

Credibly Conservative Monetary Policy and Labor-/Goods-Market Organization:
A Review with Implications for ECB-Led Monetary Policy in Europe

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Abstract: This chapter reviews recent work on political-economic management of monetary policy under varying institutional organization of labor/goods markets and varying degrees of credible conservatism in monetary policy. The emerging literature synthesizes and extends theoretical and empirical insights of previous work on central bank independence (CBI) and coordinated wage/price bargaining (CWB), emphasizing that degrees of CBI and CWB interact, with each other and with other political-economic considerations (e.g., sectoral composition, international exposure, etc.), to structure the incentives facing political-economic actors involved in monetary policy and wage/price bargaining. The core implication, theoretically surprising but empirically supported, is that even perfectly credible commitment to monetary conservatism has *long-run, on-average* real effects, even given fully rational expectations, and that these effects depend on labor/goods-market institutional structure. The real effects of labor/goods-market organization, conversely, depend on the degree of credible conservatism reflected in monetary-policy rules. Nominal effects are also interactive though this is less surprising. Thus, common European monetary policy led by a credibly conservative ECB will have nominal *and real* effects that depend, *inter alia*, on the Europe-wide institutional-structural organization of labor/goods markets. Indeed, recent arguments and evidence suggest that ECB could be less unambiguously beneficial than previously believed.

I. Introduction

Until recently, political economists interested in 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 long-run, on-average real costs.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

Based on CBI arguments and associated evidence, most academics and policy makers have concluded

that the *credible conservatism* (CC) embodied in the ECB would produce low inflation of the common European currency at little or no real cost. CWB insights 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. This exclusive focus on one institutional feature of the macro political economy, the degree of central bank conservatism and autonomy from political authority or of wage/price-bargaining coordination,³ doubtlessly aided theoretical development in each literature, now among the most influential in political economy, academically and practically. However, monetary policy and wage/price bargaining are intimately related exercises, so policy makers and bargainers will likely interact strategically if their institutional structure provides the organizational capacity to do so.

This chapter reviews an emerging literature addressing such strategic interaction of monetary policy-makers and wage/price bargainers under varying degrees of BC reflected in labor/goods-market institutional-structure and varying degrees 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., international exposure, sectoral composition, etc.), to structure the incentives facing political-economic actors involved in monetary policy and wage/price bargaining. These interactions imply that even perfectly credible monetary conservatism has *long-run, on-average* real effects that depend on labor/goods-market organization, even given fully rational expectations. Real effects of labor/goods-market institutional-structures, conversely, depend on degrees of credible monetary conservatism. Nominal effects, meanwhile, are more widely agreed to be interactive, though this is less surprising theoretically.

Intuitively: effectiveness of monetary-policy signals depends on characteristics of the sender (credibility and conservatism of the monetary authority), as previously emphasized, but also on aspects of the audience (the institutional-structural organization of wage/price bargainers) that must receive and react to those signals.

Thus, e.g., before EMU, monetary effectiveness in Germany hinged on interactions of *German* labor/goods-market organization with *Bundesbank*-led monetary policy. Likewise, monetary effectiveness in a single-currency Europe will depend on interactions of ECB-led monetary policy with *European* labor/goods-market organization. Therefore, even if the ECB obtains effective monetary autonomy and conservatism equal to the *Bundesbank's*, the effect of ECB-led monetary policy on the European economy will differ from that of *Bundesbank*-led policy on the German economy because their audiences differ.

The review develops these points thus. Section 2 briefly reviews arguments and findings from standard, game-theoretic, classical models of monetary policy (CBI). Section 3 does likewise for CWB. Each section highlights some lingering issues in passing. Section 4 more fully reviews the emerging syntheses and extensions, and Section 5 reviews the empirical results supporting them. Section 6 concludes, emphasizing implications of the analyses for our understanding of the lessons to be learned from the *Bundesbank* experience for the likely functioning of the ECB.

2. CBI: Reviewing the Standard Argument

Political economists in the '80s and '90s developed convincing arguments that CBI can achieve low inflation.⁴ The credibility advantage relatively autonomous central banks enjoy over political authorities implied that this nominal benefit had no real costs on average (but see note I). Simplifying, the argument proceeds thus. Given nominal and real rigidities, monetary authorities have incentives to create *surprise* inflation, thereby lowering real wages (prices) and pushing employment (real demand) above natural rates, which latter are assumed exogenous. However, private-sector actors recognize this incentive and incorporate its inflationary consequences into their price expectations. In rational-expectations equilibrium, monetary authorities cannot systematically surprise private-sector 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-sector actors could set lower wages without fear. Again, real wages would be unaffected, employment would remain as exogenously given, but inflation could 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 model of the economy, an expectations-augmented Phillips' Curve with an exogenously given natural rate, effectively assumes zero on-average real effects *ab initio* since private-sector actors simply, unbiasedly, and *atomistically* equate expected to actual inflation. The Phillips' Curve's slope and the underlying natural rate are not exogeneous, though; logically, they must depend on labor/goods-market structure and how that structure conditions wage/price-bargainer reaction to monetary policy. In particular, strategic private-sector reaction to monetary policy likely affects natural rates and Phillips' Curve relationships, suggesting that even credible monetary conservatism could have long-run, on-average real-effects.

Nonetheless, many empirical studies appear to have shown that CBI lowers inflation at little or no on-average real costs. Typical *demonstrations* (Alesina and Summers 1993) regress postwar averages of various nominal and real outcomes on CBI indices in cross-sections of countries (usually 15-21 OECD countries). Statistically significant negative correlations with nominal variables and insignificant correlations with real variables usually emerge. However, observations are few and standard errors correspondingly large; rarely are many (or often any) potential controls included; and never have any potential interactions been considered.⁵ Thus, the previous insignificant results could easily have missed relationships between CBI and real variables that vary with levels of other variables, e.g. CWB, which the work reviewed here suggest exist. Still, prominent anecdotes further strengthened the case for CBI. Germany, Switzerland, and the US have highly independent central banks and have shared relatively low inflation but experienced widely differing unemployment.

The logical argumentation, simple but striking evidence, and prominent empirical anecdotes have obviously influenced a broad policy-making audience, with CBI heading 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. All theory, evidence, and examples suggested that

monetary-policy delegation to a credibly conservative ECB would produce low inflation virtually without long-run, on-average real costs: an easy political sell.

