

Chapter X

STRATEGIC INTERACTIONS OF THE *ECB*, WAGE BARGAINERS, AND GOVERNMENTS

A Review of Theory, Evidence, and Recent Experience

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Abstract: Recent studies of macroeconomic management under varying organization of wage/price bargaining and varying degrees of credible monetary conservatism synthesize and extend theory and empirics on central bank independence (*CBI*) and coordinated wage/price bargaining (*CWB*). These studies find that the degrees of *CBI* and *CWB* interact with each other and with the broader political-economic context (international exposure, sectoral composition, etc.) to structure monetary-policymaker and wage/price-bargainer incentives. The theoretically surprising but empirically supported core implication was that even perfectly credible monetary conservatism has *long-run, equilibrium, on-average* real effects, even with fully rational expectations, effects that vary depending on the organizational structure of wage/price bargaining. Bargaining structure, conversely, has real effects that vary with the degree of credible conservatism reflected in monetary-policy rules, and, less surprisingly, *CBI* and *CWB* also have interactive nominal effects. Some disagreement remained over the precise nature of these interactive effects, but all theory and evidence agree that a single, credibly conservative European monetary policy would have nominal and real effects that depend upon the Europe-wide institutional-structural organization of wage/price bargaining relative to the prior domestic *CBI-CWB* combination. Indeed, the one specific point of theoretical and empirical agreement suggests that, for many *Euro*-member countries, monetary delegation to the single, credibly conservative, European Central Bank would generally worsen these bargainer-policymaker interactions. This review closes with a preliminary assessment of those predicted macroeconomic consequences one year after *Euro* notes and coins replaced twelve national currencies.¹

Key words: monetary policy, wage bargaining, central bank independence, *Euro*, European central bank, *ECB*

1. INTRODUCTION

Until recently, political economists considering the implications of the *Euro* countries' monetary-policy delegation to one, credibly conservative, European central bank confronted two disparate literatures on the institutional-structural determinants of inflation and employment. One, deriving from modern game-theoretic approaches to macroeconomic policy, stressed monetary authorities' anti-inflationary rigor and autonomy from governments, arguing that credibly independent and conservative central banks (*CBI*) offered nominal benefits at no equilibrium, long-run, real costs on average.² The other, arising from studies of democratic interest intermediation, stressed institutional organization in labor and, recently, goods markets, arguing that coordinated wage/price-bargaining (*CWB*) internalizes certain externalities inherent in wage/price settlements, thus facilitating restraint and thereby providing real and perhaps nominal benefits.³

From *CBI* arguments and evidence, academics and policymakers concluded that the *credible conservatism* (*CC*) embodied in the European Central Bank (*ECB*) would ensure low inflation of the common *Euro* currency at little or no real cost. Insights from *CWB* theory seemed only tangentially relevant. Degrees of *bargaining coordination* (*BC*) in the *Euro* 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 remain independent. This exclusive focus on the degrees of *BC* or of *CC*⁴ institutionalized in the political economy aided theoretical development of both literatures, each of which became in its time among the most practically and academically influential in political economy. However, wage/price bargaining and monetary policymaking being such intimately related exercises, these two sets of policymakers and bargainers would surely interact strategically if their institutional structures provide them the organizational capacity to do so.

This chapter reviews recent work addressing such strategic interactions of wage/price bargainers and monetary policymakers under varying degrees of *BC* and of *CC*. Building from early *CBI* and *CWB* theories and empirics, the newer models stress that degrees of *CC* and *BC* interact, with each other and the wider political-economic context (sectoral composition, international exposure, *etc.*), to structure the incentives facing political-economic actors. These interactions imply that even fully credible monetary conservatism has *equilibrium, long-run, on-average* real effects that depend on bargaining organization, rational expectations notwithstanding. Conversely, *BC*'s real effects depend on degrees of *CC*. Less surprisingly, nominal effects are also interactive. Intuitively: the efficacy of monetary-policy signals depends on characteristics of the sender, *e.g.*, monetary-authority credibility and conservatism previously emphasized, but also on those of the audience that must receive and react to those signals, *e.g.*, wage/price-bargaining structure. For example, pre-*Euro* monetary efficacy

in Germany hinged on interactions of *German* bargaining organizations with *Bundesbank* monetary policy. Monetary efficacy in a single-currency Europe now depends, analogously, on interactions of *ECB* monetary policymaking with *European* wage/price-bargaining organization. Thus, even if *ECB* conservatism and autonomy from European governments equaled what the *Bundesbank* had had, the *ECB*'s monetary-policy stance will affect the European economy differently than similar *Bundesbank* stances had affected the German economy because their wage/price-bargaining and governmental audiences differ.

