Abstract: This paper reviews recent work on macroeconomic management with varying wage/price-bargaining organizational structures and degrees of credible commitment to monetary conservatism. The emerging literature synthesizes and extends theory and empirics on central bank independence (CBI) and coordinated wage/price bargaining (CWB), arguing that the degrees of CBI and CWB interact, with each other and with other political-economic conditions (e.g., sectoral composition, international exposure, etc.), to structure the incentives facing actors involved in monetary policy and wage/price bargaining. The core implication, theoretically surprising but empirically supported, is that even perfectly credible monetary conservatism has long-run, equilibrium, on-average real effects, even with fully rational expectations, and that these effects depend on the organization of wage/price-bargaining. Conversely, wage/price bargaining structure has real effects that depend on the degree of credible conservatism reflected in monetary-policy rules. Each also has interactive nominal effects though this is less surprising. Although, much disagreement remains over the precise nature of these interactive effects, all emerging theory and evidence agree that a common, credibly conservative European monetary policy will have nominal and real effects that depend on the Europe-wide institutional-structural organization of wage/price bargaining. Indeed, the one piece of specific theoretical and empirical agreement suggests that, for many member countries, the nominal gains from monetary-policy delegation to a credibly conservative European Central Bank will have high real costs in terms of worsening these bargaining-policy interactions.

1. Introduction

     Until recently, political economists interested in the institutional-structural determinants of inflation and employment confronted two disparate and somewhat contradictory literatures. One deriving from modern game-theoretic approaches to economic policy, stresses monetary authorities’ degrees of anti-inflationary conservatism and autonomy from governments, arguing that credibly independent and conservative central banks (CBI) can achieve nominal benefits at no equilibrium, long-run real costs on average.1 The other, arising from studies of interest intermediation in democracies, stresses institutional organization in labor, and recently goods, markets, arguing that coordinated wage/price-bargaining (CWB) internalizes externalities inherent in wage/price settlements, thus facilitating restraint and thereby providing real and perhaps nominal benefits.2
From CBI arguments and associated evidence, most academics and policymakers have concluded that the *credible conservatism* (CC) embodied in the European Central Bank (ECB) will produce low inflation of the common European currency at little or no real cost. Insights from CWB work seemed only tangentially relevant to this conclusion. Degrees of *bargaining coordination* (BC) in the currency area might affect real outcomes, possibly thereby altering the nominal benefits of the ECB; otherwise, standard CBI and CWB theories, developed independently, suggested that their effects would be independent. Such exclusive focus on the degree of BC or of CC\(^3\) institutionalized in the political economy no doubt aided theoretical development in each literature, now among the most academically and practically influential in political economy. However, wage/price bargaining and monetary policy are intimately related exercises, so policymakers and bargainers will likely interact strategically if their institutional structure provides the organizational capacity to do so.

This paper reviews an emerging literature addressing such strategic interaction of monetary policymakers and wage/price bargainers under varying degrees of BC reflected in labor/goods-market institutional-structure and of CC reflected in monetary institutions. Building from standard CBI and CWB theory and empirics, this work emphasizes that degrees of CC and BC interact, with each other and with other political-economic conditions (e.g., sectoral composition, international exposure, etc.), to structure the incentives facing political-economic actors. These interactions imply that even perfectly credible monetary conservatism will have *equilibrium, long-run, on-average* real effects that depend on labor/goods-market organization, even with fully rational expectations. Real effects of BC, conversely, depend on degrees of CC. Nominal effects will also be interactive, though this is less surprising theoretically. Intuitively: the efficacy of monetary-policy signals depends on characteristics of the sender, such as the credibility and conservatism of the monetary authority as previously emphasized, but also on aspects of the audience that must receive and react to those signals, such as the organization of wage/price bargainers. For example, before EMU, monetary
effectiveness in Germany hinged on interactions of German wage/price-bargaining organizations with Bundesbank-led monetary policy. Analogously, monetary efficacy in a single-currency Europe will depend on interactions of ECB-led monetary policy with European wage/price-bargaining organization. Thus, even if the ECB obtains monetary autonomy and conservatism equal to the Bundesbank’s, the effect of ECB-led monetary policy on the European economy will differ from that Bundesbank-led policy has had on the German economy because their audiences differ.

The paper develops these points thus. Section 2 briefly reviews arguments and findings from standard, game-theoretic, classical models of monetary policy (CBI). Section 3 does analogously for CWB. Each section highlights some lingering issues in passing. Section 4 more fully reviews the emerging syntheses and extensions, and Section 5 summarizes the empirical results supporting them. Section 6 concludes, emphasizing the implications for the likely functioning of ECB-led monetary policy in a common-currency Europe.

2. CBI: Reviewing the Standard Argument

In the eighties and nineties, political economists developed convincing arguments that CBI can achieve low inflation. A credibility advantage that relatively autonomous central banks enjoy over political authorities implied that this nominal benefit would have no real costs on average (but see note 1). Simplifying, the argument proceeds thus. Given nominal and real rigidities, monetary authorities have incentives to create surprise inflation, thereby lowering real wages (or prices) and pushing employment (or real demand) above assumed-exogenous natural rates. However, private actors recognize this incentive and incorporate its inflationary consequences into price expectations. In rational-expectations equilibrium, monetary authorities cannot systematically surprise private actors, so real wages are unaffected, employment remains at exogenously given levels on average, and inflation is high. If, contrarily, monetary authorities could credibly promise to forego inflation surprises, private actors could set lower wages without fear. Again, real wages would be unaffected,
employment would remain as exogenously given, but inflation could now be lower than without such credible commitment. If, finally, institutionalizing a conservative central bank with relative autonomy from current political authority provides credible commitment to conservatism, then CBI reduces inflation without adverse on-average real effects.

Note, though, that the macroeconomic model, just an expectations-augmented Phillips Curve with exogenously given natural rates, effectively assumes zero on-average real effects \textit{ab initio} since private actors simply, unbiasedly, and \textit{atomistically} equate expected to actual inflation. Yet, Phillips-Curve slopes and natural rates cannot be exogeneous; they logically must depend on wage/price-bargaining organization and how that structure conditions bargainers’ reactions to monetary policy. Since strategic private-actor reactions to monetary policy will affect natural rates and Phillips-Curve slopes, even credible monetary conservatism could have equilibrium real-effects.

Many empirical studies seemed to show that CBI lowers inflation at little or no on-average real costs. Typical \textit{demonstrations} (e.g., Alesina and Summers 1993) regressed postwar averages of some nominal and real outcomes on CBI indices in cross-sections of (usually 15-21 OECD) countries. Statistically significant negative correlations with nominal variables and insignificant correlations with real variables usually emerged. However, observations were few and standard errors correspondingly large; rarely were appropriate (or usually any) controls included; and never were any potential interactions considered.\footnote{Thus, previous results likely missed any relationships between CBI and real variables that vary with levels of other variables, e.g. CWB. Likewise, prominent empirical anecdotes seemed to strengthen the standard case further. Germany, the US, and Switzerland have highly independent central banks and shared relatively low inflation but experienced widely differing unemployment. Yet, their wage/price-bargaining organization also differs in a way that may explain their differing unemployment experiences.} Still, the logical argumentation, simple but striking evidence, and prominent anecdotes have
obviously influenced a broad policymaking audience; enhancing CBI led economic-reform agendas worldwide. European leaders, e.g., clearly wrote requirements for EMU and outlined the ECB with these arguments and evidence in mind, and with the *Bundesbank* as template. With all theory, evidence, and examples seeming to suggest that monetary-policy delegation to a credibly conservative ECB would lower inflation virtually without real costs, it was an easy political sell.

Details of central bank behavior and pronouncements are actually inconsistent with standard models, but this likely seemed mere nuance. The US Federal Reserve, e.g., frequently announces (and enacts) monetary contraction to defuse “incipient inflationary pressures” in boom economies. However, in standard models, inflationary temptations increase with (a) monetary authorities’ weight on real relative to nominal outcomes, (b) Phillips-Curve slopes, and (c) gaps between authorities’ real targets and natural rates, all of which vary counter-cyclically if at all. When economies push capacity, (a) political authorities likely fret more over inflation than output; (b) monetary-policy real-efficacy likely shrinks (diminishing returns); and target-to-natural-rate gaps are unchanged (targets and natural rates are fixed). Thus, by standard theory, central banks face less “incipient inflationary pressures” in booms than busts. The Fed’s words and behavior to the contrary are therefore highly anomalous. The *Bundesbank* acts somewhat differently, but as anomalously, frequently directing its announcements specifically to wage/price bargainers and governments, fairly overtly threatening monetary contraction in response to upcoming settlements or budgets it views as inflationary. Standard theory cannot explain this behavior either. First, inflation-budget connections are non-existent in the theory, so banks have little reason to address governments except as price-setters for public goods, public-sector employers, and competitors for monetary-policy control. Second, bargainers simply add expected money growth, which banks control, to desired real-wage growth, which bargainers control, so banks need not threaten *responses*, they need only announce *fixed* intended money-growth. Third, most intriguingly, there is no reason from the standard perspective
that the Bundesbank should speak differently and to different agents than the Fed.

The syntheses and extensions reviewed below begin to fill the empirical gaps and to resolve lingering anomalies. Why the Bundesbank speaks differently to different audiences than does the Fed is especially key, providing insight into how the ECB will likely interact with its audiences.