Details of central bank behavior and pronouncements are actually inconsistent with standard models, but this may have 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’s 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-effectiveness likely shrinks (diminishing returns); and target-to-natural-rate gaps are unchanged (logically, 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.⁶ The *Bundesbank* acts somewhat differently, but also anomalously, frequently directing its announcements specifically to wage/price bargainers and governments, and fairly overtly threatening monetary contraction in response to upcoming settlements or budgets it views as inflationary.⁷ Standard theory cannot explain this behavior either. First, inflation-budget connections are weak at best, 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 that 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 simultaneously but independently, CWB theory argues that wage/price-bargaining coordination (BC) fosters real and nominal wage/price restraint and thereby has beneficial real and nominal effects.⁸ Summarizing, the argument proceeds thus. Fragmented wage/price-bargaining units likely ignore any externalities to individual settlements, so their wage/price-increases may be sub-optimally high, 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.⁹

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) but only in proportion to the consumption-shares of products using its labor. The perceived marginal utility of nominal-wage increases thus depends on the impact of j 's settlement on *aggregate* consumption-prices. j perceives more real consumption-value per nominal-wage gain, and so exercise less wage restraint, the less aggregate price-inflation parallels j 's wage-inflation. To the degree j 's bargain is encompassing or coordinated with others, aggregate inflation moves with its settlement; to the degree j 's bargain is small relative to the economy, it perceives aggregate inflation as given independently 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 coordination or encompassingness, unions weigh the adverse employment effects of their wage gains. j 's employment prospects depend positively on real demand for goods its labor produces and negatively on its real product-wage. Real demand for j 's goods, in turn, depends positively on aggregate real demand and negatively on 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 the last two effects dominate the opposite first effect, then, on both real-wage-gain and employment-prospect-cost side, BC increases unions' propensity to deliver wage restraint.

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.¹⁰

Recent advances address the, previously virtually ignored, employer side of bargaining and the market-power assumptions implicit in preference-orderings assumed earlier.¹¹ 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. Implicitly, this suggests that monetary policy induces non-inflationary settlements by shifting union-firm bargaining powers (e.g., by increasing unemployment) and/or changing their marginal utilities from getting (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 union j 's nominal-wage gains cause price increases for j 's products that its competitors less than match, the more product-market competition induces j 's restraint. Likewise, the less other wage settlements match j 's increases, the more labor-market competition induces j 's restraint. Coordination, by linking wage and thus 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 considerations suggests that both very competitive and very coordinated bargaining structures may induce wage/price restraint. Given perfect competition in labor and goods markets, unions cannot achieve wage gains exceeding productivity growth, and firms cannot pass any such excess cost increases

to consumers. Atomized bargainers exercising insufficient restraint simply become unemployed (lose all their market) with certainty. This incentive's strength under perfect competition overrides 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 international-competitiveness concerns as argued 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 bargaining settlement, while national-level concerns remain small since an industry is still small relative to the whole. 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 emphasized, the shape of relationships between BC and restraint depend critically on relative-wage and relative-price elasticities and how BC alters them. Unfortunately, the syntheses and extensions reviewed below inherit this indeterminacy.

Several controversies plague theoretical and empirical development: debate over degrees of BC characterizing certain country-times,¹² disagreement over whether union membership-structure sufficiently proxies for effective BC,¹³ and several key issues regarding the Calmfors-Driffill *bump*. First, even assuming BC relates curvilinearly to restraint, with most restraint at zero and full BC, whether restraint falls very quickly and rises gradually as BC increases from zero to full, *vice versa*, or anything in between remains theoretically ambiguous. The above measurement issues then hamper empirical adjudication of that matter; worse, even assuming those issues resolved, the degrees of BC *empirically* existing in any sample of country-times relative to *theoretical* zero and full BC would remain unknown.¹⁴ Current theory can only suggest that empirical measures consider economy-wide BC, across unions and firms,¹⁵ and that relationships estimated between BC and restraint allow for both competition-reducing and internalization-increasing effects.¹⁶

Important theoretical omissions also remain. Standard CBI theory hindered consideration of

interactions between bargaining and monetary institutions by assuming exogenous monetary effectiveness and natural rates, even though logically these may depend on bargainer's strategic reactions to monetary policy. Standard CWB theory, similarly, hinders such consideration because it generally allows 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 assumes homogenous unions and firms, yet some private-sector actors will 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, e.g., that the institutional-structural organization of the bargainers with which the *Bundesbank* interacted was essential to their *joint* effectiveness in regulating both nominal and real outcomes and that the very different organization of bargainers *Europe-wide* will be equally central to the, likely very different, impact of the ECB.

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, but the incompatibility of underlying assumptions hinders their combination. CBI assumes direct monetary control of inflation and exogenous natural rates and monetary effectiveness. 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;¹⁷ 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). Another shows that strategic, monopolistic, private-sector actors suffice to produce non-neutrality of non-strategic monetary-policy rules. A third studies interactions between strategic monetary-policy authorities and strategic, monopolistic, *inflation-averse* bargainers; these also imply interactive real and nominal effects for CC. A fourth emphasizes differences among strategic private-sector actors as well as coordination across them; real effects of CC there depend on CWB and on differences within and among bargaining units.

All of these approaches, standard CBI theory included, imply that the *nominal* effects of credible monetary conservatism depend on the institutional-structural organization of labor/goods markets. Note that this may suffice to imply interactive *real* effects as well because the incentives for governments to undertake real reforms partly depend on their potential to reduce the inflation bias in equilibrium monetary policy. EMU, e.g., could have real effects by altering the incentives of member nations to undergo politically costly real reform intended to reduce inflation biases. The other approaches go further, concluding: *if private-sector actors have sufficient market power to interact strategically with monetary authorities, then the CC embodied in monetary-policy institutions affects both nominal and real variables, on average, in the long run, even with fully rational expectations, and beyond any changes in other policy instruments that such CC may induce.* E.g., the real effects of ECB-led monetary conservatism will depend on the degree and nature of BC in Europe, even assuming all other policies fixed. Furthermore, these approaches agree that CC has real effects because it alters relationships between labor/goods-market organizations and bargaining restraint. However, sharp disagreement remains, largely inherited from CWB theory, on the signs and shapes of these relationships and on how the degree of CC alters them. These disagreements unfortunately

debar commonly accepted predictions much more specific than that the ECB's real effects will depend on the degree of BC exhibited *at the European level*.

