers, dislike inflation.

28 For simplicity, I now assume prices a fixed mark-up on wages since the points for which I had not previously done so have been made. This reduces the number of variables being bargained to one: the growth rate of nominal wages, \( w_j \).
would also be thoroughly incredible. The situation is similar for all bargaining dyads in similar situations, so settlements tend to become increasingly inflationary as market power rises. For the monetary authority to restrain inflation, it must create real contraction by enacting the threat, thereby raising unemployment (lowering output), and thus making the next bargain less inflationary by reducing the market power of the bargainers (and changing the weights in (12)). Equilibrium is reached when the bargainers desire no more nominal increases than the bank will tolerate. 

This explains central bankers’ concerns over incipient inflationary pressures. The bargaining perspective suggests more excessive settlements the greater market power, and market power in labor and goods markets increases in booms and decreases in recessions. Thus, incipient inflationary pressures are located in wage/price bargaining and the bank defuses them by preventing the real economy from becoming “too strong.” How strong the real economy may become before triggering incipient inflationary pressures depends on the institutional and structural configuration of the political economy as I will demonstrate below.

So, whereas with perfect credibility \((c=1)\) and no uncertainty monetary threats will never have to be enacted and the neoclassical conclusions will hold, absent perfect credibility the threats must be enacted at least periodically in order to work. Thus the neoclassical conclusion that a more credible monetary-authority per se is beneficial remains correct because credibility helps reduce the size and or frequency threat enactment. The problem is that, in practice, CBI means both more credibility and more conservatism. Refer back to (20): the former corresponds to higher \(c\), which is unambiguously beneficial, the latter to greater willingness to increase the magnitude of the threat \((\partial m/\partial w)\) at any given level of credibility. With periodic threat enactment, the latter is ambiguous, implying the usual Keynes/Phillips trade-off between inflation and unemployment. The next logical question is what equations (18)- (20) might tell us regarding the conditions under which that necessary trade-off is more or less costly.

Simply and generally: anything which lowers (raises) the required enacted threat to restrain bargainers improves (worsens) the trade-off. As we have already seen from (20), credibility per se is unambiguously beneficial since, for any given degree of monetary conservatism, greater credibility of that commitment to accept real costs helps diminish the size and/or frequency of enacted threats. One neglected line of research, then, is the degree to which the two concepts monetary conservatism and monetary credibility are theoretically and practically separable. (20) also reveals that greater CWB improves the trade-off since it increases \(\partial w/\partial w\), thereby decreasing the required threat-size. Coordinated bargainers perceive the bank’s monetary threat as being more directed at them than do fragmented bargainers, so threats can be smaller and/or less frequently enacted when CWB is high than they must be when CWB is low.

This explains the difference between Bundesbank and Fed behavior. The Bundesbank addresses wage/price bargainers because German labor- and product-market actors have the institutionally and structurally determined incentives and strategic capacity (Iversen’s apt phrase) to respond. The Fed simply no such actors to which to speak.

The rest of the implications follow from the differential impact of monetary constriction on the various sectors of the economy. Monetary tightening does two things: it raises interest rates and causes exchange-appreciation. Refer to (18) and (19). Higher interest rates reduce private investment and so hurt employers and workers in sectors dependent on domestic demand, i.e. all private sectors \((\partial y/\partial m)\) is negative and \(\partial y/\partial y\) is positive for all units \(j\) which compete in the private sector). The employment prospects of public-sector workers are unharmed or even benefit by this effect since public-sector employment is a- or even counter-cyclical \((\partial y/\partial y\) is zero or negative for units \(j\) in the public sector).

Exchange appreciation triggered by enacted threats is relevant here in three ways. First, exchange appreciation hinders demand for domestically produced goods and so, again, harms all sectors dependent on private-sector demand but leaves the public sector relatively unharmed to positively benefitted \((\partial y/\partial y\) is positive for all units \(j\) in the private sector and negative or zero for all units in the public sector). Second, exchange appreciation also raises the price of domestic tradeables relative to non-tradeables and therefore is especially painful to all units \(j\) who compete with traded goods \((\partial p/\partial m)\) is negative for all \(j\) in the traded sector). Finally, exchange appreciation lowers import prices and thereby reduces the consumption-price index. This actually benefits consumers, and so works against forcing restraint out of unions; it is irrelevant to employers qua employers, though of course as consumers they benefit by it too. I expect this effect is dominated by the others, but notice that it implies, once again, that employer-led coordination

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29 More formally, it would be trembling-hand incredible, especially since no democratic government would allow a central bank to impose catastrophe on its economy.

30 To smooth the nominal and real economy, the bank can keep the monetary reins tight enough so that market power never rises sufficiently to allow such recalcitrant bargainers to emerge.
may be more conducive to wage/price restraint than labor-led.\textsuperscript{31}

Summing up all of these considerations, the enactment of monetary threats would be most costly to bargainers who are in the private and especially the private-traded sector and least costly to bargainers who are in the (non-competing) public sector. Accordingly, the traded sector should be most responsive to monetary threats and the public sector least. Moreover, coordinated wage/price bargainers are more responsive to monetary threats and all bargainers are more responsive the greater is the credibility of the monetary authority. \textit{Thus, CBI reduces inflation most efficiently (i.e. at least real cost) in political economies characterized by traded-sector led CWB and least efficiently in political economies characterized by uncoordinated bargaining or public-sector led CWB.}

Consider also the related set of interactions of CWB with sectoral structure. Public-sector units have little incentive to exercise restraint as well as little incentive to respond appropriately to monetary threats, and, contrarily, traded-sector units are especially disposed to offer/demand wage restraint and to respond efficiently to monetary threats. This suggests that coordination works differently depending on the sectoral composition of those coordinated. Coordination is most beneficial, both \textit{per se} and in how it interacts with the monetary authority, when the traded sector dominates bargaining and the public sector follows it. As long as the traded sector continues to dominate, this may be more so the larger the public sector being so led. The effects are similar but smaller regarding the sheltered sector \textit{vis-à-vis} the public sector. On the other hand, should the public sector dominate, coordination is less beneficial on both accounts and may even be costly since a \textit{lack} of restraint might be coordinated across bargains. As long as the public sector leads, this would tend to be more costly the larger is the traded sector because it most directly bears the costs of the lack of restraint. Again, the sheltered sector is intermediate.

In terms of unemployment and inflation, then, the implications of this proposed synthesis and extension are:

(a1) \textbf{Central bank independence has interactive real effects:} it is less costly (more beneficial) when wage/price bargaining is coordinated and traded-sector led and more costly when bargaining is uncoordinated or coordinated but public-sector led.