3. CWB: Reviewing the Standard Argument

Developed near-simultaneously but independently, CWB theory argues that wage/price-bargaining coordination (BC) fosters real and nominal wage/price restraint and so has beneficial real and nominal effects. Summarizing, the argument proceeds thus. Fragmented bargaining units likely ignore any externalities to individual settlements, so their wage/price-increases may be higher than optimal, including, e.g., increments to offset expected increases elsewhere. Contrarily, encompassing or coordinated bargaining internalizes any externalities making such extra increments unnecessary. Thus, BC induces restraint, thereby reducing inflation and unemployment.

More precisely, assume \( j \) unions set nominal wages and derive utility from real consumption-wages and employment prospects. \( j \)'s real consumption-wage is its nominal wage, which it sets, less consumption prices, which it affects (via price mark-ups) in proportion to the consumption-shares of products using its labor. The perceived marginal utility of nominal-wage increases thus depends on the impact \( j \) perceives its settlement to have on aggregate consumption-prices. \( j \) perceives more real consumption-value per incremental nominal-wage gain, and so exercise less wage restraint, the less aggregate price-inflation parallels \( j \)'s wage-inflation. The more \( j \)'s bargain is encompassing or coordinated with others, the more it will perceive aggregate inflation to move with its settlement; conversely, the smaller is \( j \)'s bargain relative to the economy, the more it will perceive aggregate inflation to be independent of its settlement. Thus, unions perceive nominal wages to produce real consumption-wages in inverse proportion to the share of the economy’s wages they control.

Against this consumption-wage benefit, which declines in BC, unions weigh the adverse
employment effects of their wage gains, which tend to increase with BC. Real demand for j’s goods, and so j’s employment prospects, increase in aggregate real demand and decrease in j’s price relative to competitors’ prices. The responses (a) of competitor goods and labor prices and (b) of aggregate demand to j’s settlements and (c) of j’s employment prospects to total demand are all greater the more encompassing or coordinated j’s bargain. If effects (b) and (c) dominate the opposite (a) effect, which standard CWB theory implicitly assumed, then BC increases unions’ propensity to deliver wage restraint on the employment-prospect-cost as well as on the real-wage-gain side.

As with CBI, evidence amassed to support CWB arguments (e.g., Cameron 1984, Bruno and Sachs 1987). Econometric analyses regressed nominal and real outcomes on various indices of BC, usually finding negative correlations for both, though stronger on the real side. Prominent anecdotes again added convincingly; Austria and Scandinavia exhibited strong BC, admirable unemployment, and moderate inflation. Such intuitive argumentation, striking evidence, and real-world examples again combined to put increasing BC on many economic-policy agendas for a time.¹²

Recent advances in CWB theory clarify the, previously virtually ignored, employer side of bargaining and the market-power assumptions implicit in preference-orderings assumed earlier.¹³ First, unions do not set wages unilaterally; rather, wage/price settlements emerge from bargains between unions and counter-part employer-groups (firms). Thus, unions’ perceived marginal utility of wage gains must be considered relative to firms’ perceived marginal disutilities from ceding them and their respective bargaining strength, so labor- and goods-market institutional organizations jointly impact wage/price regulation. This clarifies that monetary policy induces non-inflationary settlements by shifting union-firm bargaining powers (e.g., by increasing unemployment) and/or by changing their marginal utilities from gaining (ceding) nominal increases (e.g., by shifting real demand). Second, standard CWB models under-emphasize the importance of group j’s competitive situation to its propensity to deliver restraint. Specifically, the more j’s wage-gains cause price
increases for $j$’s goods that its competitors less than match, the more product-market competition will induce $j$’s restraint. Likewise, the less other wage settlements match $j$’s increases, the more labor-market competition will induce $j$’s restraint. Coordination, by linking wage and price increases, reduces these incentives. Thus, BC has an *internalization-increasing effect*, described above, that increases restraint, but also a *competition-decreasing effect*, just described, that reduces restraint.

Combining the effects suggests that both very competitive and very coordinated bargaining structures will induce wage/price restraint. Given perfect competition in labor and goods markets, unions cannot achieve wage gains that exceed productivity growth, and firms cannot pass any excess cost-increases to consumers. Atomized bargainers exercising insufficient restraint simply lose their market and become unemployed. Under perfect competition, this constraint swamps the externalities stressed in early CWB work. Contrarily, under perfect BC, domestic relative-price concerns vanish since all domestic wages (prices) increase in parallel. Incentives toward restraint stem only from the international-competitiveness concerns stressed in the earliest literature. Between these extremes, some mix of incentives applies. Calmfors and Driffill (1988) argue that industry-level bargaining dampens competitive-pricing considerations, because most competitors are within industry and so have the same settlement, while national-level concerns are as small as the industry relative to the whole economy. Thus, they conclude that intermediate levels of BC are inferior to both zero and full BC, yielding the familiar hump-shaped hypothesis. However, as several (e.g., Calmfors 1993; Rama 1994; Cukierman and Lippi 1999; Velasco and Guzzo 1999) have noted, the shape of relationships between BC and restraint depends critically on relative-wage and -price elasticities and how BC alters them. Unfortunately, the syntheses and extensions reviewed below inherit this indeterminacy.

Indeed, several controversies plague further theoretical and empirical development: (a) the degrees of BC actually characterizing certain country-times,$^{14}$ (b) how well union membership-structure may proxy for effective BC,$^{15}$ and (c) the exact shape of the Calmfors-Driffill *hump*. Even
assuming BC relates curvilinearly to restraint, with most restraint at zero and full BC, whether restraint falls quickly and rises gradually as BC increases from zero to full, vice versa, or anything in between remains theoretically ambiguous. The measurement issues (a) and (b) hamper empirical adjudication of the matter. Worse, even assuming those issues resolved, the degrees of BC existing in any sample of country-times relative to theoretical zero and full BC, and so the position of the sample on the hump, would remain unknown. For example, if the hump falls very quickly and rises gradually, then the sample could easily lie entirely to the right of the nadir and so restraint would be estimated to rise monotonically in BC. Current theory can only suggest that empirical measures consider economy-wide BC across unions and firms, and that relationships estimated between BC and restraint allow for both competition-reducing and internalization-increasing effects.

Important theoretical issues also remain. Standard CBI theory hampered consideration of interactions between bargaining and monetary institutions by assuming Philips-Curve slopes and natural rates exogenous, even though logically these will depend on bargainer’s strategic reactions to monetary policy. Similarly, standard CWB theory hindered interactive considerations because it generally allowed monetary policy no role, implicitly assuming accommodating or passive policy, even though autonomous, conservative central banks would certainly react to inflationary wage/price settlements. CWB theory also often assumed homogenous unions and firms, yet some must have different interests, in general and vis-à-vis monetary policy, than others. The emerging syntheses and extensions begin to address these omissions, illuminating certain institutional-structural interactions. They imply, in particular, that the institutional-structural organization of the bargainers with which the monetary authorities interact is central to their joint effectiveness in regulating both nominal and real outcomes. Thus, the nominal and real effects of the ECB will hinge critically on the organization of wage/price bargaining viewed from a Europe-wide perspective.

4. Reviewing the Emerging Theoretical Syntheses and Extensions
In sum, CBI theory predicts centrally that CC yields low inflation at zero on-average real costs; empirics seemed supportive. However, standard theory predicts more than has been explored theoretically or empirically; monetary authorities’ actions and announcements contradict these more precise predictions; and private-sector actors have been under-specified and, particularly, assumed non-strategic. Conversely, CWB theory predicts that BC affects wage/price-bargaining restraint, thereby producing, perhaps curvilinear, nominal and real effects. Empirics again seemed supportive. Recent advances expand understanding but also raise many empirical and theoretical controversies. CWB theory also generally ignores possible monetary-policy reactions to wage/price settlements and possible differential interests among bargainers. Valuable insights emerged from both literatures, but the incompatibility of underlying assumptions hinders their combination. CBI assumes direct monetary control of inflation, exogenous natural rates, and exogenous monetary efficacy. However, bargaining implies market power, suggesting bargainers may interact strategically with monetary authorities. That strategic interaction could invalidate all three assumptions. Conversely, CWB theory assumes that monetary policy ignores or accommodates wage/price bargains; yet, whoever controls monetary policy, it aims to manage inflation and so will respond to wage/price settlements.

Several approaches to redressing these contradictions and synthesizing and extending CBI and CWB insights have emerged. One retains strict real-nominal divides by assumption yet shows the nominal effects of CBI and CWB to depend on each other (and on many other aspects of the political economy). A second shows that such nominal effects alone suffice to produce equilibrium real effects of CC if other actors, e.g. governments, can affect real outcomes and care about nominal variables. A third shows that strategic, monopolistic bargainers suffice to produce non-neutrality of non-strategic monetary rules. A fourth studies interactions between strategic monetary authorities and strategic, monopolistic, inflation-averse bargainers; these also imply interactive real and nominal effects for CC. A fifth stresses differences among as well as coordination across strategic bargainers;
there, real effects of CC depend on BC and on differences within and between bargaining units.