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 authority. Then, the nominal effects of CBA clearly depend on bargaining institutions and structure, and indeed on many other political-economic factors. Franzese (1999b) gives the general case and provides evidence strongly supporting it.¹⁸ 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:¹⁹

$$(1.) \quad \begin{aligned} m^* &= CBA \cdot m_b^* + (1 - CBA) \cdot m_g^* \\ m_b^* &= \pi_b^T + c_b \alpha (y_b^T - y_n) \\ m_g^* &= \pi_g^T + c_g \alpha (y_g^T - y_n) \end{aligned}$$

where m is monetary growth, π is inflation, y is some real variable, and $_b$ refers to banks, $_g$ to governments, $_n$ to natural rates, $*$ to equilibria, and T to targets. Thus, even ignoring any potential strategic interactions between monetary authorities and wage/price bargainers, and even maintaining direct inflation-control by policy makers (i.e., assuming $m \equiv \pi$), CBA's nominal impact is:

$$(2.) \quad \frac{d\pi}{dCBA} = -(m_g^* - m_b^*) = -\left[(\pi_g^T - \pi_b^T) + \alpha \{ c_g (y_g^T - y_n) - c_b (y_b^T - y_n) \} \right]$$

Thus, *anything* that differentially impacts banks' and governments' desired policies alters the nominal effects of CBA; *vice versa*, any such factors' effect depends on CBA. E.g., BC affects y_n and α , so nominal effects of CBA and BC generally depend on each other (and on anything else that affects π_g^T , π_b^T , c_g , c_b , y_g^T , y_b^T , α , and/or y_n). Focusing on labor-/goods-market organization, note that policy-maker 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 help internalize externalities (e.g.,

bargaining coordination). Thus, adding CWB logic to the CBI literature, leaving all other assumptions in tact:

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

Note that *credible conservatism* has two parts: central bank autonomy (CBA) and central bank conservatism relative to governments (c_g - c_b). The beneficial nominal effects of each increase (decrease) in labor/goods-market monopoly power (bargaining coordination). Moreover, the effects of bargaining institutions on the natural rate, y_n , and monetary effectiveness, α , may also depend on monetary credibility and conservatism; if so, then there would be additional *strategic* interaction effects (see below).²⁰ Thus, even standard, classical CBI theory implies that the nominal impacts of ECB will depend on any factors that would affect the desired policies of the ECB and of European political authorities differently, including, e.g., European labor/goods-market organization.

As noted above, even this nominal effect could produce other policy changes that would have real effects. E.g., since monetary autonomy and conservatism reduce the inflation costs of inferior labor/goods-market organization, monetary-authority delegation to a conservative ECB reduces incentives to undergo economically beneficial but politically costly reforms, thus creating real costs inversely proportional to ECB's nominal benefits (Ozkan *et al.* 1998). Plus, all members would receive the benefits from any member's reforms, thus common currencies create classic externalities with under-investment in reform (Calmfors 1998). However, if exchange-rate policy was a substitute for nominal flexibility, reforms to increase flexibility become more valuable with a common currency (Sibert and Sutherland 1998). Finally, suppose that under previous EMU arrangements, members whose inferior regulatory frameworks produced inflation temptations received side-payments to ignore those temptations. This would have produced 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).²¹ However these incentives aggregate, the total *real* effects of a common, conservative

monetary policy will be non-zero and will correlate, positively or negatively, with its nominal impact, which, in turn, will depend on labor/goods-market organization across its member nations, *inter alia*.

The first approach, however, continues to debar strategic interaction between bargainers and banks, though, given sufficient labor/goods-market power, bargainers would clearly incorporate expected monetary reactions into their calculations. If this interaction alters $y_n(\cdot)$ and α , syntheses maintaining strict nominal-real divides are insufficient. Soskice and Iversen (1998, 1999), e.g., show strategic private-sector actors suffice to produce *long-run, on-average* real effects of CC.²² Non-neutrality stems from bargainers' collective-action problems, not from lack of credibility, so let money-supply rules be credibly known, $M = P^{1-\beta}$, with aggregate prices, $P \equiv \prod_{i=1}^n (P_i^{n-1})$. Let $\beta \in [0..1]$ index monetary conservatism, $\beta=0$ ($\beta=1$) implying full (non-)accommodation. n equally-sized sectors and unions in Bertrand compete, with constant returns to scale and labor productivity set to one, so good i 's price, P_i , equals sector i 's wage, W_i . Give real demand in i , q_i , equal to employment, e_i , for simplicity, as:

$$(3.) \quad q_i = e_i = \frac{m}{n} - \eta p_i = \frac{m}{n} - \eta w_i$$

m is real money supply, $p_i \equiv P_i/P$ are relative prices, and η is relative-price demand-elasticity. Sectoral-monopoly unions set W_i to maximize weighted products of real consumption-wages, ω_i , and sectoral employment, with weight α on ω_i . The symmetric equilibrium employment level is thus:

$$(4.) \quad e^* = \frac{\eta(1 + \frac{\beta}{n-1})}{\alpha - \frac{\beta}{n-1}}$$

Therefore, unless $n=\infty$, i.e. outside of perfect competition, monetary conservatism, β , has real rational-expectations-equilibrium effects, and these real effects vary with the number of unions, n .²³ Specifically, conservatism (higher β) increases 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. Intuitively, when n is low, the large individual unions perceive their nominal increases to produce some *aggregate* real-money-supply

contraction, more contraction the less accommodating the bank (i.e., the higher β). Encompassing bargaining units thus exercise more restraint as β , conservatism, increases. As n becomes large, however, this effect vanishes because real money supply becomes increasingly exogenous to the settlements of increasingly atomized unions. Thus, these models conclude that monetary conservatism has beneficial real effects that increase with BC. Standard models 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, then, the German system has worked relatively well because the *Bundesbank's* highly conservative money-supply rules (high β) interacted with a fairly coordinated bargaining system (low n). The ECB, following a similarly conservative policy rule, contrarily, would face a much less coordinated *European* bargaining system (higher n), and so would have less beneficial real impact. Soskice and Iversen (1998) emphasize, however, that the European bargaining system to which the ECB would respond remains to be determined. Possibly, the European system could evolve a lead-bargaining system in which bargains in one country set wage-increase precedents that the rest would 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 money-supply rules exogenous; neither deriving from policy-maker optimization nor responding to bargaining settlements. Strategic interactions are more likely to be bi-directional. Second, as important, relative-wage demand-elasticity, η , is fixed, exogenous, and, critically, assumed independent of n . However, as the number of sectors bargaining a single wage, n , decreases, relative-price elasticities are likely to diminish;²⁴ no such Calmfors-Driffill competition effect operates here. These differences, plus private-sector inflation-aversion, led others to markedly different conclusions about the particulars of the, agreed non-zero, real effects of monetary conservatism.²⁵ The core intuition, though, is more widely shared: private-sector actors facing exogenous monetary conservatism perceive abilities to affect *real*

money-supply proportional to their share of the economy. Accordingly, the real effects of credible conservatism are generally non-zero and typically improving in BC.