(a2) \textbf{Central bank independence has interactive nominal effects:} it reduces inflation though less when bargaining is coordinated and traded-sector led and more when bargaining is uncoordinated or coordinated and public-sector led.

(b1) \textbf{Coordinated wage-/price-bargaining has interactive real effects:} when traded-sector led, it is more beneficial the higher CBI, when public-sector led, it is less beneficial (possibly even becoming costly) as CBI increases.

(b2) \textbf{Coordinated wage-/price-bargaining has interactive nominal effects:} it reduces inflation more when traded-sector led and less (possibly increasing it) when public-sector led. The magnitude of these effects are dampened as CBI increases.

(c) \textbf{Sectoral structure has interactive real and nominal effects:} Traded-sector dominance generally reduces inflation and unemployment. It does so by improving the effectiveness of CWB in delivering wage/price restraint and so has more beneficial unemployment effects the higher CWB and CBI and larger (smaller) beneficial inflation effects the higher CBI (CWB). The public sector acts oppositely and the sheltered sector intermediate.

Broadly, the synthesis and extension concludes that the political economy is fully interactive; the effect of any single institutional or structural feature on real and nominal macroeconomic outcomes depends on the configuration of other institutions and sectoral structure present. More specifically, \textit{CBI} and \textit{CWB} with dominant traded-sector and dominated public-sector are generally complements in producing beneficial real outcomes—they tend to augment each other’s efficiency in reducing unemployment—and substitutes in producing beneficial nominal outcomes—either can be sufficient to reduce inflation.\textsuperscript{32}

\textsuperscript{31} Cukierman (1997) focuses on this effect as the center of the wage-bargaining/monetary-policy interaction, and thus arrives at somewhat different conclusions.

\textsuperscript{32} The difference between these conclusions and the neoclassical synthesis I offered above is primarily (a1) that CBI has real effects (on average). The neoclassical synthesis maintains the real/nominal divide implying no real effects of CBI on average, interactive or otherwise.

These arguments extend and modify Franzese (1994, 1996 ch. 4) primarily in breaking down the monetary threat in (20), addressing the difference between sectoral size and sectoral dominance in bargaining, and more directly considering the nominal side and the interaction of wage/price bargaining institutions with sectoral structure. They extend and modify Hall 1994 and Hall and Franzese 1997 in these ways and by considering sectoral structure.

The conclusions differ from Iversen (1994, 1996) who argues that CBI has unemployment benefits when \textit{centralization} (not coordination) is intermediate, unemployment costs when centralization is high, and little effect when bargaining is
V.A. Empirical Evidence
I now offer first a brief review of the evidence amassing in favor of existent syntheses and extensions of the CBI and CWB arguments and then some new evidence which, in addressing the present theory, extends and modifies previous offerings and possibly resolves one controversy.

V.A. A Brief Review of Previous Evidence
The empirical trail begins with Hall (1994) who points out that, charting postwar-average inflation and unemployment by CBI and CWB, an interactive pattern appears. Hall and Franzese (1997) summarize that pattern tabularly, showing that (a) postwar-average inflation declines in both CBI and CWB, (b) postwar-average unemployment declines in CWB and rises in CBI, (c) the unemployment costs of CBI (and benefits of CWB) decrease (increase) as CWB (CBI) increases—this reflects the complementarity in real outcomes mentioned above—and (d) the inflation benefits of CBI and CWB each tend to decrease as the other increases—this reflects the substitutability in nominal outcomes. Their regression analyses employing postwar-averages, decade-frequency, and annual data in 18 OECD countries also support these conclusions (though point (d) only weakly).

Franzese (1994, 1996 ch. 4) uses decade-frequency data in 21 OECD countries to test a set of hypotheses about the interactive real effects of CBI, CWB, and sectoral structure. In addition to the interaction of CBI and CWB—which produces results substantively congruent with and statistically at least as significant as those in Hall and Franzese (1997)—these models include traded- and public-sector employment (as a percent of total) and their interactions with CBI. The results provide very strong support for the hypothesis that public-sector employment and CBI interact detrimentally in the regulation of unemployment. When CBI is high, increasing public-sector workers increases unemployment whereas, when CBI is low, hiring public-sector workers lowers unemployment. Also, traded-sector employment-share seems to improve unemployment outcomes, and more so the greater CBI, but that result was less strongly supported statistically.

Garrett and Way (1995a) criticize Hall (1994) and Franzese (1994) for using subjective indices of coordination. Replacing CWB with “union strength” (union concentration plus coverage of wage bargaining)—a procedure I have argued against here following Swenson (1989, 1991) and Soskice (1990)—they nonetheless find very similar institutional interactions to those suggested by Hall and Franzese. Using postwar quinquennial data in 13 OECD countries, Garrett and Way (1995a) find that CBI and CWB interact beneficially in regulating inflation, unemployment, and real-growth, with the last of these most strongly supported statistically.

Garrett and Way (1995b) provide more direct evidence of the negative effect public-sector employment has on CWB’s ability to deliver wage/price restraint than Franzese (1994, 1996 ch. 4). They estimate a curvilinear relationship between union strength and unemployment, allowing “public-sector strength” within the union movement (public-sector union-members as a fraction of all union-members) to alter that relationship. Using quinquennial unemployment data from 13 OECD countries, they find a hump-shaped relationship between union strength and unemployment when public-sector strength is low, but also that encompassing labor institutions function increasingly counter-productively as the portion of their membership in the public sector rises.

Iversen (1994, 1996) provides further evidence in support of the contention that CBI has real effects which are a function of wage-/price-bargaining institutions and vice versa, but the nature of these effects differs radically from previous findings. Iversen argues that monetary conservatism and credibility reduces unemployment when wage-bargaining concentration (not coordination) is intermediate, increases unemployment when it is high, and has little effect when it is low (see also note 33). His findings in quinquennial data from 15 OECD countries, 1973-93 support these predictions. The sample and the measure of bargaining concentration differ from the rest—the latter notably in regard to the placement of Japan and Switzerland which is also the empirical controversy between Soskice (1990) and Calmfors and Driffill (1988). The measure of monetary conservatism and credibility also differs, using actual exchange-decentralized. (He does not address the nominal side.) The differences arise because (a) his wage bargainers also have a preference for wage equality and (b) he incorporates the hump-shaped hypothesis into the theoretical analysis differently. We will see that the differences are smaller than they first appear though.