To presage, all these approaches, standard CBI theory included, imply that the nominal effects of CC depend on the institutions and structure of labor/goods markets. The second approach shows that this suffices to imply interactive real effects for CC as well because the incentives for governments to undertake real reforms partly depend on their potential to reduce the inflation, which depends on the CC of the monetary authority. EMU, e.g., alters member nations’ incentives to undertake politically costly real reforms intended to reduce inflation biases. The other approaches go further, concluding: if private actors have sufficient market power to interact strategically with monetary authorities, then the CC embodied in monetary institutions affects both nominal and real variables on average, in equilibrium, even with fully rational expectations, and beyond any changes in other policy instruments that such CC may induce. These approaches also agree that CC has real effects because it alters relationships between bargaining organization and wage/price restraint, but sharp disagreement remains, largely inherited from the indeterminacy of CWB theory, on the signs and shapes of these relationships and on how the degree of CC alters them. These disagreements will unfortunately debar shared predictions much more specific than that the real effects of the ECB’s CC will depend on the degree of BC exhibited at the European level. Still, one specific conclusion that is shared will suggest that, for many countries, monetary delegation to a conservative ECB will worsen the interaction of monetary policy and wage/price bargaining.

4.a. Retaining the Strict, Classical Real-Nominal Divide

The first approach retains strict nominal-real divides by assumption and distinguishes central bank autonomy from political authorities (CBA) from the conservatism of the monetary authorities (c). Franzese (1999b) elaborates the general case, which shows the nominal effects of CBA to depend on bargaining institutions and structure (and on many other political-economic factors) and shows the evidence strongly supports it. 20 Virtually by definition of autonomy, the bank controls monetary
policy to the degree given by CBA and the government controls it to the remaining degree:21

\[ m^* = CBA \cdot m^*_b + (1-CBA) \cdot m^*_g \]

(1.) 

\[ m^*_b = \pi^*_b + c_b \alpha (y^*_b - y^*_n) \]

\[ m^*_g = \pi^*_g + c_g \alpha (y^*_g - y^*_n) \]

with money growth \( m \), inflation \( \pi \), a real variable \( y \), Philips-Curve slope \( \alpha \), monetary-authority conservatism \( c \), and with \( b \) referring to banks, \( g \) to governments, \( n \) to natural rates, \( ^* \) to equilibria, and \( T \) to targets. The second and third lines are equilibrium money-growth from the standard CBI model. (1) shows that, even ignoring any potential strategic interactions between monetary authorities and other actors, and even maintaining direct inflation-control by policymakers (i.e., assuming \( m \equiv \pi \)), the nominal effect of CBA depends on anything that differentially impacts banks’ and governments’ desired policies and, vice versa, any such factors’ nominal effect depends on CBA:

\[ \frac{d\pi}{dCBA} = -\left( m^*_g - m^*_b \right) = -\left[ \pi^*_g - \pi^*_b \right] + \alpha \left[ c_g \left( y^*_g - y^*_n \right) - c_b \left( y^*_b - y^*_n \right) \right] \]

For example, since BC affects \( y_n \) and \( \alpha \), the nominal effects of CBA and BC depend on each other (and on anything else that affects \( \pi^*_g, \pi^*_b, c_g, c_b, y^*_g, y^*_b, y^*_b, \alpha, \) or \( y_n \)). To see this specifically, note that policymaker incentives toward surprise inflation, and therefore inflationary biases, only exist insofar as real wages are excessive. I.e., \( y_n \) decreases in real-wage excessiveness, which, in turn, increases in labor/goods institutional structures that ameliorate competition effects (e.g., monopoly power) but decreases in institutional structures that foster internalization of bargaining externalities (e.g., coordination). Thus, adding CWB logic to standard CBI theory, leaving all other assumptions intact:

(a) Bargaining coordination (monopoly power) reduces (increases) natural rates;
(b) CBA reduces inflation, less (more) so the higher is bargaining coordination (monopoly power);
(c) Bargaining coordination (monopoly power) reduces (increases) inflation, less so the higher CBA;
(d) CBA does not affect natural rates on average (by assumption).

Note that CC has two parts: the central bank’s autonomy (CBA) and its conservatism relative to government \( (c_g-c_b) \); the beneficial nominal effects of each decrease (increase) in the monopoly
power (coordination) of bargainers. Furthermore, the effects of bargaining institutions on the natural rate, \( y_n \), and on monetary efficacy, \( \alpha \), may also depend on monetary credibility and conservatism; if so, then there would be additional *strategic* interaction effects (see below).\(^{22}\) Even without such strategic interactions, though, even standard CBI theory implies that the ECB’s nominal effects will depend on many factors that would affect the desired policies of the ECB and of European political authorities differently, including, e.g., the organization of bargaining in Europe.

As noted above, these nominal effects alone can induce other policy changes that would have equilibrium real effects. For example, since an autonomous and conservative central bank reduces the inflation costs of inferior labor/goods-market organizations, delegation to the ECB will reduce member-government incentives to undertake economically beneficial but politically costly reforms. Thus, a conservative ECB has real costs inversely proportional to its nominal benefits (Ozkan et al. 1998). Moreover, since all members of a common currency receive the nominal benefits of any one’s reforms, mutual delegation to the ECB creates classic externalities with under-investment in reform (Calmfors 1998). On the other hand, if exchange-rate policy was a substitute for nominal flexibility in labor or goods markets, then commitment to a common currency increases the value of pro-flexibility reforms (Sibert and Sutherland 1998). Alternatively, suppose that previously under EMU, members whose inferior labor/goods-market institutions raised inflation temptations received side-payments to ignore those temptations. This would generate an incentive to under-invest in reform that would disappear (with the side-payments) when these members lost domestic political control of monetary policy (Sibert 1999) by delegating to the ECB.\(^{23}\) Thus, in political-economic general equilibria where governments can react strategically to monetary authorities, the real effects of CC will be non-zero and will correlate, positively or negatively, with its nominal effects, which, in turn, will depend on labor/goods-market organization across its member nations.

4.b. *Adding Strategic Wage/Price Bargainers:*
These two approaches continue to debar strategic interactions between wage/price bargainers and monetary authorities. If those interactions alter $y_n$ and $\alpha$, however, syntheses that maintain such strict real-nominal divides will be insufficient. Soskice and Iversen 1998, 1999, for example, show that strategic bargainers with monopolistic power will induce *equilibrium, long-run, on-average* real effects for CC. $^{24}$ The non-neutrality stems from bargainers’ collective-action problems, not from any lack of credibility, so they model money supply as perfectly credibly known to follow $M = P^{1-\beta}$ with aggregate prices given by $P \equiv \Pi_{i=1}^{n} (P_i^{\omega-i})$. $\beta \in [0..1]$ indexes monetary conservatism, with $\beta=0$ ($\beta=1$) implying full (non-)accommodation. They assume that $n$ equal-sized unions with perfect sectoral monopolies Bertrand compete under constant returns to scale and with labor productivity fixed to one for simplicity. This gives good $i$’s price, $P_i$, equal to sector $i$’s wage, $W_i$. Lastly, they assume real demand for $i$, $q_i$, is simply equal to employment, $e_i$, which they give as:

$$q_i = e_i = \frac{m}{\eta} - \eta p_i = \frac{m}{\eta} - \eta w_i$$

with real money-supply $m$, relative price $p_i \equiv P_i/P$, and relative-price demand-elasticity $\eta$. Sectoral-monopoly unions set $W_i$ to maximize weighted products of their real consumption-wages, $\omega_i$, and their sector’s employment, $e_i$, with weight $\alpha$ on $\omega_i$. The symmetric equilibrium employment is thus:

$$e^* = \frac{\eta (1 + \frac{\beta}{\eta})}{\alpha - \frac{\beta}{\eta}}$$

Therefore, unless $n=\infty$ (i.e., outside perfect competition), monetary conservatism, $\beta$, has real rational-expectations-equilibrium effects, and these real effects vary with the number of unions, $n$. $^{25}$ Specifically, conservatism (higher $\beta$) raises employment and does so increasingly as BC increases ($n$ lowers) from perfect competition, $n=\infty$, with zero real effects, to $n=1$, where the equilibrium is undefined (see Figure 1). Intuitively, when $n$ is low, the large individual bargainers perceive their nominal increases to produce *aggregate* real-money-supply contraction, more contraction the less
accommodating the monetary authority (i.e., the higher $\beta$). Encompassing bargaining units thus exercise more restraint as $\beta$, conservatism, increases. As $n$ becomes large, however, this effect vanishes because real money supply becomes increasingly exogenous to the settlements of extremely atomized unions. Thus, the Soskice-Iversen models conclude that CC has beneficial real effects that increase with BC. Standard CBI theory missed this by ignoring the real money supply’s dependence on wage/price decisions, $\frac{d(M/P)}{dW_i} = \frac{\beta}{n-1}$, which is non-zero and decreasing in $n$ for $n < \infty$.

By this analysis, highly conservative monetary rules (high $\beta$) interact best with highly coordinated bargaining systems (low $n$) such as in Germany under the Bundesbank and IG Metal-Gesamptmetal led bargaining. The ECB conducting similarly conservative policy, however, would face a far less coordinated European bargaining system (higher $n$), and so would have less beneficial real effect. Soskice and Iversen 1998 stress, however, that the European bargaining system to which the ECB would respond is not yet determined. They suggest that Europe could evolve a system in which lead-bargains in one country set wage-increase precedents that the rest follow. If so, the ECB could interact more directly with the pattern-setter: a more beneficial arrangement.