This chapter develops these points thus. Section 2 briefly reviews arguments and findings from classic, game-theoretic models of monetary policy and *CWB*, highlighting the lingering issues. Sections 3 and 4 survey recent syntheses and extensions more fully and summarize the empirical support. Section 5 concludes, stressing implications for the functioning of *ECB*-led monetary policy in one-currency Europe and evaluating early experiences in this regard.

2. THE CLASSICAL ARGUMENTS

2.1 Central Bank Independence (*CBI*)

2.1.1 *CBI*: Theory

In the 1980s and 1990s, political economists developed strong arguments that *CBI* reduces inflation⁵ and, due to credibility advantages that autonomous central banks enjoy over political authorities, that this nominal benefit had no real costs on average (cf. note 2). In brief: given nominal and real rigidities,⁶ monetary authorities have incentives to create *surprise* inflation to reduce real wages (or prices) and push employment (or output⁷) above *assumed-exogenous* natural rates. However, private actors realize this incentive and incorporate its inflationary consequences in their price expectations. In rational-expectations equilibrium, monetary authorities cannot surprise private actors systematically, so real wages are unaffected on average, employment remains at exogenously given levels, and inflation is high. If monetary authorities could instead credibly forswear inflation surprises, bargainers would accept lower wages, leaving real wages and (exogenous) employment again unaltered, but with inflation lower than possible without such credible commitment. If, finally, institutionalizing a *conservative* central bank with some autonomy from current political authority provides credible commitment, then *CBI* reduces inflation with no on-average real effects. Notice, though, that the model of the economy in this argument, a simple expectations-augmented Phillips Curve, effectively assumes zero on-average real effects *ab initio*, given unbiased expectations and *exogenous monetary efficacy and natural rates*. Yet, Phillips-curve slopes and natural rates

are not exogenous; they logically must depend on wage/price-bargaining structure and how it conditions bargainers' reactions to monetary policy. With strategic private-actor reactions to monetary policy altering these rates and slopes, even credible monetary conservatism will have equilibrium real-effects.

2.1.2 *CBI*: Empirics

Nonetheless, many empirical studies seemed to show *CBI* lowering inflation at little or no real cost on average. Typical *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, finding significantly negative correlations with nominal variables and insignificant ones with real variables. However, these studies had few observations and so large standard errors, rarely included appropriate (or often any) controls, and ignored any possibility of interactions.⁸ Such analyses would have easily missed any relations of *CBI* to real variables that varied with levels of other variables, like *CWB*. Prominent empirical anecdotes also seemed to bolster the case. Germany, the US, and Switzerland had highly independent central banks and low inflation but widely differing unemployment (which their varying wage/price-bargaining structures might have explained). Still, the logical argumentation, simple but striking evidence, and prominent anecdotes clearly convinced wide academic and policymaking audiences as enhancing *CBI* rose to lead economic-reform agendas worldwide. European leaders, e.g., clearly wrote *EMU* requirements and designed the *ECB* with these arguments and evidence in mind, and with the *Bundesbank* as template. With all theory, evidence, and anecdote 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.

2.1.3 *CBI*: Lingering Anomalies and Inadequacies

Details of central bank behavior and pronouncements, however, remained inconsistent with these models. The US Federal Reserve, e.g., often announces (and enacts) monetary contraction to defuse *incipient inflationary pressure* in strong economies. Yet, in these models, such inflation temptations rise with (a) monetary authorities' weight on real outcomes relative to nominal, (b) Phillips-Curve slopes, and (c) gaps from natural-rate to targeted output, which all vary *counter-cyclically* if at all. When economies push capacity, likely (a) political authorities fret inflation more than output; (b) monetary-policy real-efficacy falls (diminishing returns); and (c) target-to-natural-rate gaps narrow (although the models assume both fixed). Thus, strong economies yield *less incipient inflationary pressure* on central banks in these models.⁹ The *Bundesbank* acts similarly anomalously. Moreover, it also often addresses its statements more

directly to wage/price bargainers and governments, fairly overtly threatening to respond with monetary contraction to pending settlements or budgets it sees as inflationary.¹⁰ Standard theory cannot explain this either. First, no links from budgets to inflation exist, so banks have no reason to address governments except as public-sector employers, price-setters, and competitors for monetary-policy control. Second, bargainers simply add expected money growth, which banks fully control, to desired real-wage growth, which they fully control, so banks need not threaten *responses*. They need only to announce *fixed* intended money-growth. Third, most intriguingly, the standard view offers no reason that the Fed and *Bundesbank* should speak differently and to different agents.