Finally, Cukierman (1997) differs in that wage bargainers therein dislike inflation for consumption not employment reasons, and in that inflation is determined by money growth not wage bargaining. These theoretical differences lead to narrower but not otherwise very different substantive conclusions.

rate movements in conjunction with an index of CBI. With such differences in sample and measures, different results are not surprising. These are disturbing differences, however, in that Iversen’s findings suggest CBI has unemployment benefits over much of the sample and unemployment costs in the most concentrated-bargaining countries: almost opposite previous results regarding CBI and CWB. I suggest below that the present synthesis and extension resolves this apparent controversy, but let me emphasize here the points of agreement across all of these authors.34

First, it is agreed that the institutions of wage/price bargaining and of monetary policy-making interact in the determination of both real and nominal outcomes. Accordingly, the classical division between the real and nominal economy must be scrapped, and institutional analysis needs to consider, as much as possible, the functioning of networks of institutions since the effects of any particular institution depend on the others operating in the environment in question. Second, it is agreed that the real effects of CBI are more palatable or less unpalatable with intermediate than with low coordination. There is disagreement regarding high coordination. Third, to the degree these have been explored, the nominal effects of all the institutional and structural variables we have considered are broadly agreed. This last agreement is shared even with the neoclassical synthesis offered above.

V.B. Evidence on the Present Synthesis and Extension

Empirical evaluation of the set of predictions derived above has five steps: (1) selection of the relevant sample (and units of analysis), (2) measurement of the variables identified by the theory (and controls), (3) specification of the model suggested by the theory, (4) estimation of that model, and (5) inference from the results about the theory.

These arguments and their predecessors presuppose that wages and prices are bargained in a relatively liberal market economy and that it is possible, at least to some degree, for an institution like the central bank to be effectively independent of government and able to conduct nationally distinct monetary policy. The combination of these considerations imply that our sample be restricted to established capitalist democracies large enough to have minimally distinct national policies. I contend that this applies to 21 OECD countries: the US, Japan, Germany, Italy, the UK, Canada, Austria, Belgium, Denmark, Finland, Greece,35 Ireland, Norway, Portugal,36 Spain,36 Sweden, Switzerland, Australia, and New Zealand. Further, the Bretton Woods fixed-exchange-rate era limited national monetary-autonomy; I exclude it for this reason and to increase comparability to Iversen’s (1994, 1996) results. This leaves annual data from 21 countries from 1974-1990.

The theory emphasizes three independent variables—CBI, CWB, and sectoral structure—and two dependent variables—inflation and unemployment. I measure inflation by CPI growth rates (sources: IMF IFS CD-ROM 6/96; OECD Economic Outlook 61 and Historical Supplement diskettes; OECD Main Accounts II, Detailed Tables diskettes). Unemployment are internationally comparable figures (sources: Layard et al. 1991; OECD). I measure CBI by a 0-1 index averaging the five most frequently-used indices (LVAU, QVAU from Cukierman 1992; EC, POL from Grilli et al. 1991; CBI from Bade and Parkin 1982). I measure CWB as in Hall and Franzese (1997), a subjective index valued (0,.25,.5,.75,1) according to the degree of wage/price-bargaining coordination. The index built from those of Layard et al. (1991: BO, LO) and Soskice (1990: EWC) and secondary sources; I extend it here, using Layard et al. (1991), to Greece (0), Portugal (.25), and Spain (0). These two indices were seen previously in Figure 1 and Figure 2.

I have emphasized three sectors: public, sheltered, and traded. The desired data are the proportions of employment in sectors covered by wage/price bargaining whose products respectively do not compete in the market, do not compete with foreign products, and compete with foreign products. The available data are government employment and employment by single-digit ISIC sectors36 in percents of total (source: OECD). Since the theory predicts oppositely for the traded and public sectors with sheltered sector intermediate, I use government employment (G) divided by manufacturing employment (M) to proxy for public-relative-to-traded sectoral-structure (S).37

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34 These points of agreement are now shared by Cukierman (1997) also.
35 Dummy variables for Greece, Portugal, and Spain, and one for the authoritarian periods therein are included in both equations acknowledging those country-years’ ambiguous membership in the sample.
36 These are agriculture, extraction, construction, manufacturing, utilities, exchange, transport-shipping-communications, finance, other services, other.
37 “Government employees” may contain employees who do not bargain wages, and some public-sector employees as theoretically defined will not be counted in “government employment.” Manufacturing is clearly traded and is mostly characterized by wage/price bargaining, but equally clearly it omits large parts of the traded sector. Moreover, manufacturing is probably more unionized than most sectors, and government employees are variably unionized and able to bargain across countries—typically more unionized and able to bargain in countries with large public sectors than small. All of these considerations may confound G/M as a measure of public-relative-to-traded-sector structure as theoretically defined, but the
The sets of controls in the inflation and unemployment equations are detailed in Appendix I, but I emphasize here that I control for union density (union membership as a fraction of total employment) in accordance with the discussion in section III. I refer to these sets of controls in the following as \( \alpha'x_1 + \gamma'x_2 \) where the first term represents the constant, time-serial controls, dummies for non-democracies, and their coefficients, and the second term represents the other controls detailed in the appendix and their coefficients.

On specification, I noted back in (5) that inflation is a weighted average of what it would be if the political authority controlled monetary policy, \( \pi_j' \), and what it would be if a completely independent and conservative central bank controlled inflation, \( \pi_j'' \), with the weights given by the degree of CBI. The subsequent discussion in section IV highlighted that among the determinants of discretionary inflation (\( \pi_j'' \)) should be CWB, the sectoral structure of the political economy, and their interaction. The same theory predicts that CBI, CWB, sectoral structure, and their interactions are among the determinants of unemployment—though a weighted average form is not expected. Finally, in both cases, we expect the impact of sectoral structure (G/M) to differ according to whether the public (numerator) or the traded (denominator) sector dominates. I.e., the impact of G/M should be non-linear in a manner most easily enabled by including G/M and (G/M)^2 in our regressions. The specifications matching the theory are therefore:

\[
\pi = \alpha'x_1 + \beta_1 + \beta_2 \gamma'x_2 + \theta I + \theta C + \theta S^2 + \theta I C\]

\[
U = \alpha'x_1 + \beta_1 + \beta_2 \gamma'x_2 + \theta I + \theta C + \theta S^2 + \theta I C\]

\[
\partial \pi / \partial I = \beta_2 \gamma'x_2 + \theta I + \theta C + \theta S^2 + \theta I C\]