However, two aspects of the Soskice-Iversen approach differentiate it, and its conclusions, from others reviewed below. First, monetary policy is non-strategic, with exogenous money-supply rules not deriving from optimal policymaker responses to bargaining settlements. Yet, such strategic interactions are more likely to be bi-directional. Second, as important, they assume relative-wage demand-elasticity, $\eta$, to be exogenously fixed and, critically, independent of $n$. As the number of sectors encompassed in a single wage/price-bargain decreases, relative-wage elasticities are likely to diminish. Yet, no such Calmfors-Driffill competition effect operates here, and so they find BC monotonically increasingly beneficial in CC. These differences plus bargainer inflation-aversion led others to markedly different conclusions about CC’s real effects. Still, the core intuition is widely shared: strategic bargainers facing monetary-policy reactions perceive an ability to affect the real
money supply in proportion to their share of the economy and the policymaker’s conservatism. Thus, all agree the real effects of CC are generally non-zero and typically improving in BC, although most others will find real costs for CC that generally decrease in BC rather than real benefits that increase.

4.c.1. Adding a Monopoly, Strategic, Inflation-Averse Wage/Price Bargainer:

Several others explore interactions of a strategic monetary authority with one strategic monopoly bargainer. In these models, CC has equilibrium real effects if the wage/price bargainer is inflation-averse. Empirically, private-sector inflation-aversion is quite large and well-documented (see, e.g., Hibbs 1987 ch. 4); theoretically, inflation-aversion can be justified on four grounds. First, monetary-policy models routinely assume inflation-averse policymakers, so symmetry alone argues for private-sector inflation-aversion. Moreover, any actual government’s utility must derive from some combination of private-actor’s utilities, albeit likely with highly unequal weights especially in non-democracies; so, if policymakers dislike inflation, then some private actors must also. Any reason adduced for policymaker inflation-aversion in standard models (e.g., correlation of inflation levels and volatility) therefore justifies private-sector aversion as well. Second, inflation-aversion is standard, if often under-motivated, in CWB theory. Possible motivations include, third, private-sector holdings of incompletely indexed nominal assets, especially mandatory holdings like some pension schemes or tax systems. Fourth, in open economies, domestic inflation is a relative price-rise unless domestic consumption and production bundles are equal (i.e., with trade). Irrespective of theoretical motivation, a strategic inflation-averse bargainer will take monetary-policy reactions to their behavior, now including the inflation-effects of such reactions, into account in its bargaining.

Gylfason and Lindbeck 1994, for example, start with the quantity theory, \( Y+P=M+V \), setting \( V=0 \), as “...the simplest possible way to capture the crucial inverse relationship between output and the price level for given money supply.” They add \( Y=P-W \) as “...the simplest possible aggregate supply as an increasing function of prices for given nominal wages” (36), and set all elasticities to
one for simplicity. Aggregate equilibrium (AD=AS) then implies: \( Y = 0.5(M - W) \); \( P = 0.5(M + W) \).

If government and monopoly union exogenously dictated money and wages respectively, then the equilibrium would have standard Keynesian properties: \( \frac{dY}{dM}, \frac{dP}{dM}, \frac{dP}{dW} > 0; \frac{dY}{dW} < 0 \).\(^{31}\)

The Cournot-Nash equilibrium is more novel. Subject to AD=AS, a strategic government minimizes over M losses quadratic in output and inflation deviations from targets, as standard, and a strategic monopoly-union minimizes over W losses quadratic in real-wage, output, and inflation deviations from targets, as standard for monopoly-unions, but adding inflation-aversion. This gives two reaction functions\(^{32}\) in which the union fully accommodates money increases, so classical real-nominal divides obtain, only if it disregards inflation and the government fully accommodates wage increases, leaving the union unable to affect output, only if it disregards inflation. The more each weights inflation, the less it accommodates. Generally, output and prices depend on all preference parameters of both parties; but, if unions dislike inflation, and union and government targets, \( Y^T \) and \( \Delta P^T \), are equal, further insights emerge. If the union’s real-wage and employment targets lie above the labor-demand curve at full employment, union-government strategic interactions will spawn stagflation: \( Y < Y^T \) and \( \Delta P > \Delta P^T \). Alternatively, if union targets lie on the curve, and output targets remain equal, government conservatism, \( \Delta P^T_g < \Delta P^T_u \), alone will imply stagflation. If (a) monopoly union and monetary authority target the same employment and inflation, and (b) the union’s target real-wage/employment combination is not above the labor demand curve, is CC neutral nominally and really. If either (a) or (b) is violated, then CC will have equilibrium real and nominal effects that depend critically on the preferences and targets of both the monopoly union and the government.\(^{33}\)

One common, surprising result of this approach is that ultra-liberal monetary authorities, those indifferent to inflation, may achieve optimal (zero inflation and unemployment) outcomes. Skott 1997 nicely summarizes the intuition behind this and the related results:

\[ \ldots \text{If the central bank is inflation averse (or committed to a particular inflation rate or growth of nominal demand), the union can take advantage of this aversion (pre-commitment): high} \]
money-wage increases will buy lower output (and raise real wages). Whether and to what extent the union will want to exploit this possibility depends on the terms at which it can purchase output changes (i.e., the central bank’s [relative weights on inflation and output]) as well as on its own relative preferences for inflation and output. At one extreme…the inflation-indifferent central bank… makes it infinitely expensive for the union to reduce output [below the bank’s target], y∗∗; at the other extreme, the output-indifferent central bank implies that it is costless for the union to reduce output, so the union achieves its bliss point, y∗. In between those two extremes are outcomes with π>0 and y∗∗>y>y∗ (p. 613).

Grüner and Hefeker 1997 and Zervoyianni 1997 analyze fixed-exchange-rate commitments and international exposure, respectively, assuming inflation-averse monopoly unions in each of two countries and monetary policy determined by various combinations of the governments involved. They conclude, *inter alia*, that domestic monetary-policy credible-conservatism is not functionally equivalent to exchange-rate commitments because the set of wage/price-bargainers with which the respective monetary policymakers interact differs. Similar insights drive this review’s application of the emerging theories to ECB-led European monetary policy. However, single-bargainer models are ill-suited to such analysis because wage/price-bargaining structure cannot be theoretically varied, yet member-country delegations to the ECB neither begin nor end in monopoly-union settings.

### 4.c.2. Adding Varyingly Organized, Strategic, Inflation-Averse Wage/Price Bargainers:

Cukierman and Lippi 1999 and Velasco and Guzzo 1999 allow union concentration to vary. Cukierman-Lippi consider n unions and a monetary policymaker with utilities similar to 4.c.1. They assume all labor is unionized by *craft*, so that labor is perfectly substitutable across industries but imperfectly across unions. They allow increasing centralization (lower n) to increase the demand-elasticity facing unions to reflect the Calmfors-Driffill competition effect, but fix substitutability across crafts, γ. Each union sets its nominal wages, taking others’ and the bank’s reaction function as given; the bank fulfills its reaction function (fully credible commitment), setting monetary policy and thereby inflation. Unions’ wages reflect their fully rational expectations. The equilibrium is:

\[
\pi = \frac{\alpha^2}{c} - \varphi; \quad \varphi = \sigma - \omega^r
\]
\( u = \alpha \varphi \quad ; \quad \varphi = \tilde{\psi} - \omega^c \)

\( \pi \equiv \text{inflation} ; \; u \equiv \text{unemployment} ; \; \omega^c \equiv \text{market-clearing real-wage} \). The key term, \( \varphi \), is the average \textit{real-wage premium}. \( c \) is the bank’s weight on nominal relative to real targets (CC), and \( \alpha \) plays a similar role to the Phillips Curve slope. This would be exactly the classical result, except \( \varphi \) depends on \( c \).

This strategic non-neutrality arises for two reasons. First, because unions dislike inflation, which the bank will increase in response to higher unemployment, unions may moderate their wage demands to lessen the bank’s temptation. The larger its share of the economy, the more union \( j \) perceives bank responses as directed toward it, so the more it moderates. Conversely, the more conservative is the bank (higher \( c \)), the less \( j \) expects it to succumb to inflation temptations, so the less this restraint-inducing mechanism, which drove the results in 4.c.1 also, operates. Second, the model also reveals a \textit{competition-induced strategic non-neutrality} (CISNN), which arises because the marginal \textit{real}-wage effect \( j \) perceives from higher nominal wages depends positively on \( c \) while the perceived \textit{relative}-wage effect of nominal-wage hikes is independent of \( c \). Higher \( c \) narrows this differential and thus alters unions’ CISNN-induced moderation. A similar mechanism seems to drive the Soskice-Iversen results. However, the direction of the effect of CC on the CISNN depends heavily on elasticity assumptions, especially regarding \( \alpha \) and \( \gamma \), and their relation to \( n \).

Equilibrium real and nominal outcomes clearly depend on \( c \) and \( n \) (CC and BC) and their interaction, but highly non-linearly, making interpretation difficult. Cukierman-Lippi nonetheless manage several propositions. (1) Higher union inflation-aversion, \( B \), and cross-craft substitutability, \( \gamma \), unambiguously improve employment and inflation, though these effects vanish when \( n=\infty \) (perfect competition). (2) Beyond a critical amount of union inflation-aversion relative to other parameters, \( B_c = A \alpha^2 \gamma / \alpha^3 \), a Calmfors-Driffill curve relates \( n^{-1} \) (BC) to the real-wage premium, \( \varphi \); short of \( B_c \), real and nominal outcomes strictly worsen in BC (competition effects dominate). (3) If union-inflation-aversion exceeds this critical level, then the Calmfors-Driffill curve adverse optimum moves toward
decentralization as $c$ increases (see Figure 1); in any event, (4) full decentralization dominates full centralization. The net effects of the interactions implicit in these propositions determine whether Calmfors-Driffill curves exist—unemployment monotonically rises in BC if not—and, if one exists, how the interactions of $c$ (CC) and $n^{-1}$ (BC) shift and reshape it.