Several others²⁶ explore interactions of a *strategic* monetary-policy authority with a *single* strategic, *monopoly* private-sector actor. Here, CC has real effects *if the wage/price bargainer is directly inflation-averse*. Empirically, private-sector inflation-aversion is large and well-documented (see, e.g., Hibbs 1987 ch. 4); theoretically, inflation-aversion is justified on four grounds.

First, monetary-policy models routinely assume inflation-averse policy-makers, so symmetry suggests private-sector inflation-aversion. Indeed, any real government's utility derives from private-sector utilities somehow, though likely with highly unequal weights especially in non-democracies; so, if policy makers dislike inflation, then some private-sector actors must also.²⁷ Any reason adduced for policy-maker inflation-aversion in standard models (e.g., inflation level and volatility correlation) could therefore justify private-sector aversion also. 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 and progressive tax systems. Fourth, in open economies, *domestic* inflation is a *relative* price-increase unless domestic consumption and production bundles are the same, i.e. given some trade.²⁸ Irrespective of theoretical motivation, strategic inflation-averse private-sector actors will take monetary-policy reactions to their behavior, now including the inflation-impacts of those reactions, into account in their bargaining.

Gylfason and Lindbeck (1994), e.g., 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," and set all elasticities "...to one for simplicity and without material loss of generality" (36). Aggregate-demand-equals-supply (AD=AS) then implies: $Y = .5(M - W)$; $P = .5(M + W)$. If government and monopoly union exogenously dictated money and wages, respectively, then equilibria would

have standard Keynesian properties: $\frac{dY}{dM}, \frac{dP}{dM}, \frac{dP}{dW} > 0; \frac{dY}{dW} < 0$.²⁹

Cournot-Nash equilibria are more novel. Subject to $AD=AS$, a strategic government minimizes over M losses quadratic in output and inflation deviations from targets, as standard, while 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 a pair of reaction functions³⁰ in which (a) the union fully accommodates money-supply increases, so classical nominal-real divides obtain, only if the union disregards inflation and (b) 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 ΔP^T , are equal, then further insights emerge. If union real-wage and employment targets combine to a point above the labor-demand curve at full employment, then union-government strategic interaction spawns *stagflation*: $Y < Y^T$ and $\Delta P > \Delta P^T$. Alternatively, even if union targets are on the curve, and output targets remain equal, government conservatism, $\Delta P_g^T < \Delta P_u^T$, alone will imply stagflation. Thus, if (a) monopoly union and monetary authority target the same employment and inflation, and (b) the union's targeted real-wage/employment combination is *not* above the labor demand curve, then CC is neutral *nominally and really*. If either condition is violated, then CC has real and nominal effects which depend critically on the preferences and targets of both the monopoly union and the government.³¹

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

...If the central bank is inflation averse (or pre-committed to a particular rate of inflation or growth of nominal demand), the union can take advantage of this aversion (pre-commitment): high money-wage increases will buy lower output (and higher 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 banks 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 $\pi > 0$ 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 fixed-exchange-rate commitments because the set of wage/price-bargainers with which the respective monetary policy-makers interact differs.³² This insight drives this reconsideration of the *Bundesbank* experience and its application to the ECB also; however, single-bargainer models are ill-suited to that analysis because labor-/goods-market organization cannot be theoretically varied and moves to ECB-led European monetary policy neither begin nor end in monopoly-union settings.

IV.C.2 Strategic, Inflation-Averse Private-Sector Actors and a Strategic Monetary Authority:

Cukierman and Lippi (1999) and Velasco and Guzzo (1999) allow union concentration to vary. Cukierman-Lippi consider n unions and a monetary policy-maker with utilities similar to IV.C.1. They assume all labor is unionized by *craft*, so that labor substitutability is perfect across industries but imperfect across unions. Increasing centralization, lower n , generally increases demand-elasticity facing individual unions, reflecting Calmfors-Driffill's competition effect, but substitutability across crafts, γ , is fixed. Each union sets nominal wages, taking others' wages and the bank's reaction function as given; the bank fulfills its reaction function (fully credible commitment), picking monetary policy and thus determining inflation; and unions set wages given their rational expectations. The equilibrium is:

$$(5.) \quad \pi = \frac{\alpha^2}{c} \varphi \quad ; \quad \varphi \equiv \varpi - \omega^c$$

$$(6.) \quad u = \alpha \varphi \quad ; \quad \varphi \equiv \varpi - \omega^c$$

π ≡inflation; u ≡unemployment; ω ≡market-clearing real-wage. So, φ is the average *real-wage premium*. ϵ is monetary authority weight on nominal relative to real targets, and α plays a similar role to the Phillips Curve slope in standard models. Thus, this would be exactly the classical result, *except* that φ turns out to depend on ϵ . This strategic non-neutrality arises for two reasons.

First, because unions dislike inflation and banks directly control it, increasing inflation with unemployment, unions may moderate their demands to lessen monetary-authorities' inflationary temptations. 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 the monetary authority (higher ϵ), the less j expects it to succumb to inflation temptations, so the less this restraint-inducing mechanism, which drove the results in IV.C.I also, operates. Second, Cukierman-Lippi also emphasize a *competition-induced strategic non-neutrality (CISNN)*, which arises because the marginal effect of increases in j 's nominal wages on its real wage depends positively on ϵ while the marginal effect of increases in j 's nominal wages on its *relative* wage does not. Higher ϵ narrows this differential and thus reduces CISNN-induced moderation. A similar mechanism seems to drive the Soskice-Iversen results.³³

Equilibrium real and nominal outcomes clearly depend on ϵ and n and their interaction, but in highly non-linear ways that make interpretation difficult. Cukierman-Lippi nonetheless manage several propositions. (1) Higher union inflation-aversion, B , and cross-craft substitutability, γ , unambiguously improve employment and inflation, though these effects when $n=\infty$ (perfect competition). (2) Beyond a critical amount of union inflation-aversion relative to other parameters, $B_c \equiv A\epsilon^2\gamma/\alpha^3$, a Calmfors-Driffill curve relates the real-wage premium, φ , to n ; short of B_c , however, 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's peak moves toward centralization as ϵ increases; 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 CC, ϵ , and BC, n^{-1} , shift and reshape it. These combine to offer some insight into 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, or both, then CC unambiguously *decreases* employment. CC generally decreases inflation, but sufficient inflation aversion can even overturn that result at some n . Focusing on unemployment, the Calmfors-Driffill curve at higher ϵ is argued to lie entirely above the curve at lower ϵ , and, as ϵ increases, the peak of the curve also becomes more accentuated and drifts toward lower BC. These considerations imply that locations and shapes of any relations between BC and real variables depend on degrees of CC, but the direction and nature of this shifting and reshaping depends critically on assumptions or arguments regarding, especially the elasticity of substitution across labor and goods types, though also on many other model parameters, and if and how each changes with BC. The net effect seems to be that CC decreases employment, probably more so at low-to-moderate BC than at moderate-to-high BC, though these effects diminish at the extremes.