We expect this to be generally negative, but its magnitude will depend on the degree of CWB and sectoral structure present in the political economy.\footnote{The effect of CBI also depends on all of \( x_2 \) given the weighted-average form of the equation. See Franzese (1997) for further discussion.} The modeled effect of CWB on inflation is:

\[
\partial \pi / \partial C = + \beta_1 I [\beta_c + \beta_{cs1} S + \beta_{cs2} S^2]\]

We expect this to be generally negative also, but the magnitude will depend on the degree of CBI and the sectoral structure. CWB may even increase inflation given the “wrong” sectoral structure. Finally, the modeled effect of sectoral structure on inflation, specifically of an increase in government-relative-to-manufacturing employment (S+G/M), is:

\[
\partial \pi / \partial S = + \beta_1 I [\beta_1 - \beta_{cs0} S + \beta_{cs2} S^2] + \theta_{cs1} I C S + \theta_{cs2} I C S^2\]

which depends on CWB and sectoral structure. The effect may be positive or negative since CBI has both conservatism and credibility effects, but it should generally be decreasing as CWB rises when the traded sector dominates (low S)
and generally be increasing as CWB rises when the public sector dominates (high S). Symmetrically, the modeled effect of CWB on employment is:

\[
\frac{\partial U}{\partial C} = \theta + \theta_1 I + \theta_2 S + \theta_3 I \cdot S + \theta_4 I \cdot C + \theta_5 S \cdot C + \theta_6 I \cdot S \cdot C
\]  

(27)

which should generally be negative but depends on I and S, and may even become positive for large enough public-relative-to-traded sectors and CBI. Finally, the modeled effect of sectoral structure on unemployment depends on the degrees of CBI and CWB and upon its own level as follows:

\[
\frac{\partial U}{\partial S} = \theta_1 S + \theta_2 S^2 + \theta_3 I \cdot S + \theta_4 C \cdot S + \theta_5 I \cdot S \cdot C
\]  

(28)

We expect a positive effect when CBI, CWB, and public-relative-to-traded sector are all large because under these conditions the sectoral structure is not conducive to restraint, coordination has been captured by the public sector, and the central bank reacts with costly real consequences. Conversely, when the public sector is not so large as to dominate, increases in G/M actually increase the value of coordination and independence, and so (28) could be negative. \(^{39}\)

I turn now to estimation. Equations (21) and (22) were both estimated by least-squares with White’s robust standard-errors. \(^{40}\)

<table>
<thead>
<tr>
<th>Coefficient (Associated Variable)</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>t-Statistic</th>
<th>Two-Sided p-Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>( b_{cwb} ) (CWB)</td>
<td>-28.150</td>
<td>5.818</td>
<td>-4.838</td>
<td>0.000</td>
</tr>
<tr>
<td>( b_s ) (G/M)</td>
<td>-34.834</td>
<td>9.968</td>
<td>-3.495</td>
<td>0.001</td>
</tr>
<tr>
<td>( b_{s2} ) (G/M)^2</td>
<td>+16.000</td>
<td>5.301</td>
<td>3.018</td>
<td>0.003</td>
</tr>
<tr>
<td>( b_{cs} ) (CWB \cdot G/M)</td>
<td>+43.699</td>
<td>11.734</td>
<td>3.724</td>
<td>0.000</td>
</tr>
<tr>
<td>( b_{cs2} ) (CWB \cdot (G/M)^2)</td>
<td>-19.267</td>
<td>5.955</td>
<td>-3.325</td>
<td>0.001</td>
</tr>
<tr>
<td>( b_{i1} ) (CBI)</td>
<td>-8.954</td>
<td>11.748</td>
<td>-0.762</td>
<td>0.447</td>
</tr>
<tr>
<td>( b_{i2} ) (CBI \cdot { } )</td>
<td>-0.691</td>
<td>0.157</td>
<td>-4.413</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The inflation results are summarized in Table 1 in which the central result is clear: CBI, CWB, and sectoral structure interact in the determination of inflation. That CBI interacts with CWB and sectoral structure (and the rest of the model) to determine inflation is reflected in the coefficient \( b_{i2} \) which is negative (quite statistically significantly) and reasonably near \(-1\), as predicted. Similarly the interaction of CWB and sectoral structure is strongly supported by the estimated \( b_{cs2} \) which is negative (quite statistically significantly) and reasonably near \(-1\), as predicted. Similarly the interaction of CWB and sectoral structure is strongly supported by the estimated

\(^{39}\)“Fuller syntheses” tend to produce complicated predictions as this discussion no doubt illustrated. Relatedly, they often prove difficult to estimate since their highly interactive equations usually exhibit considerable correlation among the regressors. This is one reason quantitative scholars have avoided them. Here, fortuitously, multicolinearity did not hinder our obtaining interesting and apparently robust results.

\(^{40}\)Specifically, I employ weighted (W) two-stage (2S) least-squares (LS). WLS is necessary because high unemployment and inflation both exhibit greater (stochastic) variance. The weights are \(1/(1+Y)^2 \) where Y is the dependent variable. I employ 2SLS to mitigate endogeneity concerns regarding contemporaneously measured independent variables. The set of instruments is simply the one-year lag of all of these. White’s robust standard-errors for these estimates are reported since scale is unlikely to be the only source of heteroskedasticity. The inflation equation is estimated by non-linear (N) W2SLS since its weighted-average form is not unconstrainedly linear. Beck-Katz panel-corrected standard-errors have not yet been implemented for NLS, so for consistency I use only White’s in both equations. The reported results are robust across applications of any subset combination of these techniques (right down to OLS).
coefficients $b_{cs}$ and $b_{cs^2}$. The substantive meaning of these statistically significant coefficients cannot easily be read from the coefficient estimates themselves, however, since the impact of each factor depends on the other institutional and structural variables as shown in (23)-(25). I delay substantive discussion though until after summarizing the unemployment estimates, so that we may consider real and nominal effects together.