The model offers many insights for the comparative statics of central interest here. Excluding perfect competition, if labor is incompletely substitutable and $n>1$, or if union(s) are inflation averse, then CC unambiguously reduces employment. (CC also generally lowers inflation, though sufficient inflation aversion can even overturn that result at some $n$.) Visually, Calmfors-Driffill curves (in BC-unemployment space) at higher $c$’s lie entirely above curves at lower $c$’s, and the peak becomes more accentuated and drifts toward lower BC as $c$ increases (see Figure 1). Unemployment is highest at some intermediate BC level if unions are sufficiently inflation-averse but is strictly increasing in BC if they are not so inflation-averse. Broadly, then, the location and shape of the relations between BC and real variables depend on degrees of CC, but the nature of this shifting and reshaping of the Calmfors-Driffill curve depends critically on assumptions regarding substitution elasticities across labor and goods types (and some other model parameters) and if and how BC alters those elasticities. For present purposes, we may sum by noting that CC generally reduces employment, generally more at low-to-moderate BC than at moderate-to-high BC, though these effects diminish at BC extremes.

Thus, the Cukierman-Lippi model suggests that credibly conservative monetary authorities tend to interact best with more coordinated bargainers, producing low inflation at low, but positive, real costs. Monetary conservatism from the ECB, contrarily, would likely achieve low inflation only at relatively high real cost because the European labor/goods market would likely include many poorly coordinated bargaining units, each retaining considerable monopoly power in their domain.

Some aspects of the model warrant further development though. First, European labor is organized more by industry or sector than by craft, so the model’s craft-union assumption likely
overemphasizes inter-union relative to inter-firm substitution. Second, as in Soskice-Iversen, labor-demand real-wage-elasticity depends on $n$, so some of the competition-reducing effects of BC are present. Although, unlike the Soskice-Iversen model, unions’ inflation-aversion in Cukierman-Lippi may reproduce a Calmfors-Driffill, many other key parameters remain independent of $n$. Note especially the exogeneity of the relative-wage-elasticity of labor demand, which submerges the some of Calmfors-Driffill’s hump. Third, analyzing the Cukierman-Lippi model without inflation-aversion to isolate the $CISNN$, which seems to drive the Soskice-Iversen non-neutrality as well, may help clarify the nature of this effect. Finally, employers are largely absent in all these models. Unions set wages and firms take them; the only bargains are between unions and central banks, each of whom fully controls its instruments: wages and money supply.

Velasco and Guzzo 1999 endogenize more parameters and introduce one representative firm employing a continuum of worker types to produce a single good. Its profit maximization produces symmetric labor demand for each worker-type. Equal-sized unions maximize workers’ intertemporal utilities, which weigh consumption against labor and inflation. The strong symmetry implies unions optimally set equal wages for all workers. Otherwise, the model is similar to Cukierman-Lippi. Real-wage labor-demand elasticity for each worker as perceived by the union is again central. It again depends negatively on the number of unions, $n$, and positively on substitution elasticity between worker-types, $\sigma$, and returns-to-scale, $\alpha$, though now via the firm’s production function and profit-maximization decision in general equilibrium. Bertrand games among unions and between each union and the monetary authority, with unions setting wages first, monetary authorities setting inflation next, and the firm setting employment and output last, produce several startling results.

First, outside perfect competition, strategic inflation-averse unions moderate wage demands to reduce policymakers’ inflation temptations, more so the less conservative the monetary authority. This mechanism operates as in all models with bargainer inflation-aversion, implying CC decreases
restraint and employment. However, the CISNN operates very differently than in Cukierman-Lippi, where, given sufficient bargainer inflation-aversion relative to labor-demand real-wage-elasticity, a Calmfors-Driffill curve emerges that shifts upward and peaks further left (lowest employment at lower BC) as CC increases. In the Velasco-Guzzo model, CC also shifts BC-unemployment relations upward, but a standard Calmfors-Driffill hump-shaped curve never emerges. Rather, if substitution elasticity across worker types is sufficiently low, employment monotonically falls in $n$; otherwise, employment is highest at intermediate BC levels; an inverse Calmfors-Driffill curve.

Key to these differences is the severe symmetry in the Velasco-Guzzo model, which induces equal equilibrium wages and so flattens the Calmfors-Driffill curve reproduced by the Cukierman-Lippi CISNN. Velasco-Guzzo allow competition-effects to increase as $n$ increases, but toward a fixed parameter of the production function rather than toward infinity as Cukierman-Lippi and Calmfors-Driffill assumed. Thus, as $n$ approaches $\infty$, BC’s competition-reducing effects remain limited in Velasco-Guzzo whereas they become infinite in Calmfors-Driffill and Cukierman-Lippi. Again, the crucial parametric assumptions regard labor substitutability across unions, $\sigma$, and its relation to BC.

Despite these differences, Velasco-Guzzo also find the nominal and real effects of CC and BC to be interactive, though highly non-linear and dependent on key parameter values. They graph several simulations, from which emerge the comparative statics of core interest here (see Figure 1). In their model, CC always has positive real costs, $R$, which depend on substitution elasticity among worker types, $\sigma$, returns to scale, $\alpha$, BC, and CC itself: $\frac{dR}{dCC} = f(\sigma, \alpha, BC, CC) > 0$. CC generally has diminishing marginal real costs: $\frac{d^2R}{dCC^2} \equiv \frac{df}{dCC} < 0$. With $\sigma (1 - \alpha) < 1$, $\frac{dR}{dCC}$ also diminishes in BC; with $\sigma (1 - \alpha) > 1$, BC raises $\frac{dR}{dCC}$, but only noticeably so for $n < 3 \pm \frac{1}{s}$, $\frac{d^2R}{dCCdn^{-1}} \equiv \frac{df}{dn^{-1}} \ll 0$ as $\sigma (1 - \alpha) \ll 1$.

Despite this last indeterminacy, the model’s implications for a move toward common, conservative European monetary policy are one-sided. For most members, the move effectively
decentralizes bargaining, but, even if $\sigma (1 - \alpha ) > 1$, so that the lower BC would reduce the real costs of the ECB’s conservatism, Europe would be in the flat range of that curve ($n \gg 3$). If, contrarily, $\sigma (1 - \alpha ) < 1$, the bargaining decentralization induced by raising monetary policy to the European level would significantly increase the real costs of the ECB’s conservatism.

4.d. Adding Strategic, Differentiated Bargainers:

Two final approaches emphasize differences among strategic bargainers additionally to their degree of coordination. Franzese 1999a stresses the differential impact of CC on private-traded, private-non-traded, and public-sector bargainers. Iversen 1998ab stresses strategic unions that dislike wage disparity in addition to having standard real-wage and employment goals, which underscores differences in productivity (growth) within and among bargaining units. 36

Franzese 1999a argues that, since monetary policymakers do not directly control prices, they must control inflation via monetary-policy responses to wage/price settlements sufficient to induce monopolistic bargainers to settle upon non-inflationary increases. Policymakers essentially announce “threats”, $\frac{dM}{dP}$, that shift power-balances in union-firm Nash bargains toward acceptable nominal growth. As elsewhere, the threats required to induce non-inflationary settlements become less severe as BC rises because bargainers perceive only $1/n$ of threats directly. He also stresses, though, that monetary policy impacts bargainers differently. Enacted threats (real contractions) hinder domestic real-demand and so injure all actors dependent thereupon, including all private-sector but excluding public-sector bargainers. Furthermore, monetary contractions also raise export relative to import prices, thereby especially injuring traded-sector bargainers. Since policymakers induce nominal restraint by creating or threatening real slack sufficient to produce non-inflationary settlements, the rest of the economy must suffer disproportionately less when traded-, more when public-, and intermediately when non-traded-sector bargainers dominate the aggregate of wage/price settlements. If, as he argues, policymakers must occasionally enact threats, then monetary conservatism achieves
nominal benefits only at some real cost. The terms of this familiar tradeoff generally improve with BC and are best (worst, intermediate) when traded- (public-, non-traded-) sector bargainers lead (see Figure 1). However, for any given degree of monetary conservatism, greater credibility remains unambiguously beneficial because it reduces the required frequency of threat enactment.

Thus, CC, BC, and traded-relative-to-public-sector dominance are complements in producing beneficial real outcomes but substitutes in producing beneficial nominal outcomes. The latter follows directly from (1). The argument suggests, for example, that the strong nominal and real performance of postwar Germany derived partly from especially beneficial interactions between the Bundesbank’s high CC and the German bargaining system’s moderately high BC led by engineering (traded-sector) confederations: IG Metall (unions) and Gesammtmetall (firms). ECB-led European monetary policy, contrarily, would likely face lower European BC with weaker traded- and stronger public-sectors, at least given their relative sizes, so it would have more costly real-impact. As Soskice-Iversen also concluded, some pattern-setting arrangement among member-countries’ bargaining organizations would be beneficial, here especially if traded-sector bargainers set the pattern as they do in Germany.