Thus, Cukierman-Lippi suggests that the *Bundesbank's* interaction with the moderately highly coordinated organization of German wage/price bargaining produced quite moderate inflation at fairly low, but positive, real cost. If, however, the ECB attempts to employ its autonomy toward equally conservative inflation targets, it would likely do so at higher real cost, even if it is equally credible, because the European labor/goods market would possess many more bargaining units, but each probably retaining non-negligible 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 Cukierman-Lippi's craft-union assumption likely overemphasizes inter-union over inter-firm substitution. Second, as in Soskice-Iversen, labor-demand real-wage-elasticity depends on n , so some competition effects of BC are present. Many other key parameters, though, are independent of n . Note especially the exogeneity of the *relative-wage-elasticity* of labor demand, which

submerges some of the Calmfors-Driffill's hump. Third, removing inflation-aversion to isolate the *CISNN*, which drives Soskice-Iversen's non-neutrality as well, is the next logical step in theory building. Finally, the employer side of wage bargaining is still largely absent from 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 some key parameters, assuming a (single) representative firm employing a continuum of symmetric workers to produce a single good. Its profit-maximization decision produces symmetric labor demand for each worker-type. Equal-sized unions maximize their members' intertemporal utilities, which weigh consumption against labor and inflation. The strong symmetry implies unions optimally set equal wages for all workers. Real-wage labor-demand elasticity for each worker as perceived by the union is again key. It again depends negatively on the number of unions, n , and positively on elasticity of substitution between worker-types, σ , and returns-to-scale, α , though now *via* the firm's production function and profit-maximization decision. Bertrand games among unions and between each and government, with unions setting wages first, government setting inflation next, and the firm setting employment and output last, again produce several startling results.

First, outside perfect competition, strategic inflation-averse unions moderate wage demands to reduce government's inflation temptations, more so the less conservative the monetary authority. Thus, *CC* unambiguously decreases restraint and employment, as in Cukierman-Lippi. However, the *CISNN* operates much differently in the Velasco-Guzzo model. In Cukierman-Lippi, given sufficient private-sector inflation-aversion relative to labor-demand real-wage-elasticity, a standard Calmfors-Driffill curve emerges which shifts upward and peaks more leftward (lowest employment at lower *BC*) as *CC* increases. In Velasco-Guzzo, *CC* still shifts the *BC*-unemployment relation upward, but a standard Calmfors-Driffill hump-shaped curve never emerges. Rather, if substitution elasticities across worker types are sufficiently low, employment falls monotonically with n ; otherwise employment is *highest* at some intermediate level of *BC*: an inverse Calmfors-

Driffill curve.

Key to these differences is the severe symmetry in Velasco-Guzzo, which obscures and swamps the Calmfors-Driffill curve reproduced by the Cukierman-Lippi *CISNN*, basically because there are no relative wages in equilibrium. The Velasco-Guzzo production function allows 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 had assumed. Thus, even as n approaches ∞ , the competition-reducing effects of BC are limited in Velasco-Guzzo. Once again, the crucial parametric assumptions regard the substitutability of labor across unions, σ , and its relation to BC.

Velasco-Guzzo also conclude that the nominal and real effects of CC and BC are interactive, though highly non-linear and dependent on several key parameter values. They graphically illustrate several simulations, from which emerge the comparative statics of central interest here. CC has positive real costs, R , which depend on elasticity of substitution among worker types, σ , returns to scale, α , BC, and CC itself: $\frac{dR}{dCC} = f(\sigma, \alpha, BC, CC) > 0$. The marginal costs of CC generally diminish with CC itself: $\frac{d^2R}{dCC^2} \equiv \frac{df}{dCC} < 0$. For $\sigma(1-\alpha) < 1$, they also diminish with BC, but with $\sigma(1-\alpha) > 1$ they increase with BC, though only noticeably so for $n < 3$: $\frac{d^2R}{dCCdn^{-1}} \equiv \frac{df}{dn^{-1}} < 0$ as $\sigma(1-\alpha) < 1$. Despite this indeterminacy, the implications of a move toward common, conservative European monetary policy are fairly one-sided. The move would effectively decentralize bargaining, but, even if $\sigma(1-\alpha) > 1$, so that the low BC would reduce the real costs of the higher CC, Europe would be in the flat range of that curve ($n \gg 3$). The effective bargaining decentralization induced by raising monetary policy to the European level would significantly increase the costs of CC if, contrarily, $\sigma(1-\alpha) < 1$.

IV.D. Strategic, Differentiated Private-Sector Actors and Strategic Monetary Authorities:

Two final approaches emphasize differences among strategic private-sector actors additionally their

bargaining coordination. Franzese (1999a) stresses the differential impact of CC on private-traded, private-non-traded, and public-sector bargainers; Iversen (1998ab) emphasizes, instead, strategic unions that dislike wage disparity in addition to standard real-wage and employment goals, suggesting the importance of differences in productivity (growth) within and among bargaining units.³⁴

Franzese (1999a) argues that, since monetary authorities do not directly control prices, they must control inflation *via* monetary-policy responses to wage/price settlements sufficient to induce monopolistically-empowered wage/price bargainers to settle upon non-inflationary increases. Monetary authorities essentially announce “threats”, $\frac{dM}{dP}$, that shift power-balances in union-firm Nash bargains toward acceptable nominal growth. As elsewhere, the severity of the threats required to induce non-inflationary settlements depends on BC because only $1/n$ of threats are directly perceived by bargainers. Also emphasized, though, is that monetary policy impacts some bargainers differently. Enacted threats (real contractions) hinder domestic real-demand and so injure all actors dependent on domestic demand, i.e. all private-sector actors, but they also increase export relative to import prices, thereby especially injuring traded-sector actors. Since, inflation equilibration is achieved by creating or threatening real slack sufficient to produce non-inflationary wage/price settlements, the rest of the economy must suffer disproportionately less when traded-sector, more when public-sector, and intermediately when private-non-traded-sector bargainers dominate the aggregate of settlements. If threats are sufficiently frequently enacted, monetary *conservatism* involves familiar (Keynesian) macroeconomic trade-offs, though, for any given conservatism, monetary *credibility* remains unambiguously beneficial.