Table 2: The Relevant Portion of the Unemployment Equation (22)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>t-Statistic</th>
<th>Two-Sided p-Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) CWB</td>
<td>+11.826</td>
<td>3.847</td>
<td>3.074</td>
<td>0.002</td>
</tr>
<tr>
<td>(b) CBI</td>
<td>+20.314</td>
<td>6.885</td>
<td>2.951</td>
<td>0.003</td>
</tr>
<tr>
<td>(c) G/M</td>
<td>+14.921</td>
<td>7.132</td>
<td>2.092</td>
<td>0.037</td>
</tr>
<tr>
<td>(d) (G/M)$^2$</td>
<td>-4.924</td>
<td>4.372</td>
<td>-1.126</td>
<td>0.261</td>
</tr>
<tr>
<td>(e) CBI CWB</td>
<td>-29.423</td>
<td>9.204</td>
<td>-3.197</td>
<td>0.002</td>
</tr>
<tr>
<td>(f) CBI G/M</td>
<td>-35.596</td>
<td>15.317</td>
<td>-2.324</td>
<td>0.021</td>
</tr>
<tr>
<td>(g) CBI (G/M)$^2$</td>
<td>+14.163</td>
<td>8.753</td>
<td>1.618</td>
<td>0.107</td>
</tr>
<tr>
<td>(h) CWB G/M</td>
<td>-22.523</td>
<td>8.465</td>
<td>-2.661</td>
<td>0.008</td>
</tr>
<tr>
<td>(i) CWB (G/M)$^2$</td>
<td>+8.385</td>
<td>4.740</td>
<td>1.769</td>
<td>0.078</td>
</tr>
<tr>
<td>(j) CBI CWB G/M</td>
<td>+54.697</td>
<td>20.051</td>
<td>2.728</td>
<td>0.007</td>
</tr>
<tr>
<td>(k) CBI CWB (G/M)$^2$</td>
<td>-22.201</td>
<td>10.651</td>
<td>-2.084</td>
<td>0.038</td>
</tr>
</tbody>
</table>

Summary Statistics

| Number of Observations | 347 |
| Degrees of Freedom    | 320 |
| $R^2$                 | 0.907 |
| Std. Err. of Regression | 0.637 |
| Adjusted $R^2$        | 0.899 |
| Durbin-Watson Stat.   | 2.082 |

The basic unemployment result is also clear: CBI, CWB, and sectoral structure interact in determining it. This can be seen from the generally significant coefficients on the set of interaction terms; more precisely, a Wald test on coefficients (e)-(k) establishes the joint significance of the interactions ($p = .02$). That CBI has real effects, implying that the neoclassical synthesis is insufficient, is established by a Wald test on coefficients (b), (e)-(g), and (j)-(k) on variables which involve CBI ($p = .003$). The analogous tests for CWB and sectoral structure likewise strongly support the broad claim of institutional and structural interaction. Again the substantive meaning of these statistically significant coefficients is not clear from the coefficients in Table 2 alone because the effects of CBI, CWB, and sectoral structure on unemployment are interactive (as in (26)-(28)).

Table 3: The Estimated Impact on Inflation of a +.1 Increase in CBI as a Function of the Degree of CWB and the Sectoral Structure

<table>
<thead>
<tr>
<th>G/M</th>
<th>CWB 0.00</th>
<th>CWB 0.25</th>
<th>CWB 0.50</th>
<th>CWB 0.75</th>
<th>CWB 1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>-1.20</td>
<td>-0.88</td>
<td>-0.57</td>
<td>-0.25</td>
<td>-0.07</td>
</tr>
<tr>
<td>0.50</td>
<td>-0.81</td>
<td>-0.62</td>
<td>-0.42</td>
<td>-0.23</td>
<td>-0.04</td>
</tr>
<tr>
<td>0.75</td>
<td>-0.55</td>
<td>-0.44</td>
<td>-0.34</td>
<td>-0.23</td>
<td>-0.12</td>
</tr>
<tr>
<td>1.00</td>
<td>-0.43</td>
<td>-0.37</td>
<td>-0.30</td>
<td>-0.24</td>
<td>-0.18</td>
</tr>
<tr>
<td>1.25</td>
<td>-0.45</td>
<td>-0.39</td>
<td>-0.33</td>
<td>-0.27</td>
<td>-0.20</td>
</tr>
</tbody>
</table>

To evaluate the substantive import of these results we must consider the estimated impact of each variable over relevant sample ranges of the others (CBI goes from about 0.15-0.95, CWB 0-1, and most G/M observations in our sample are between 0.25-1.25). Consider, e.g., the estimated impact on inflation of a .1 increase in CBI (about the gap in the ascending sequence Sweden-Italy-Ireland-Netherlands-Austria-US-Switzerland-Germany). That effect will depend

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41 Joint significance approximately .0001 by a Wald F-test.
on the degree of CWB and the sectoral structure of the political economy in which such an increase occurs. Setting all other variables to their means, our estimates indicate that the effect of a .1 increase in CBI is as given in Table 3.

We argued that CBI should generally lower inflation. Every entry but the extreme top-right—and there are no observations with those characteristics in the sample—is indeed negative. We also argued that CBI should lower inflation less when the institutional and sectoral structure of wage/price bargaining was itself anti-inflationary to begin with and more when the institutional and sectoral structure are less anti-inflationary themselves. I.e, it is a question of how much the central bank must do by itself to constrain inflation, or, alternatively, CBI, CWB, dominating traded sectors and dominated public sectors are substitutes in the production of low inflation. This implies that the estimated impact should be a less negative number as CWB increases, which the table affirms. It also implies larger negative numbers as G/M increases beyond some point since beyond some point this reflects public-sector dominance. Public-sector dominance is inflationary, so CBI must do more with monetary policy to reduce inflation. Conversely, we expected smaller negative numbers prior to that point since in that range the traded sector dominates and so does more good the larger the public sector it dominates, leaving less for CBI to do itself. This is exactly the pattern revealed in Table 3.42

<table>
<thead>
<tr>
<th>G/M</th>
<th>CBI 0.15</th>
<th>CBI 0.35</th>
<th>CBI 0.55</th>
<th>CBI 0.75</th>
<th>CBI 0.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>-4.13</td>
<td>-3.49</td>
<td>-2.86</td>
<td>-2.22</td>
<td>-1.58</td>
</tr>
<tr>
<td>0.50</td>
<td>-2.49</td>
<td>-2.11</td>
<td>-1.72</td>
<td>-1.34</td>
<td>-0.95</td>
</tr>
<tr>
<td>0.75</td>
<td>-1.39</td>
<td>-1.18</td>
<td>-0.96</td>
<td>-0.75</td>
<td>-0.53</td>
</tr>
<tr>
<td>1.00</td>
<td>-0.83</td>
<td>-0.70</td>
<td>-0.58</td>
<td>-0.45</td>
<td>-0.32</td>
</tr>
<tr>
<td>1.25</td>
<td>-0.81</td>
<td>-0.69</td>
<td>-0.56</td>
<td>-0.44</td>
<td>-0.31</td>
</tr>
</tbody>
</table>

Next, consider the impact of a 0.25 increase in CWB on inflation \(0.25(\partial \pi/\partial C)\). We argued first that CWB should generally reduce inflation, and indeed every entry in Table 4 is negative. Second we argued that CWB should reduce inflation less the greater is CBI since with a more independent central bank, coordinated bargainers need reduce inflation less on their own: a property of substitutes. Reading from left to right in the table, we see that this is indeed the case. Finally, we argued that as public sectors grew relative to traded sectors, CWB should become less able to deliver anti-inflationary wage/price restraint. Reading from top to bottom, our estimates bear this out as well since the estimated impact of CWB on inflation is less negative as G/M increases.