Unfortunately, Franzese’s model is incomplete; it merely describes marginal (dis-)utilities to unions (firms) of nominal increases given $\frac{dP}{dW}$ (which depends on BC) and threat schedules, $\frac{dM}{dP}$, to illustrate and guide the argument. Distinguishing conservatism from credibility, modeling union-firm bargaining directly, and allowing differentiated bargainers strategic relation to policymakers seems to promise important advances, but full formal implementation awaits future work.

Iversen 1998ab also studies differences among bargainers but stresses strategic unions that dislike wage disparity in addition to having standard real-wage and employment goals. In highly centralized bargaining, the compression of nominal wages in the national bargain necessitates some “wage creep”, where high-skill and other market-empowered workers wring supplementary raises from employers. This is inflationary and requires lax monetary policy to accommodate and to erode
the induced real-wage disparity. Aggregate real efficiency will require such nominal laxity more as the wages of more disparate-productivity workers are compressed by bargaining in encompassing units. This suggests that monetary conservatism will have adverse real effects at high BC. Contrarily, under perfect competition, marginal-value productivity and not bargaining determines wages and disparity, so CC is neutral. For intermediately organized economies, separate union organizations can allow wage-disparity to reflect productivity differentials, but monetary conservatism is actually required to enforce cooperative “lead-bargain” coordination on aggregate restraint.\textsuperscript{38}

Again, CC has equilibrium real effects that depend on BC and, here, also on productivity (growth) differences within and among bargaining units (see Figure 1). The model, however, seems to rely on differential money illusion among different wage-bargainers; high-productivity-growth workers seem to ignore the erosion of their relative gains by inflation. It may also require further explication as to why coordinated bargainers cannot agree to productivity-scheduled deviations from restrained average-wage increases within centralized bargains.\textsuperscript{39} These issues notwithstanding, the model clearly illustrates preference differences across low- and high-productivity-growth workers, both intrinsically and vis-à-vis their strategic interaction with monetary authorities.\textsuperscript{40}

The model’s substantive implications are clear. Pattern-setting arrangements in European bargaining would be optimal in real and nominal terms. Very-high coordination is undesirable. And, deregulatory moves might be beneficial if very substantial but would still be dominated by moderate coordination under pattern setting. However, the ECB’s impact would also depend on how different the productivity growth of those in any European lead-bargaining scheme. The radically different productivity levels and growth rates across Europe may make an appropriate balance between the benefits of pattern-setting BC and the costs of wage compression without nominal laxity difficult. Unfortunately, the historical parallel may well be the absorption of the East into the West German bargaining system, rather than the postwar success of the West German system \textit{per se}. 
5. The Accumulating Empirical Support

Rapidly amassing evidence supports many of these claims. The empirical trail begins with Hall 1994 who charted postwar-average inflation and unemployment by CC and BC and detected an interactive pattern. Hall and Franzese 1998 summarize that pattern tabularly, showing postwar-average (a) inflation declines in CC and in BC and (b) unemployment declines in BC and rises in CC. (c) The unemployment decrease per unit BC (increase per unit CC) is larger (smaller) at higher CC (BC), suggesting a strategic complementarity in real outcomes. (d) The inflation decrease per unit CC and BC both tend to shrink as the other increases, suggesting a strategic substitutability in nominal outcomes. Their regression analyses, using postwar-average, decade-frequency, and annual data in 18 OECD countries 1950-90, also support these conclusions (though (d) only weakly).

Franzese 1994,1996:ch.4 used decade data in 21 OECD countries to explore interactive real effects of CC, BC, and sectoral structure. In addition to CC-BC interactions, which produced results consistent with and statistically stronger than those in Hall and Franzese 1998, he included traded-sector and government employment-shares and their interactions with CC. He found strong evidence that public employment and CC interact detrimentally in determining real outcomes. At high CC, increases in government employment-shares were associated with higher unemployment, while at low CC, the opposite association held. He also found, though less strongly statistically, that traded-sector employment-share improved unemployment outcomes, and more so the greater CC.

Garrett and Way 1995a criticize Hall 1994 and Franzese 1994 for their subjective BC indices. Replacing BC with union strength, given as union concentration plus coverage rates (a procedure others—e.g., Swenson 1989, 1991, Soskice 1990—argue against) they nonetheless find quite similar institutional interactions to those in Hall and Franzese 1998. In postwar quinquennial data from 13 OECD countries, they find evidence that CC and BC interact beneficially in regulating inflation, unemployment, and real-growth, with the last (first) most (least) strongly supported statistically.
Garrett and Way 1995b provide more-direct evidence than Franzese 1994 of the deleterious effects of public-sector weight within bargaining on the ability of coordination to deliver wage/price restraint. They estimate a curvilinear relation between union strength and unemployment, allowing public-sector strength within the unionized sector (public-sector share of total union members) to alter that relationship. Using quinquennial unemployment data from 13 OECD countries, they find a standard Calmfors-Driffill relation between union strength and unemployment at low public-sector strength, but that union strength functions increasingly counter-productively as public-sector strength rises, eventually becoming a monotonic real detriment.

Cukierman and Lippi 1999 regress 5-year averages of unemployment and inflation centered on 1980, 1990, and 1994 in 19 OECD countries on (a) a tricotomized index of BC (high, medium, low) derived from OECD 1997; (b) Cukierman’s 1992 LVAU index of CC; the interaction of (b) with (a); and a few controls. They find that CC increases unemployment at low BC, reduces it at intermediate BC, and also reduces it, slightly and insignificantly less so, at high BC. This accords with their prediction that CC reshapes the Calmfors-Driffill curve but does not quite support their precise claims about how CC changes that curve. CC did have greatest real costs at relatively low BC, but it had real benefits at moderate and high BC. Their inflation findings are similarly mixed. Despite these differences, Cukierman-Lippi’s results agree with previous findings and their own arguments in that $\frac{\partial u}{\partial cc} > 0$ at low BC and that $\frac{\partial^2 u}{\partial ccdbc}^2$ is generally negative. That is, CC has real costs at low BC, and these costs generally decrease as BC increases, here actually becoming benefits.43

Iversen 1998ab also find real effects for CC that depend on BC and vice versa, but his results differ radically from others’. He argues, and finds in quinquennial 1973-93 data from 15 OECD countries, that CC reduces unemployment at moderate, increases unemployment at high, and has little effect at low bargaining concentration. His sample and measurement of CC and bargaining concentration all differ from the rest, so the differing findings are not so surprising. Disturbingly,
though, his results imply CC has real benefits over most of BC’s sample-range, and real costs only at very high BC while others argue and find nearly the opposite. Franzese 1999a offers arguments and evidence that may help resolve these differences (see below), but note here the continuing agreement that going from low to moderate BC reduces the real costs (increases the benefits) of CC. I.e., Iversen too finds that $\frac{dR}{dCC}$ slopes downward from low to moderately high BC.

Franzese 1999a considers real and nominal outcomes in annual data from 21 OECD countries 1974-90, relating them to CC, BC, G/T, and (G/T)$^2$, where G is government- and T is traded-sector employment-share. He finds strongly that BC is more beneficial in real and nominal terms the more traded sectors dominate government sectors in bargaining; indeed, BC becomes detrimental with sufficient government-sector dominance. CC has nominal benefits that diminish as traded-sector-led BC rises and increase as BC falls or becomes increasingly public-sector led. CC has real costs that diminish as traded-sector-led BC rises but that increase as public-sectors increasingly lead or BC falls. I.e., the impact of BC, both per se and in strategic interaction with CC, depends critically on the competitive exposure of the bargainers being coordinated, and, specifically, CC and BC are strategic complements (substitutes) in determining real (nominal) outcomes.

Iversen 1998ab find real costs for CC at very high BC; Cukierman and Lippi 1999 find real benefits in that range but slightly lesser and statistically weaker than at mid-BC. Other studies find real costs for CC that diminish monotonically in BC, although their specifications do not allow non-linear interactive effects. Franzese 1999a suggests one possible resolution to this dispute. He argues and finds that CC interacts detrimentally with high, public-sector-led BC and notes that the adverse sign of $\frac{dR}{dCC}$ that Iversen predicts at high BC requires that workers of highly disparate productivity (growth) accede to common settlements. Since high-and-low-productivity-growth and traded-and-government-sector workers are empirically much the same sets, this could explain Iversen’s findings if that particular sectoral composition tends to occur at high BC. Franzese argues that the wage-
compression induced by high BC tends to price the private sector out of, and thus the public sector into, services where much employment growth has occurred. If correct, the requisite composition is indeed likely to evolve at high BC. However, since it does not always evolve, and since some high-BC systems in fact allow considerable wage disparity (e.g., Austria), this also could explain Cukierman-Lippi’s less-significant beneficial CC-BC interaction at high BC. Sometimes, where public sectors or wage compression remain weak, high BC and CC interact well; sometimes, where competitively exposed bargainers fail to retain pattern-setting leadership or wage compression is strong across quite disparate productivity (growth) bargainers, CC and very high BC interact poorly.