CC thus has real effects that depend on BC *and* the sectoral composition of bargaining. CC, BC, and T/P (traded-relative-to-public-sector dominance) are strategic complements in producing beneficial real outcomes but strategic substitutes in producing beneficial nominal outcomes. The latter follows directly from (5). Thus, the argument suggests that the fairly strong nominal and real performance of postwar Germany depended (partly) on a particularly beneficial interaction between the *Bundesbank's* high CC and the German bargaining system's moderately high BC, which is led by the metal-industry (traded-sector) confederations: *IG*

Metall (unions) and *Gesamptmetall* (firms). ECB-led European monetary policy will almost certainly face lower BC than the *Bundesbank* has, so the ECB is likely to have less beneficial real-impact. As Soskice-Iversen also concluded, some pattern-setting arrangement among member-countries' bargaining organizations would be beneficial, now especially if traded-sector bargainers led this pattern-setting, as they have in Germany. Unfortunately, the model is only heuristic: describing marginal (dis-)utilities of nominal increases to unions and firms given threat schedules, $\frac{dM}{dP}$, and the relation $\frac{dP}{dW_j}$, which depends on BC so as to illustrate and guide the argument. So, while the potential gains from distinguishing conservatism and credibility, modeling union-firm bargaining as directly determining price increases, and allowing differentiated bargainers in strategic relation to monetary authorities may be clear, full formal implementation awaits future work.

Iversen (1998ab) also emphasizes differences among bargainers but stresses instead strategic unions *that dislike wage disparity* in addition to having standard real-wage and employment goals. The key insight: inflation erodes real-wage disparity relative to whatever nominal-wage disparity wage/price settlements may have produced. Thus, lax monetary policy may provide nominal slack, which unions could value as undoing some disparity their settlements would otherwise have produced. Unions would desire such nominal laxity more as the wages of more disparate-productivity workers are compressed by bargaining within encompassing units. This suggests that CC could have adverse effects at high BC. Contrarily, as the economy approaches perfect competition, wage disparity is increasingly determined by relative marginal-value-products and decreasingly by bargaining, so CC should be increasingly neutral. Finally, for intermediately organized economies, wage-disparity is less problematic but CC can help enforce cooperative “lead-bargain” coordination (e.g., as practiced in Germany).³⁵

Thus, the non-zero on-average real effects of CC depend on BC and on productivity (growth) differences within and among bargaining units. Iversen's (1998a,1998b) results, however, either rely on differential money illusion among different wage-bargainers—high-productivity-growth workers seem to ignore

erosion of their relative gains by inflation—or requires further assumptions regarding why coordinated bargainers need to decrease wage inequality indirectly *via* aggregate inflation rather than directly *via* their bargains. These issues notwithstanding, the model clearly illustrates preference differences, both intrinsic and *vis-à-vis* their strategic interaction with monetary authorities, across low- and high-productivity-growth workers.³⁶ The implications seem simple: pattern-setting arrangements in European bargaining would improve the ECB's real performance; otherwise, some of the beneficial real effects of *Bundesbank* interaction with lead-bargaining in Germany will not materialize for Europe. 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. The historical parallel may, unfortunately, be the absorption of Eastern Germany into the West German bargaining system.

V. 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 CBI and CWB and noted an interactive pattern. Hall and Franzese (1998) summarize that pattern tabularly, showing that postwar-averages of (a) inflation decline in CBI and CWB and of (b) unemployment decline in CWB and rise in CBI. (c) The unemployment decrease in CWB (increase in CBI) itself increases (decreases) as CBI (CWB) increases, suggesting *strategic complementarity* in real outcomes, and (d) the inflation decrease in CBI and CWB both tend to decrease as the other increases, suggesting *strategic substitutability* in nominal outcomes. Their regression analyses, using postwar-average, *decade*-frequency,³⁷ 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 test for interactive real effects of CBI, CWB, and sectoral structure. In addition to CBI-CWB interactions, which produced results substantively congruent with and statistically stronger than those in Hall and Franzese (1998), these models include traded-

sector and government-employment shares and their interactions with CBI. The results strongly support claims that government employment and CBI interact detrimentally in real-outcome determination. With high CBI, greater government employment-shares were associated with higher unemployment, whereas with low CBI, greater government employment-shares lowered unemployment. Also, traded-sector employment-share seemed to improve unemployment outcomes, and more so the greater CBI, but those results were less strong statistically.

Garrett and Way (1995a) criticize Hall (1994) and Franzese (1994) for using subjective CWB indices. Replacing CWB with *union strength*, i.e. union concentration plus coverage rates, a procedure Swenson (1989,1991) and Soskice (1990) argue against, they nonetheless find quite similar institutional interactions to those suggested by Hall and Franzese (1998). Using postwar quinquennial data in 13 OECD countries, they find some evidence 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 deleterious effects of public-sector employment on CWB's ability to deliver wage/price restraint. They estimate a curvilinear relationship between *union strength* and unemployment, allowing *public-sector strength* within the unionized sector (public-sector-union-members' share of total union-membership) to alter that relationship. Using quinquennial unemployment data from 13 OECD countries, they find a Calmfors-Driffill hump-shaped relationship between union strength and unemployment when *public-sector strength* is low, but that high union strength functions increasingly counter-productively as public-sector strength rises.

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 CWB (high, medium, low) derived from OECD (1997); (b) Cukierman's (1992) LVAU index of CBI; the interaction of (b) with (a); and a few controls. Their findings indicate that increasing CBI increases unemployment at low CWB, reduces it at intermediate CWB, and also, though insignificantly more moderately, reduces it at high CWB. This accords

with their prediction *that* CBI reshapes the Calmfors-Driffill curve but does not support their precise claims about *how* CBI changes that curve (e.g., CBI did not appear generally to increase unemployment). Their inflation findings are similarly mixed. Despite some differences, Cukierman-Lippi's results agree with previous findings in that $\frac{dR}{dCC} > 0$ at low CWB and that $\frac{dR^2}{dCCdBC}$ is generally negative (R is some real variable). I.e., CC has real costs at low BC, and these costs generally decrease, perhaps becoming benefits, as BC increases (at least from low to moderate ranges).

Iversen (1998ab) gives further evidence that CBI has real effects that depend on bargaining organization and *vice versa*, but the precise effects found differ radically from others'. Iversen argues CC reduces unemployment at moderate, increases unemployment at high, and has little effect at low bargaining *concentration*. His findings in quinquennial data (15 OECD countries, 1973-93) support these predictions. The sample, measurement of bargaining *concentration*,³⁸ and measurement of CC³⁹ all differ from the rest, so the differing results are not too surprising. Disturbingly, though, they suggest that CC has real *benefits* over most of the sample-range of BC and real *costs* only in high BC countries while others argued and found very differently. As suggested below, arguments and evidence in Franzese (1999a) may help explain these differences, but notice that there is still agreement that increasing from low to moderate BC reduces the real costs (increases the benefits) of CC.