The remaining derivatives, representing the inflation effects of increases in G/M, are more difficult to present because they depend on three factors–CBI, CWB, and the level of G/M itself–and so require three dimensions. Suffice it here to note that increasing public-sector dominance has the most detrimental inflation effects when CWB is high and CBI is low as we would expect. Increases in G/M when CWB is high increase the degree to which coordinated bargains are inflationary; the net inflationary effects are largest absent a central bank conservative and independent enough to resist that monetarily.

Our predictions regarding the unemployment impact of CBI were that, while it may be positive or negative, it would decrease in CWB so long as coordination remains dominated by the traded sector and will increase in CWB as coordination becomes dominated by the public sector. Reading Table 5 from left to right, we see that indeed the effect of CBI on unemployment becomes less positive (more negative) as CWB increases when G/M is below one and reverses that direction as government employment comes to dominate manufacturing employment. Somewhat surprisingly, however, when coordination is low, CBI actually seems to have less detrimental (more beneficial) unemployment effects as government-relative-to-manufacturing employment increases. Perhaps this reveals something about the different bargaining rights and strengths of public-sector relative to traded-sector actors in high and low coordination countries. When coordination is low, public-sector workers may be relatively powerless in wage/price bargaining or even legally denied the right to bargain. If so their increase relative to manufacturing workers does not force central bank enactment of monetary threats and in fact decreases the proportion of the economy which bargains. That certainly demands further

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42 In fact, how large the public sector must be before it begins to dominate appears to decline as CWB increases suggesting that public sectors dominate coordinated bargaining more easily than uncoordinated bargaining. This supports an argument made in Garrett and Way (1995b).
exploration but should not distract from the strong central conclusion that CBI and CWB with traded-sector dominant and public-sector dominated are complements in the production of low unemployment. Reverse the sectoral structure, and CBI and CWB become complements in the production of high unemployment.

Table 5: The Estimated Impact on Unemployment of a +.1 Increase in CBI as a Function of the Degree of CWB and the Sectoral Structure

<table>
<thead>
<tr>
<th>G/M</th>
<th>CWB 0.00</th>
<th>CWB 0.25</th>
<th>CWB 0.50</th>
<th>CWB 0.75</th>
<th>CWB 1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>+1.23</td>
<td>+0.80</td>
<td>+0.37</td>
<td>-0.06</td>
<td>-0.48</td>
</tr>
<tr>
<td>0.50</td>
<td>+0.61</td>
<td>+0.42</td>
<td>+0.22</td>
<td>+0.03</td>
<td>-0.16</td>
</tr>
<tr>
<td>0.75</td>
<td>+0.16</td>
<td>+0.14</td>
<td>+0.11</td>
<td>+0.09</td>
<td>-0.07</td>
</tr>
<tr>
<td>1.00</td>
<td>-0.11</td>
<td>-0.04</td>
<td>+0.04</td>
<td>+0.12</td>
<td>-0.20</td>
</tr>
<tr>
<td>1.25</td>
<td>-0.21</td>
<td>-0.10</td>
<td>+0.01</td>
<td>+0.11</td>
<td>-0.22</td>
</tr>
</tbody>
</table>

Finally, consider the estimated impact of a 0.25 increase in CWB. We argued that CWB should generally reduce unemployment, and indeed our estimates broadly support that claim. We also argued that, provided the traded-sector dominates, CWB should reduce unemployment more the greater CBI because an independent and conservative central bank helps enforce restraint by coordinated traded-sector bargainers and, vice versa, coordinated traded-sector bargainers respond best to an independent central bank’s monetary threats. However, should the public sector come to dominate CWB, this relationship reverses. An independent central bank will not tolerate coordination on public-led bargaining because it tends to be inflationary, and so the impact of CWB when both CBI and G/M are large is actually positive! Given an inappropriate sectoral structure, coordination will be detrimental to unemployment performance if the central bank is conservative and independent enough resist the inflationary results of such coordination monetarily.

Table 6: The Estimated Impact on Unemployment of a +.25 Increase in CWB as a Function of the Degree of CBI and the Sectoral Structure

<table>
<thead>
<tr>
<th>G/M</th>
<th>CBI 0.15</th>
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<th>CBI 0.55</th>
<th>CBI 0.75</th>
<th>CBI 0.95</th>
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<td>1.00</td>
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<td>-0.16</td>
<td>0.00</td>
<td>+0.15</td>
</tr>
<tr>
<td>1.25</td>
<td>-0.65</td>
<td>-0.43</td>
<td>-0.22</td>
<td>-0.01</td>
<td>+0.21</td>
</tr>
</tbody>
</table>

Once again, the related derivatives of unemployment with respect to sectoral structure would require three dimensions to present. Suffice it here to note that increasing government-relative-to-manufacturing employment when (a) the public sector already dominates, (b) coordination is high, and (c) the central bank is independent, increases unemployment, as expected.

VI.A. Summary

Most broadly, the analysis demonstrates that the politico-economic regulation of unemployment and inflation depends on the network of institutions and the structural setting within which wage/price bargainers and monetary policy-makers are interacting. Analysts must take Pontusson’s (1995b) advice and “put interests in their place and [...] take [...] structure seriously.” I.e., the appropriate framework recognizes that individuals act in their self-interest within an institutional and sectoral setting which structures (a) who acts in which venues, (b) how those actors interact, (c) what capabilities and information are available to them, and (d) the likely outcomes of their actions and therefore their incentives to act in certain ways.

More specifically, I have shown that central bank conservatism and independence, coordination in wage/price bargaining, and the sectoral structure of the economy–traded, sheltered, and public–interact in the regulation of unemployment and inflation. Consider the contributions made to the CBI and CWB literatures.