The disputes notwithstanding, all empirical work on monetary policymaking and wage/price bargaining interactions agree on three core results. First, all find non-zero long-run, equilibrium, on-average real effects for CC. Money may be neutral, but the expected character of monetary policy is not. Second, all find the institutional-structural organization of wage/price bargaining and the character of monetary policymaking interact to determine both nominal and real outcomes. CC’s effects depend on BC and vice versa. Third, all find the real effects of CC more palatable or less unpalatable with mid-to-high BC than with low-to-mid BC; i.e., all find \( \frac{dR}{dCC} \) slopes downward over the empirically intermediate BC-range (\( \frac{dR}{dCC} < 0 \)). Disagreement regards the real effect of CC at high BC and the exact shape of \( \frac{dR}{dCC} \); i.e., whether this generally agreed non-zero and downward-sloping effect line lies above or below zero and at what level of BC it may cross. Nominal effects are broadly agreed. CC reduces inflation and generally does so more the less anti-inflationary is wage/price-bargaining organization. Thus, the evidence is unanimous that conservative monetary policymaking and beneficial bargaining organization are strategic substitutes nominally and strategic complements in real terms at least in the low-to-moderately-high BC range.

For substantive example, all the results would seem to agree on both the German case and the likely effects of the move from Bundesbank-led monetary policy in Germany to ECB-led
monetary policy in Europe. That move is from moderate-to-high BC, led by the traded sector, to relatively low BC with unknown if any sectoral leadership, with CC intended to remain high. By any of these analyses, then, German institutional-structural conditions effected relatively favorable real-nominal long-run tradeoffs, achieving equilibrium low inflation at moderate real cost or even at some benefit. European institutional-structural conditions promise much less favorable terms.

**Figure 1: Illustration of the Theories and Predictions from the Reviewed Work**

<table>
<thead>
<tr>
<th>Theory</th>
<th>Predictions</th>
<th>Graphical Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard CBI Theory</strong></td>
<td>CC has nominal benefits, greater the more inflationary government policy would be: ( \frac{\partial \pi_c(X_c) - \pi_g(X_g)}{\partial CC} &lt; 0 )</td>
<td><img src="image1" alt="Illustration of Credible Monetary Conservatism (CC)" /></td>
</tr>
<tr>
<td></td>
<td>CC has no real effect: ( \frac{\partial \pi}{\partial CC} = 0 )</td>
<td><img src="image2" alt="Illustration of Coordination of Wage Bargaining (BC)" /></td>
</tr>
<tr>
<td><strong>Traditional CWB Theory</strong></td>
<td>BC has real benefits: ( \frac{\partial UE}{\partial BC} &lt; 0 )</td>
<td><img src="image3" alt="Illustration of Coordination of Wage/Price Bargaining (BC)" /></td>
</tr>
<tr>
<td></td>
<td>BC has, perhaps smaller, nominal benefits: ( \frac{\partial \pi}{\partial BC} &lt; 0 )</td>
<td></td>
</tr>
<tr>
<td><strong>Modern CWB Theory</strong></td>
<td>CC has non-monotonic real and nominal effects, with most-adverse outcome between its extremes. Exact shape indeterminate.</td>
<td></td>
</tr>
<tr>
<td><strong>Political-Economic General-Equilibrium Theories</strong></td>
<td>CC has nominal benefits as in classical CBI theory: ( \frac{\partial \pi_c(X_c) - \pi_g(X_g)}{\partial CC} &lt; 0 )</td>
<td><img src="image4" alt="Illustration of Inflation under Full Government Monetary Policy Control (PI(Xg))" /></td>
</tr>
<tr>
<td></td>
<td>CC has real costs proportional to its nominal benefits: ( \frac{\partial UE}{\partial CC} \propto \frac{\partial \pi}{\partial CC} )</td>
<td><img src="image5" alt="Illustration of Inflation under Full Bank Monetary Policy Control (PI(Xc))" /></td>
</tr>
</tbody>
</table>
Strategic Bargainers (Soskice and Iversen Model)  
CC has real benefits that increase in BC:  
\[ \frac{d\text{UE}}{d\text{CC}} < 0, \quad \frac{d\text{UE}^2}{d\text{CC} \, d\text{BC}} < 0 \]

Cukierman and Lippi Model  
At high inflation-aversion (B>B₀), Calmfors-Driffill hump emerges whose peak accentuates and shifts up-and-leftward as CC rises.

Strategic, Inflation-Averse Bargainers  
At low inflation-aversion (B<B₀), BC has monotonic real costs, which CC magnifies more at low than at high BC.

Velasco and Guzzo Model  
At high labor-substitutability relative to economies of scale, \( \sigma (1-\alpha) > 1 \), an inverse Calmfors-Driffill hump emerges, which CC raises, more at very high BC and less noticeably at most levels.

At low labor-substitutability relative to economies of scale, \( \sigma (1-\alpha) < 1 \), BC has monotonic real benefits, and CC has diminishing costs that are greater at lower than higher BC.
At high traded-relative-to-public-sector strength, BC is beneficial, and CC has real costs that decrease in BC:

\[ \frac{d\text{UE}}{d\text{CC}} > 0 \quad \text{and} \quad \frac{d\text{UE}^2}{d\text{CC}d\text{BC}} < 0 \]

Franzese

At sufficiently high public-to-traded-sector strength, BC is detrimental, and CC has real costs that increase in BC:

\[ \frac{d\text{UE}}{d\text{CC}} > 0 \quad \text{and} \quad \frac{d\text{UE}^2}{d\text{CC}d\text{BC}} > 0 \]

Iversen

CC has real benefits that increase from low through mid-BC. From mid-BC, the benefits diminish, becoming real costs at very high BC. From mid-through low BC, CC’s real benefits diminish, becoming no effect at perfect competition.

NOTES: The political-economic general-equilibrium, Soskice-Iversen, and Velasco-Guzzo models have not received empirical exploration. Empirical results reported with the other models concur with their theoretical predictions in all cases except Cukierman-Lippi, where the empirical results suggested that CC had more beneficial effects at mid- and high-BC than the above theoretical diagrams would suggest (see text above and note 43).

6. Conclusion

Important points of theoretical and empirical agreement have emerged. First, even standard, classical approaches agree that CC’s nominal benefits depend on labor/goods-market organization. Political-economic general equilibrium may then suffice to imply real effects for CC. If governments enact real reforms in part to reduce inflation biases, then their incentives to do so depend on the size of the bias and that depends, inter alia, on the degree of CC, of BC, and their interaction.

Second, all strategic-private-sector models agree that strategic private-actor interaction with monetary authorities undermines the strong neutrality result of standard classical CBI theory (and modifies any version of CWB theory). Inflation aversion among wage/price bargainers, for example,
suffices to produce non-neutrality of CC, generally implying real costs for CC, if bargainers have strategic capacity (i.e., outside perfect competition). Indeed, all strategic-bargainer approaches would agree with general statements that strategic bargainer reactions to the expected character of monetary policy shifts and reshapes the relation between BC and real outcomes. Such strategic non-neutralities arise because (a) more coordinated inflation-averse bargainers moderate their wage demands more the less credibly conservative the monetary authority, or (b) credibly conservative monetary policy affects real- and relative-wage labor-demand elasticities differently, altering wage/price settlements in ways that depend on the organization of bargaining, or (c) conservative monetary policy affects differentiated bargainers differently, producing on-average real effects that depend on the shares of types of bargainers in the aggregate of settlements. Disagreements regard the nature of this shifting and reshaping of Calmfors-Driffill curves induced by these strategic interactions and stem primarily from different assumptions about key elasticities, especially real and relative wage (price) elasticities of labor (goods) demand, and how each changes with the institutional-structure of wage/price bargaining. As noted above, the empirical findings also share core conclusions despite disagreeing disturbingly regarding some specifics. All found that CC is generally non-neutral in ways that depend on its interaction with BC and that the real effects of CC were more palatable at mid-to-high than at low-to-mid BC, though some disagreement surrounds the effect at very high BC and the sign of CC’s non-neutrality at various levels of BC more generally (see Figure 1).

Notwithstanding the wide diversity in sources of non-neutralities and specific disagreements in empirical and theoretical conclusions, the reviewed work has surprisingly uniform implications for the likely impact of member-country delegation to a common, credibly conservative, ECB-led European monetary policy. With the German (and Swiss and Austrian) example(s), and with support of previous theory and evidence, the ECB’s framers clearly intended to endow it with considerable conservatism and autonomy, expecting nominal benefits at little or no equilibrium real costs. This
emerging literature suggests, however, that postwar Germany’s success in combining low inflation and unemployment derived, not from the Bundesbank’s credible conservatism alone, but from its interaction with mid-to-highly coordinated bargaining with dominant traded- and dominated public-sector bargainers. European wage/price bargaining, contrarily, would be characterized by relatively small (relative to Europe), numerous, and uncoordinated bargaining units, though certainly still not approaching perfect competition in most industries. Therefore, the ECB’s autonomous conservatism will likely be more costly (less beneficial) than the Bundesbank’s has been in Germany.46

Franzese’s 1999a empirical analysis allows a (very) crude estimate of the ECB’s effects for member countries, incorporating his sectoral-structure considerations. In 1990, the countries now composing the EC had a median public-to-traded-sector-employment ratio (G/T) of about 0.8, and, assuming Europe would have BC of perhaps .25 on his scale (0-1, with, e.g., Italy at .25). His estimates indicate that a country already with BC of 0.25 (e.g., Italy) and G/T about 0.8 would increase unemployment by about 0.5 points and decrease inflation by about 0.8 points in the long run for each 0.1 increment in CC from its current bank to the ECB (CC on a 0-1 scale with, e.g. the Bundesbank at about .93 and the Fed about .73). The tradeoff generally involves less unemployment pain for less inflation gain for countries with lower G/T and higher BC and vice versa. These crude guesstimates isolate effects associated with the interaction of wage/price-bargaining institutional-structural organization and autonomous conservatism. (Obviously, other considerations, such as reduced exchange-rate uncertainty and transaction costs, are also paramount. The reviewed work makes no claim that its emphasized effects dominate, indeed the opposite could easily be true; rather, the work clarifies a previously missed effect of delegation to an autonomous, conservative ECB.)