Franzese (1999a) considers real and nominal outcomes in annual data from 21 OECD countries 1974-90, relating them to CBI, CWB, G/T, and $(G/T)^2$, where G is government and T traded-sector employment-share. The findings strongly suggest that CWB is more beneficial the more traded-sector dominate government-sector workers; CWB can even be detrimental with sufficient government-sector dominance. CWB's sectorally determined impact is then magnified in its real effects and diminished in its nominal effects by CBI. I.e., the evidence says first that CBI and CWB are strategic complements (substitutes) in real-(nominal-)outcome determination and second that the impact of CWB, both *per se* and in strategic

interaction with monetary authorities, depends critically on the competitive exposure of the bargainers being coordinated. This may suggest a resolution to the above controversy over CC's effect at high BC. Possibly, Iversen (1998ab) attributes to wage-equalization among productivity-differentiated workers bargaining in concert what Franzese (1999a) attributes to competitive-exposure-differentiated workers acting as bargaining leaders since high-and-low-productivity-growth and traded-and-government-sector workers are empirically much the same sets of workers.⁴⁰

Despite the controversies, empirical work exploring the interactions of CC and labor/goods market institutional-structure agree on three important results. First, all conclude that strict classical divisions between real and nominal economies seem empirically unwarranted; the on-average, long-run real effects of CC are generally non-zero. Second, all find that the institutional-structural organization of wage/price bargaining and of monetary policy-making interact in determining both real *and* nominal outcomes; the real effects of CC depend on BC and *vice versa*. Third, all found that the real effects of CC are more palatable or less unpalatable with intermediate than with low BC; i.e., all found $\frac{dR^2}{dCCdBC} < 0$ over the empirically intermediate range of their BC measure. Disagreement regards effects of CC at high BC and the sign of, the agreed non-zero, $\frac{dR}{dCC}$; i.e., whether this generally non-zero curve lies above or below zero and at what level of BC it crosses if it does. Empirically, the nominal effects are broadly agreed. CC reduces inflation and generally does so more the less beneficial labor-/goods-market organization. CC and BC are strategic complements nominally. Thus, again despite the controversies, the empirical work would all 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. The move is one of moderate-to-high BC, led by the traded sector, to relatively low BC with unknown if any sectoral leadership. By any of these analyses, then, the German situation made relatively favorable nominal-real trade-offs while the European one promises less favorable terms.

VI. Conclusion:

Important points of theoretical and empirical agreement have emerged. First, even standard, classical approaches agree that the nominal benefits of CC depend on labor/goods-market organization. Political-economic considerations may then suffice to produce real effects for CC that depend on BC because governments may introduce real reform to reduce inflation biases. If so, then the incentives to conduct such real reform 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-sector interaction with monetary authorities would undermine the strong neutrality result of standard classical CBI theory (and modify any version of CWB theory). E.g., inflation aversion among private-sector actors would also suffice to produce non-neutrality of CC, and that private-sector inflation-aversion would imply positive real costs for CC if private-sector actors are strategic (i.e., outside perfect competition). Indeed, all such approaches would agree with general statements that strategic private-sector action implies that CC shifts and reshapes any relation between BC and real outcomes. These strategic non-neutralities arise (a) because more coordinated strategic, inflation-averse bargainers moderate their wage demands more the less credibly conservative the monetary authority, (b) because credibly conservative monetary policy affects real- and relative-wage elasticities of demand differently, inducing changes in wage/price settlements that depend on the encompassingness of bargaining, and/or (c) because 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 settlement. Disagreements regard the nature of this shifting and reshaping 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 these change with the institutional-structure of wage/price bargaining.

As just noted above, the empirical conclusions 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 intermediate than at low BC, though some disagreement surrounds the effect at high BC and the sign of CC's non-neutrality at various levels of BC more generally.

Notwithstanding the diversity in sources of non-neutralities, and the disagreements in empirical and theoretical conclusions, the implications of this emerging literature for our understanding of the *Bundesbank* experience and its implications for the likely impact of the move to a common European monetary policy led by a credibly conservative ECB are surprisingly uniform. With the examples of Germany, Switzerland, and Austria, and with the support of previous theory and evidence, the ECB's framers clearly intended to endow it with considerable conservatism and autonomy. These theories suggest, however, that Germany's apparent success in combining low inflation and low unemployment derived not only from the credible conservatism of the *Bundesbank*, but from its interaction with moderately-to-highly coordinated bargaining with dominant traded- and dominated public-sectors. What does this reveal about the likely costs of unifying European monetary policy under an autonomous and conservative ECB?

European wage/price bargaining, relative to European aggregates, would be characterized by relatively small, numerous, and uncoordinated bargaining units, though certainly still not approaching perfect competition in most industries. Germany's wage bargaining, relative to German aggregates, is characterized by large union-employer-confederation dyads further coordinated by a system of annual lead-bargains (usually led by the traded sector). Surprisingly, despite all the controversies, the work reviewed here broadly agrees that moves from moderately high coordination to moderately low coordination increase the real costs of credible conservatism. Thus, the ECB's high autonomy and conservatism will be more costly (less beneficial) than the *Bundesbank's* has been in Germany.⁴¹

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 a Europe-wide economy

would have BC of perhaps .25 on his scale (0-1, with, e.g., Germany at .75). 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 of CC represented by the ECB relative to its current bank (CC on a 0-1 scale with, e.g. the Bundesbank at about .93 and the Fed about .73).⁴² The trade-off would generally involve less unemployment pain for less inflation gain for countries with lower G/T and higher BC and *vice versa*. Whether these trade-offs are acceptable depends, of course, on the relative value given inflation and unemployment, but trade-offs do exist and their parameters depend on the institutional and sectoral structure countries would be exchanging for Europe's institutional and sectoral structure. Also, of course, 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 ECB than, e.g., the institutional and sectoral structure of Germany has with the *Bundesbank* in the past.

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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.

⁴ Classical, game-theoretic approaches build from Kydland and Prescott (1977); Bade and Parkin (1982); Barro and Gordon (1983ab); Rogoff (1985); Grilli *et al.* (1991); Cukierman (1992); Lohmann (1992); Alesina and Summers (1993); Eijffinger and De Haan (1996).

⁵ 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.