2.2 Coordinated Wage/Price-Bargaining (CWB)

2.2.1 CWB: Theory

CWB theory held concurrently but independently that wage/price bargaining coordination (*BC*) fosters beneficial real and nominal wage/price restraint.¹¹ In brief: fragmented bargaining units ignore any externalities to their individual settlements, yielding sub-optimal high wage/price hikes that include increments to offset expected hikes elsewhere. Encompassing or coordinated bargaining, contrarily, internalizes such externalities, thereby restraining settlements and so lowering inflation and unemployment.¹² Suppose, *e.g.*, unions *j* set nominal wages and derive utility from their 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* mark-ups) in proportion to the share in consumption of outputs using *j*'s labor. Thus, *j* perceives higher marginal utility *per* nominal-wage increment the less *j* expects its settlement to affect *aggregate* consumption-prices. If *j*'s bargain is encompassing or highly coordinated with others, it views aggregate prices as responding sizably to its settlement and so sees little real gain from nominal hikes. If, instead, *j*'s bargain is small relative to the economy, it views aggregate prices as independent of its settlement and so sees large real gains. Thus, unions perceive nominal wage-gains to produce real ones in inverse proportion to their bargain's share of the economy. Against this consumption-wage benefit, which declines in *BC*, *j* weighs the adverse employment effects of its wage gains, which increase with *BC*. Demand for *j*'s goods, and so its employment prospects, improve with aggregate demand and decline in *j*'s price relative to its competitors. The responses of (a) competing goods and labor prices and (b) aggregate demand to *j*'s settlements and of (c) *j*'s employment prospects to total demand all increase with *j*'s bargain's share of the economy. If adverse effects (b) and (c) dominate beneficial (a), as classic *CWB* theory implicitly assumed, then *BC* increases unions' propensity to deliver restraint on both employment-prospect-cost and real-wage-gain sides.

2.2.2 *CWB*: Evidence

Here too: Evidence amassed supporting *CWB* theory (e.g., Cameron 1984, Bruno and Sachs 1987); regressions of nominal and, especially, real outcomes on various indices of *BC* found strong benevolent correlations. Key cases added convincingly, Austro-Scandinavia exhibiting strong *BC*, low unemployment, and moderate inflation. Intuitive argument, striking evidence, and real-world examples again put raising *BC* on many economic-policy agendas for a time.¹³

2.2.3 *CWB*: Lingering Anomalies and Inadequacies

Recent theoretical advances clarify the virtually ignored employer role in bargaining and the market-power assumptions implicit in preference orderings assumed earlier.¹⁴ First, unions do not unilaterally set wages; rather, wage/price settlements emerge from union-firm *bargains*. Thus, the theory must consider unions' marginal gains from wage increases, firms' marginal costs from ceding them, and their respective bargaining strengths; *i.e.*, labor- and goods-market institutional structures jointly affect wage/price regulation. This also clarifies that monetary policy can discourage inflationary settlements *only* by shifting union-firm bargaining power (e.g., by raising unemployment) or by changing marginal utilities from gaining or ceding nominal increases (*i.e.*, altering real-demand conditions). Second, classic *CWB* theory ignored group *j*'s competitive situation on its restraint propensity. Specifically, the less other wage settlements match *j*'s, the more labor-market competition fosters union restraint. Likewise, the less price hikes of competitors for *j*'s goods track *j*'s wage-gains, the more product-market competition bolsters firms' resolve. By linking wage and price increases across competitors, *BC* dampens such incentives. Thus, *BC* has both *internalization-increasing effects* that spur restraint and *competition-decreasing effects* that hinder restraint. The combination suggests that highly competitive and coordinated bargaining may both induce wage/price restraint. In perfectly competitive labor and goods markets, unions (firms) whose wage (price) hikes exceed productivity (cost) growth—*i.e.*, fully atomized bargainers who exercise insufficient restraint—simply lose their job or market. *Perfect* competition swamps the externalities stressed in early *CWB* work. Conversely, with *full* coordination, most relative-price considerations vanish as all domestic wages and prices move in parallel. Restraint incentives stem only from international-competitiveness concerns, as the earliest *CWB* literature stressed. Calmfors and Driffill (1988) argued that industry-level bargaining, which lies between these never-realized extremes, dampens competitive-pricing concerns because most competitors are within industry while leaving national-level concerns as small as the industry's share of the economy. Thus, both zero and full *BC* dominated intermediate, yielding the familiar Calmfors-Driffill hump. However, as others

(e.g., Calmfors 1993; Rama 1994; Cukierman and Lippi 1999; Velasco and Guzzo 1999) noted since, the precise curvature of the *BC*-restraint relationship depends critically on relative-wage and -price elasticities and how *BC* alters them. The syntheses reviewed below unfortunately inherit this indeterminacy.