Whether such tradeoffs are acceptable depends on the relative value given real and nominal outcomes, but tradeoffs do exist, in equilibrium, on average, and in the long run. Their terms depend on the institutional (CC, BC) and sectoral (G/T, etc.) political-economic structure that each member-
country exchanges for Europe’s political-economic structure in delegating to the ECB. Moreover, within countries, those constituencies more hurt by unemployment would tend to suffer while those more harmed by inflation would generally gain. Finally, these aggregate and distributional tradeoffs are likely to be steeper for most polities than the popular historical examples suggest because the institutional and sectoral structure of Europe would interact much less favorably with the ECB than, for example, the institutional and sectoral structure of Germany has with the Bundesbank in the past.

REFERENCES

Berger, X. et al. 1999. “XXXX”


De Haan, J. 1999. “Endogenizing the Bias,” XXXX.


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NOTES

1 Conservative commitments also debar monetary stabilization, effective here given uncertainty or incomplete information (see, e.g., Cukierman 1992), yet the core conclusion remains that CBI lowers inflation virtually costlessly, especially since evidence that CBI increases real variance is lacking (see, e.g., Alesina and Summers 1993).

2 The relationship may be non-linear (see Calmfors and Driffill 1988).

3 Distinguishing central bank autonomy from monetary-policy conservatism and concentration of wage/price bargaining-units from bargaining coordination will be important later.

Ball and Romer 1990 show that small nominal rigidities, Lucas-Rapping 1969 sticky wages or Mankiw 1985 menu costs, alone do not suffice to produce much real policy-effectiveness, but small real and nominal rigidities do. Akerlof-Yellen 1985 near-rationality or calculation costs, or bargaining power in labor/goods markets, would suffice.

Whether nominal and real rigidities stem from price-setting firms or wage-setting unions is irrelevant; henceforth, the text adopts the more familiar wage-setting language.

Eijffinger and De Haan 1996 review previous empirical studies, listing few with controls (see also Al-Marhubi and Willett n.d.; Havrilesky and Granato 1993) and no interactive models.

Indeed, “incipient inflationary pressures” do not strictly exist in standard models since inflation is just money-supply growth, which banks fully control. Furthermore, financial-stability motives for counter-cyclicality (see Cukierman 1992:ch.7) cannot explain the Fed’s justification for its behavior even if they might explain the counter-cyclicality.

The Fed rarely if ever mentions wage/price bargainers; examples of the Bundesbank’s very different announcements are easily found: e.g., Kennedy (1991:27-53); Financial Times 24/6/1993:14.


Bargains are often modeled as prisoners’ dilemmas with i’s most-preferred outcome that all ~ i exercise restraint, then all, then none, then only i. The ordering implicitly assumes considerable market power since only i raising wages would be most preferred only if employment is very inelastic. See below: Calmfors and Driffill 1988; Calmfors 1993.

The UK and Italy, e.g., scrambled briefly, mostly unsuccessfully, to institute CWB in their economies (Regini 1984).


E.g., Soskice 1990 and Calmfors and Driffill 1988 dispute Japan and Switzerland.


One can exclude zero and full BC though. Bargaining implies some market power, implying non-zero BC. Conversely, any international mobility in goods or labor precludes full coordination among all bargainers since some are foreign.

Arguments in, e.g., Golden 1993, Thelen 1994, and Golden and Wallerstein 1995 suggest that union-membership structure will not suffice.

18 Curvature of relations between BC and restraint can be estimated directly (e.g., Iversen 1998). Alternatively, competition-reducing and internalization-increasing features of wage/price-bargaining organization can be separated (e.g., Layard et al. 1991). Attempts at this rely on union density to represent the former and BC indices the latter.

19 Sharpf’s 1984,187,1991 work is exceptional (both senses) and somewhat foreshadowed the syntheses reviewed here.

(a) Bleaney 1996, Forteza 1998, Hall and Franzese 1998, Iversen 1999, and those reviewed below, and (b) Jonsson 1995, Simmons 1996, and Clark et al. 1998, and Way 2000 more thoroughly explore a subset of the implied interactions, regarding CBA interactions (a) with BC and (b) with government-partisanship and/or the electoral cycle.

20 Scale CBA to 0=full dependence, 1=full autonomy. Lohmann 1992 shows that, for similarly scaled costs of replacing bankers, r, equilibrium policy is r C+(r-1) G, where C is banks’ and G governments’ desired policy, but she does not emphasize this result. Jonsson 1995 and Bleaney 1996 posit (1)’s first line but also ignore its general implications.

21 Bleaney 1996; Forteza 1998; Hall and Franzese 1998; Iversen 1999 analyze nominal effects of strategic interaction directly. Work reviewed below analyzes nominal and real effects of such interactions, so further discussion is deferred.

22 See De Haan 1999 and Berger et al. 1999 for reviews of these political-economic general-equilibrium approaches.

23 The text follows the simpler 1998 model; the 1999 article derives similar results in a Blanchard-Fisher 1989 (p. 433) model: “Equilibrium output is neutral with respect to...nominal scale [but with strategic bargainers]...non-neutral with respect to degrees of accommodation in the monetary rule” (Soskice and Iversen 1999).

24 Conversely, of course, n has real effects that depend on B.

25 Similar concerns may apply to the exogeneity of α.

27 Constant returns to scale also differentiate the approach from some others. Another problematic, technical issue is that, at union weight on real wages (α=β/(N-1)), employment is undefined, and wages are 0. As α approaches β/(N-1) from below, e’ goes to oo; as it approaches from above e’ goes to -oo (from 0 at α=oo).


29 If not, then inflation is irrelevant. Benevolent planners also combine private-actor utilities, usually with equal weights.


31 The authors note that standard CBI models are simpler even than this since output is at least endogenous here.

\[ W = w_1 + w_2 M \] where \( w_1 = \frac{2w_1 - 2w_1^2 + 2qP^I}{1 + q} \) and \( w_2 = \frac{1}{1 + q} \), and

\[ M = m_1 + m_2 W \] where \( m_1 = \frac{2y^2 + 2xP^I}{1 + y} \) and \( m_2 = \frac{1 - y}{1 + y} \)
\( v \) is government weight on prices relative to output, and \( u, q \) are union weight on output and prices relative to real wages.

33 Cubitt 1992 considers games where union, government, both, or neither can pre-commit to M or W: Stackelberg Government-Leads, Stackelberg Union-Leads, and Nash with and without pre-commitment. Results differ with who leads; interestingly, government may prefer to follow. Cubitt 1997 explores three aspects of corporatism other than centralization: greater union-weight on inflation, higher union aggregate-output target, greater alignment of union and government output-targets, and cooperative union-government play. The results can be derived from the above.


35 Cubiert-Lippi and Soskice-Iversen both assume \( \alpha \) and \( \gamma \) exogenous and independent of \( n \).

36 Franzese 1999a, however, is only a heuristic model, and Iversen 1998ab has implicit differential money illusion among different wage-bargainers or requires further assumptions (see below). Hall 1994, Franzese 1996, Hall and Franzese 1998, Franzese and Hall 1999 make some of the same points as Franzese 1999a, less formally still.

37 More completely, monetary conservatism interacts best (worst) with small traded (public) sectors leading large (traded) public sectors in coordinated bargaining, with non-traded sectors intermediate. Public-sector-led coordinated bargaining can under-perform non-coordinated bargaining intrinsically and in its interaction with monetary conservatism.


39 Such complicated contracts may be difficult to write at high levels of aggregation, for example.

40 The model also laid foundations for Soskice and Iversen 1998, 1999, and is more fully-specified than Franzese 1999a.

41 Except as noted, in this section BC refers to some bargaining-coordination index, and CC to some index of “central bank independence” summarizing both autonomy and conservatism of the monetary authority.


43 Examining the Cukierman-Lippi row of Figure 1 carefully, one sees that such results could emerge CC/mid-to-high-BC interactions confer some benefit that their model misses. Iversen 1998ab, Franzese 1994, 1996, 1999a, and Soskice and Iversen 1998, 1999 all suggest such a possibility, namely that higher CC may help enforce coordination on restrained settlements in non-centralized systems of “pattern-setting” coordinated bargaining.

44 Iversen 1998ab uses actual exchange-rate movements in addition to an average of standard CBI indices.

45 Notably regarding Japan and Switzerland, over which Soskice 1990 and Calmfors and Driffill 1988 also dispute. However, his sensitivity analysis leans against that being the sole source of the different findings.

46 Hall 1994 and Hall and Franzese 1998 elaborate a similar argument. Soskice and Iversen 1998ab emphasize that Europe could evolve a pattern-setting system of bargaining, which would be more beneficial, and Franzese 1999a would imply that traded-sector bargainers would be best to set such patterns.