⁶ Indeed, incipient inflationary pressures do not exist in standard models since inflation is money-supply growth which banks completely control. Furthermore, financial-stability motives for counter-cyclical policy (see Cukierman 1992:ch.7) cannot explain the justification the Fed offers for its behavior even if they might explain the actual counter-cyclicity.

⁷ 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.

⁸ Development follows Olson (1965); Headey (1970); Berger (1981); Lehmbruch and Schmitter (1982); Cameron (1984); Lange (1984); Lange and Garrett (1985); Bruno and Sachs (1987); Calmfors and Driffill (1988); Soskice (1990). Carlin and Soskice (1990) and Layard *et al.* (1991) are textbook treatments; Calmfors (1993) provides an excellent review.

⁹ The multiple bargains are often modeled as prisoners' dilemma with *i's* most-preferred outcome all $\sim i$ exercise restraint, then all, then none, then only *i*. The ordering implicitly assumes considerable market power since only *i* raising wages is most preferred only if employment is very wage inelastic. See below; Calmfors and Driffill (1988); Calmfors (1993).

¹⁰ The UK and Italy, e.g., scrambled briefly, mostly unsuccessfully, to institute CWB in their economies (Regini 1984).

¹¹ See Swenson (1989), Soskice (1990), and Layard *et al.* (1991) on the former and Calmfors and Driffill (1988), Layard *et al.* (1991), and Calmfors (1993) on the latter.

¹² E.g., Soskice (1990) and Calmfors and Driffill (1988) dispute Japan and Switzerland.

¹³ Cf. Hall (1994), Garrett and Way (1995ab), Iversen (1998ab), Hall and Franzese (1998), and Franzese (1999a).

¹⁴ Zero and full BC may be excluded though. Bargaining implies some market power, implying non-zero BC. Conversely, any international mobility in goods or labor excludes full coordination among all bargainers since some are foreign.

¹⁵ Data on union-membership structure will not suffice. See, e.g., Golden (1993), Thelen (1994), and Golden and Wallerstein (1995) for further considerations.

¹⁶ Curvature of relations between effective, economy-wide 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.

¹⁷ Scharpf's (1984,1987,1991) work is exceptional (both senses) and somewhat foreshadowed the syntheses reviewed here.

¹⁸ (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) 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.

¹⁹ Scale CBA to 0=full dependence, 1=full autonomy. Lohmann (1992), e.g., implies that, for similarly scaled costs of replacing bankers, r , equilibrium policy is $r \cdot C + (1-r) \cdot G$, where C is banks' and G governments' desired policy, but she does not emphasize this result. Jonsson (1995) and Bleaney (1996) posit (**I**)'s first line but also ignore its general implications.

²⁰ 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.

²¹ See De Haan (1999) and Berger et al. (1999) for reviews of these political-economic general-equilibrium approaches.

²² The text follows the simpler (1998); (1999) derives similar results in a Blanchard-Fisher (1989:433) model: "Equilibrium output is neutral with respect to...nominal scale [but with strategic private-sectors]...non-neutral with respect to degrees of accommodation in the monetary rule" (Soskice and Iversen 1999).

²³ Conversely, of course, n has real effects that depend on β .

²⁴ Similar concerns may apply to the exogeneity of α .

²⁵ Constant returns to scale also differentiate the approach from some others. Another problematic, technical issue is that at union weight on real wages, $\alpha = \beta / (N-1)$, employment is undefined, and wages are 0. As α approaches $\beta / (N-1)$ from below, e^* goes to ∞ ; as it approaches from above e^* goes to $-\infty$ (from 0 at $\alpha = \infty$).

²⁶ A thorough review would include Yashiv (1989); Cubitt (1992,1995); Agell and Ysander (1993); Gylfason and Lindbeck (1994); Grüner and Hefeker (1997); Jensen (1997); Skott (1997); Zervoyianni (1997).

²⁷ If not, the inflation is irrelevant. *Benevolent planners* also combine private-sector utilities, usually with equal weights.

²⁸ Rama (1994), Grüner and Hefeker (1997), Zervoyianni (1997), and Franzese (1999a) emphasize this justification.

²⁹ Gylfason and Lindbeck note that the standard CBI model is simpler still than this since output is at least endogenous here.

³⁰ (IO) $W = w_2 + w_1 M$ where $w_2 \equiv \frac{2\omega_u^T - 2uY_u^T + 2qP_u^T}{1+u+q}$ and $w_1 \equiv \frac{1+u-q}{1+u+q}$, and

(II) $M = m_2 + m_1 W$ where $m_2 \equiv \frac{2Y_g^T + 2vP_g^T}{1+v}$ and $m_1 \equiv \frac{1-v}{1+v}$,

v is government weight on prices relative to output, and u and q are union weight on output and prices relative to real wages.

³¹ Cubitt (1992) considers games in which union, government, both, or neither can pre-commit to M or W strategies, yielding: Stackelberg/Government-Leads, Stackelberg/Union-Leads, and Nash with and without a pre-commitment stage. Results differ depending on who can lead; interestingly, government may prefer to follow. Cubitt (1997) explores three aspects of *corporatism* other than bargaining centralization (monopoly-union models assume full centralization): greater union-weight on inflation, higher union aggregate-output target, greater alignment of union and government output-targets, and cooperative play by union and government. The results can be derived from the above discussion.

³² Soskice and Iversen (1998), Hall and Franzese (1998), and Franzese (1999a) concur.

³³ However, the direction of the *CISNN* depends heavily on elasticity assumptions, especially regarding α and γ , and their relation to n . Cukierman-Lippi and Soskice-Iversen both assume it is exogenous and independent of n .

³⁴ 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.

³⁵ A similar mechanism operates in Soskice and Iversen (1998, 1999) and Franzese (1999a).

³⁶ Plus, the model laid some of the groundwork for Soskice and Iversen (1998, 1999).

³⁷ Henceforth *decade* refers to Cukierman's LVAU's (1992) periodization—the most frequently measured index available: 1950-9, 1960-72, 1973-9, 1980-9.

³⁸ 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.

³⁹ Iversen 1998ab uses *actual* exchange-rate movements in addition to an average of standard CBI indices.

⁴⁰ Franzese (1999a) argues that the adverse sign of $d^2R/dCCdBC$ that Iversen (1998ab) predicts at high BC depends on a particular sectoral composition of the workforce occurring at high BC. He also suggests why that composition may, in fact, be likely to evolve at high BC.

⁴¹ Hall (1994) and Hall and Franzese (1998) elaborate a similar argument.

⁴² These crude guesstimates isolate effects associated with the institutions and structure of wage/price bargaining interacting with an autonomous and conservative ECB; obviously there are other considerations.