Empirical controversies also stunted theoretical and empirical progress: (a) the actual degree of *BC* characterizing certain country-times,¹⁵ (b) how well union membership-structure might proxy for effective *BC*,¹⁶ and (c) the shape of the Calmfors-Driffill hump. Even assuming a *BC*-restraint hump with most restraint at zero and full *BC*, whether restraint falls quickly and rises gradually in *BC*, *vice versa*, or otherwise, remains theoretically ambiguous, and issues (a) and (b) hampered empirical adjudication. Worse, even with these three issues resolved, the empirical range of *BC* relative to *theoretical* zero and full *BC*, and so the section of the hump empirically revealed, would remain indeterminate.¹⁷ If restraint falls quickly and rises gradually in *BC*, e.g., the sample could easily lie entirely right of nadir, so estimates would show restraint rises monotonically in *BC*. Thus, theory could only recommend that empirical measures consider economy-wide *BC* across unions and firms¹⁸ and that models for estimating *BC*-restraint relationships allow both *competition-reducing* and *internalization-increasing* effects.¹⁹ Finally, whereas *CBI* theory ignored bargainer/monetary-policy maker interactions by assuming Philips-Curve slopes and natural rates exogenous even though they logically intertwine, *CWB* theory evaded them by implicitly assuming accommodating or passive policy even though autonomous and conservative central banks would certainly react to inflationary settlements. Moreover, *CWB* theory often assumed homogenous unions and firms, although bargainers' interests surely differ, in general and *vis-à-vis* monetary policy.

3. THEORETICAL SYNTHESSES AND EXTENSIONS

In sum, *CBI* theory predicts centrally that *CC* yields low inflation at zero average real cost, and empirics seem supportive. The theory, however, predicts more than has been explored theoretically or empirically; monetary authorities' actions and announcements contradict some model specifics; and private actors remain under-specified and, particularly, non-strategic. *CWB* theory predicts, conversely, that *BC* fosters nominal and real wage/price restraint, perhaps nonlinearly, and empirics seem supportive. Recent advances clarify some issues but also raise empirical and theoretical controversies and still ignore monetary-policy reactions to wage/price settlements²⁰ and possible differential interests among bargainers. Both theories offer valuable insights, but their juxtaposition reveals incompatibilities and inadequacies. *CBI* theory assumes direct monetary control of inflation and exogenous natural rates and monetary efficacy, yet bargaining implies market power, suggesting that bargainers may interact with

monetary authorities strategically, which could invalidate all three assumptions. Conversely, *CWB* theory assumes monetary policy accommodates or ignores wage/price bargains, yet whoever controls monetary policy must respond to settlements, again suggesting strategic interaction. Recent synthetic extensions start to address these issues, finding that the institutional-structural organization of the bargainers with which monetary authorities interact is key to their *joint* efficacy in regulating both nominal and real outcomes, so, *e.g.*, the *ECB*'s nominal and real effects hinge critically upon *European* bargaining structure.

The emerging syntheses and extensions offer several approaches to redress these inadequacies. One retains classical real-nominal divides by assumption yet shows the nominal and *short-term* real effects of *CC* and *BC* to depend on each other (and on many other political-economic conditions). 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 ones. A third shows that strategic, monopolistic bargainers suffice to produce non-neutrality of non-strategic monetary rules. In a fourth, interactions between strategic monetary authorities and strategic, monopolistic, *inflation-averse* bargainers imply interactive real and nominal effects for *CC*. A fifth stresses differences among as well as coordination across strategic bargainers; there, *CC*'s real effects depend on *BC* and the heterogeneity of bargaining units.