First, contrary to the neoclassical literature, CBI does have real effects; their manifestation depends on the institutional structure of wage/price bargaining and the sectoral composition of bargainers. The real effects of a central
The present theory suggests, however, that the success of these three in combining low inflation with low unemployment. Third, these new arguments and evidence resolve a previous anomaly regarding the actions and beneficial when coordination is high and traded-sector led. These are complementary relationships. Second, additional to the neoclassical literature, CBI lowers inflation less the more conducive toward low inflation is the rest of the institutional and sectoral structure of the political economy, and *vice versa*. These are substitute relationships: an independent central bank needs to do less monetarily if wage/price bargaining (and other factors) are already conducive toward low inflation. Third, these new arguments and evidence resolve a previous anomaly regarding the actions and announcements of central banks themselves. The Bundesbank speaks differently and to different entities than does the Fed because its audience is differently structured institutionally, and both react to real strength in the economy as *incipient inflationary pressure* because real strength weakens the incentives of bargainers to exercise wage/price restraint, especially when coordination is low.

The CWB literature has not usually directly considered the response of monetary policy to wage/price settlements or the impact of sectoral structure on the incentives of wage/price bargainers to exercise restraint and respond to expected monetary reactions. I have argued and the evidence reveals that the impact of CWB, on both nominal and real outcomes, depends critically upon the sectoral composition of those being coordinated and upon who controls monetary policy. CWB most reduces unemployment when traded sectors dominate public sectors, especially when monetary policy is controlled by a conservative and credibly independent central bank. CWB least reduces (or even increases) unemployment when public sectors dominate traded sectors, especially when monetary policy is credibly conservative. These are complementary relationships. Conversely, CWB reduces inflation, more so when the traded sector dominates the public sector and less so when the central bank is independent so that inflation would have been low anyway: substitute relationships.

Finally, our brief review of previous synthetic work considering the interaction of CBI and CWB found a growing empirical literature highlighting particular single interactions between some two of CBI, CWB, and sectoral structure. What I have argued and shown empirically here is that the impact of each of these politico-economic features depends on all of the others. Certainly previous authors (myself included) suspected this to be so, but it remained to be demonstrated theoretically and empirically. That review also raised one important point of contention. Iversen (1994, 1996) found that the unemployment impact of CBI was beneficial when centralization was intermediate and detrimental when centralization was highest. Others found CBI uniformly more beneficial as coordination increased. The italicized difference notwithstanding, these findings appeared radically and disturbingly different.

The present argumentation and evidence suggests a resolution. It shows that coordination interacts beneficially with CBI when traded sectors dominate public sectors but that this relationship reverses when public sectors dominate. Could adverse sectoral structure combined with coordination produce the detrimental unemployment effects of CBI which Iversen observed at high centralization? One important theoretical advance of Iversen’s model is that wage bargainers therein seek wage equality and achieve it more the greater is centralization. Now add to that the fact that economies universally become more service oriented as they advance. Since services productivity-growth lags industry, wage equalization will make private-sector provision of services increasingly costly in those growing economies where the institutions of wage/price bargaining achieve wage-equality. With the private sector “priced out” of service-provision, public-sector service-provision must rise or growth and employment will suffer. Thus centralization or coordination *with wage-equalization* forces governments in increasingly wealthy economies to increase public-sector employment. But that sectoral trend eventually weakens the ability of coordination to produce beneficial nominal and real outcomes as I have demonstrated here. The choice for governments in this situation becomes increasingly one of a high-inflation/low-unemployment equilibrium (without monetary conservatism) or a low-inflation/high-unemployment one (with it). Thus considerably less controversy exists between Iversen’s arguments and findings and these (and previous work) than first appears. In fact, the arguments are complementary; together they suggest that coordination might be inherently unstable in the long-run if it is accompanied by wage-equalization because together they produce public-sector growth which is incompatible with coordination’s achievement of wage/price restraint.

**VI.B. Implications: A Conservative and Independent European Central Bank (ECB)**

With the German, Swiss, and Austrian examples, and with the support of previous theory and evidence, the European Community apparently intends to endow its proposed ECB with considerable conservatism and independence. The present theory suggests, however, that the success of these three in combining low inflation with low unemployment
derived not merely from CBI, but from CBI in the presence of CWB with dominant traded- and dominated public-sectors. What does this reveal about the likely costs of instituting an independent and conservative ECB?

Wage/price bargaining in a Europe-wide economy would be characterized by relatively small, numerous, and uncoordinated bargaining units. This alone suggests that high conservatism and independence for the ECB would be somewhat more costly than it has been in these three countries individually.\textsuperscript{43} Our empirical analysis allows a crude estimate of these costs, incorporating sectoral-structure considerations. In 1990 the countries now composing the EC had a median public-traded ratio (G/M) of about 0.8, and a Europe-wide economy would have CWB of perhaps .25. Our estimates therefore indicate that a country already with CWB of 0.25 and G/M about 0.8 would increase unemployment by about 0.5 points and decrease inflation by about 0.8 points in the long run\textsuperscript{44} for each 0.1 increment of CBI represented by the ECB relative to its current bank.\textsuperscript{45} The trade-off would generally be worse for countries with lower G/M and higher CWB and vice versa.

Whether these trade-offs are acceptable depends on the relative value given inflation and unemployment, but the points are that there is a trade-off and that its parameters depend on the institutional and sectoral structure countries would be exchanging for Europe’s institutional and sectoral structure. Within countries, those constituencies more hurt by unemployment would tend to suffer while those more harmed by inflation would generally gain. Furthermore, that trade-off is likely to be generally steeper for most polities than the popular historical examples suggest because the institutional and sectoral structure of Europe would interact much less favorably with an ECB than the institutional and sectoral structures of Germany, Austria, and Switzerland have with their banks in the past.

Thus, the choice for much of Europe along the monetary-policy axis remains the traditional and painful one: lower inflation or lower unemployment. If lower inflation is chosen, this would be better pursued by an independent central bank than by elected officials for exactly the credibility reasons emphasized in previous literature. Whether a domestic independent central bank or a European one is preferable is another question, depending again on the domestic institutional and sectoral structure relative to the European. Desirable in any case would be to foster traded-sector dominance over the public sector in wage/price bargaining. Provided this dominance could be (re-)established, increasing CWB would also be unambiguously desirable, but coordination is much less easily engineered than independence (see, e.g., Regini 1984).

VI.C. Implications: The “Collapse of Corporatism”

Noting the collapse of CWB in Sweden and Denmark, many scholars have begun to discuss the general decline of corporatism. In recent work, however, Iversen (1993a, 1993b), Lange et al. (1993), and Golden and Wallerstein (1995) have noted that this decline is not so general as first believed. According to data presented by the latter authors, centralized wage/price bargaining has indeed collapsed in Denmark and Sweden. In the first, the collapse began around 1980; in the latter, there were hiccups of low centralization in 1984 and 1988 then the apparently permanent decline in 1991. Norway also experienced considerable turbulence in bargaining centralization at least through 1987. Contrarily, in Austria, Finland, and Germany, there was some a drop in the early 1970s, but centralization has lost no further ground since. In Japan, Golden and Wallerstein (1995) suggest that CWB may have been increasing. Comparable data for Switzerland are not available, but I am unaware of any decline in employer-led coordination there.

Scholars have attributed the collapse of centralized bargaining to new (post-Fordist) production techniques, the increasing mobility of capital, and/or the shifting political power from labor to employers in these economies. These arguments, however, are hard to sustain on their own if the collapse has occurred in some countries, like Sweden, Denmark, and possibly Norway, but not (or not yet) in others. Certainly, e.g., capital is no less mobile in Austria, Finland, and Germany, not to mention Japan and Switzerland than in these three. Nor is post-Fordism likely more predominant there than elsewhere among high CWB countries. Clearly there has been a political power-shift, and it may have been supported or even caused by increased capital mobility and changing production techniques. A power shift alone, however, cannot explain why employers (and allied skilled labor) have become enemies of CWB when they had been instrumental in instituting and maintaining it (see Pontusson 1992b; Swenson 1989, 1991). The present theory

\textsuperscript{43} Hall (1994) and Hall and Franzese (1997) elaborate a similar argument.

\textsuperscript{44} Hall (1994) and Hall and Franzese (1997) elaborate a similar argument.

\textsuperscript{45} Obviously there are other considerations; I am isolating here the effects associated with the institutions and structure of wage/price bargaining interacting with an independent and conservative ECB.

\textsuperscript{46} Since I am now comparing only within countries over time, centralization and coordination may be closely enough related.
and evidence suggest an explanation.

**Figure 3** reveals that the public sector has come increasingly to dominate the traded sector in coordinated economies (CWB=.75 or 1). That trend is OECD-wide, but by the mid- to late-1980s, Denmark, Norway, and Sweden had government-to-manufacturing-employment ratios over 1.5. Only Canada comes close to that, having risen to 1.25±; a few others now have ratios near 1 including Austria and Finland, whereas most of the sample most of the time has remained below .75. As I have demonstrated, this exceptional relative rise (decline) in government (manufacturing) employment implies that the output and unemployment costs of controlling inflation monetarily have risen dramatically in Denmark, Norway, and Sweden while they have risen less in other high CWB political economies.

![Graph showing government-to-manufacturing-employment ratios from 1974 to 1990 for various countries.](image)

**Figure 3:** The Rising Public-Sector Dominance of the Traded Sector in Coordinated Political Economies

I propose, therefore, that the decline of coordinated bargaining is linked to the rise of the public relative to traded sector within the bargaining units (see Lange *et al.* 1993, Iversen 1993a, 1993b, 1994, and Garrett and Way 1995b for further relevant evidence; see Pontusson 1992a, 1992b, and Pontusson and Swenson 1993 for related arguments). The relative public-sector (traded-sector) rise (decline) has significantly sapped the ability of CWB to produce restraint. As CBI was low in Sweden and Norway, inflation was not particularly combated monetarily and the rise led to increasingly frequent decisions to allow the currency to depreciate (see Calmfors 1993b). This depreciation alleviated the real impact of the lack of restraint and thereby prevented a coalition of (especially traded-sector) employers and (especially high-productivity-growth, i.e. skilled) traded-sector workers from forming against coordinated bargaining. This solution becomes increasingly difficult to maintain, however, as the sectoral trend continues, and it will continue when increasingly service-oriented economies attempt to maintain wage equality. As the inflationary pressures mount, eventually—as in the late 1980s and early 1990s when Sweden attempted to fix its currency to the Deutschmark more firmly—the growing anti-inflation coalition wins. The tighter money then brings the delayed real costs which solidifies an anti-CWB coalition of employers and (especially skilled) traded-sector workers against the sheltered and especially public sector. A similar process has periodically flared in Norway but oil resources there have enabled a somewhat weaker commitment to hard currency to persist. In Denmark, where CBI was higher and the commitment to hard currency much earlier and firmer made, the costs of controlling inflation monetarily were sooner and more directly felt in unemployment. The anti-CWB coalition solidified and won sooner. In all three countries, I contend, the increasing inability of CWB to provide wage/price restraint was (is) central to employer and, later, (skilled/traded) labor disillusionment with it and its eventual collapse. If similar sectoral trends continue in other high CWB political
economies, they can only follow.

Appendix I: Controls in the Regression Equations

Both equations included (1) time-serial controls, (2) dummies for Greece, Portugal, Spain, and for the authoritarian periods therein, (3) trade-openness (O: exports plus imports divided by GDP), (4) terms-of-trade (T: export-price index over import-price index), (5) their product, (6) the natural log of real GDP per capita (Y), (7) the partisan center of the current government (CoG), (8) a pre-electoral year indicator (ELE), (9) union density (UD). The inflation equation also controlled for (10) financial-sector employment-share (F) in consideration of Posen’s (1995a, 1995b) arguments and (11a) the average inflation rate in the other 20 countries in that year (inflation abroad, \( \pi_a \)). Similarly, the unemployment equation controls for (11b) the average unemployment rate abroad (Ua). In the text, \( X_1 \) refers to (1) and (2) and \( X_2 \) to (3)-(11).

### Descriptive Statistics for the Data

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<th>( \pi )</th>
<th>U</th>
<th>( \pi_a )</th>
<th>Ua</th>
<th>O</th>
<th>T</th>
<th>Y</th>
<th>COG</th>
<th>ELE</th>
<th>F</th>
<th>UD</th>
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<td>1.5</td>
<td>9.8</td>
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Complete estimation results available upon request. All data available from the author’s homepage: http://www-personal.umich.edu/~franzese.

### References


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47 Three lags of the dependent variable proved sufficient in each equation. The resulting residuals exhibited no further dangerous serial correlation, and the coefficients on the lags added to well under one, leaving no concerns regarding unit roots.

48 Spain’s dummy was significantly negative in the inflation and positive in the unemployment equation; Greece’s and Portugal’s were small and insignificant in both. The authoritarian dummy was small and insignificant in the unemployment equation and negative and nearly significant in the inflation equation.