To presage, all these approaches, classic *CBI* theory included, imply that the *nominal* effects of *CC* depend on the institutions and structure of labor/goods markets. That specifics of monetary and other political-economic institutions condition the *short-term* real effects of *CC* likewise represents no departure from classical real-nominal divides. The second approach also requires no such departure, showing that the anti-inflation effects of *CC* alone suffice to imply interactive, *equilibrium* real effects because government incentives to undertake real reforms depend partly on their potential to lower inflation. Thus, *e.g.*, *EMU* alters member nations' incentives to undertake politically costly real reform intended to reduce inflation biases. Other approaches go further, concluding: *if private actors possess 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 more-radical departures agree that *CC* has real effects because it alters relationships of bargaining organization to wage/price restraint, but sharp disagreement remains, largely inherited from indeterminacy in *CWB* theory, on the signs and shapes of these relationships and on how the degree of *CC* alters them. These disagreements unfortunately debarred shared predictions much more specific than that the *ECB*'s real effects would depend on the degree of *BC* exhibited *at the European level*. Still, one specific shared conclusion suggested that monetary delegation to a credibly conservative *ECB*

would worsen monetary policy and wage/price bargaining interactions for many Euro members, a prediction preliminary explored in the conclusion below.

3.1 Retaining the Classical Nominal-Real Divide

3.1.1 Non-Strategic Interactions in Nominal Outcomes

The first approach retains classical nominal-real divides and distinguishes a central bank's conservatism, c , from its autonomy, a , from political authority. Franzese (1999) elaborates the general case, which shows the nominal effects of autonomy to depend on the institutions and structure of bargaining (and many other political-economic factors), and shows the evidence strongly supportive.²¹ In simple logic: virtually by definition, central banks control monetary policy to a degree given by a , and governments control it to remaining degrees, giving:²²

$$m^* = a \cdot m_b^* + (1 - a) \cdot m_g^* \quad (1)$$

$$m_b^* = \pi_b^T + \frac{\alpha}{c_b} (y_b^T - y_n) \quad (2)$$

$$m_g^* = \pi_g^T + \frac{\alpha}{c_g} (y_g^T - y_n) \quad (3)$$

with money growth m , inflation \mathbf{p} , a real variable y , Philips-Curve slope \mathbf{a} , monetary-authority conservatism c , and $_b$ referring to banks, $_g$ governments, $_n$ natural rates, $*$ equilibria, and T targets. (2) and (3) are just equilibrium money-growth from the classic *CBI* model. (1) shows that, even excluding any strategic interactions between monetary authorities and other actors and retaining direct policymaker control of inflation (*i.e.*, assuming $m \equiv \mathbf{p}$), the nominal effect of *CBI* depends on *everything* that affects banks' and governments' desired policies differently and, *vice versa*, any such factors' nominal effects depend on *CBI*:

$$\frac{d\pi}{da} = -(m_g^* - m_b^*) = -\left[(\pi_g^T - \pi_b^T) + \alpha \left\{ (y_g^T - y_n)/c_g - (y_b^T - y_n)/c_b \right\} \right] \quad (4)$$

Thus, since *BC* affects y_n and \mathbf{a} , the nominal effects of *CC* and *BC* depend on each other (and on anything else that affects \mathbf{p}_g^T , \mathbf{p}_b^T , c_g , c_b , y_g^T , y_b^T , \mathbf{a} , or y_n). Note that inflationary biases in the classic model only exist insofar as targets exceed natural rates: $y^T > y_n$. Thus, since y_n decreases in real-wage excessiveness, which rises in labor/goods institutional structures that lessen competition (*e.g.*, monopoly power) but declines in those that enhance internalization (*e.g.*, coordination), adding *CWB* logic directly to a classical *CBI* theory yields:

- a) *BC* improves (and monopoly power worsens) natural rates;
- b) *CC* reduces inflation, less (more) so the higher is *BC* (monopoly power);
- c) *BC* (monopoly power) lowers (raises) inflation, less so the higher *CC*;
- d) *CC* does not affect natural rates on average (by assumption).

Note that *CC* has two parts: central bank autonomy, *a*, and conservatism relative to government, $c_b^{-1}-c_g^{-1}$; the beneficial nominal effects of each increase (decrease) in bargainers' monopoly power (coordination). Moreover, the effects of bargaining institutions on the natural rate, y_n , and monetary efficacy, *a*, may also depend on monetary credibility and conservatism via *strategic* interaction effects (see below).²³ Even without such strategic interactions, though, a simple additive combination of *CBI* and *CWB* logic implies that, *e.g.*, the nominal effects of *ECB CC* will depend on all factors, such as *European* bargaining organization, that would affect the desired policies of the *ECB* and of *European* political authorities (howsoever the *EU* aggregates that authority) differently. The anti-inflation benefit of a *Euro* member's monetary delegation to the *ECB*, therefore, is the difference from (*a*) the inflation rate that would have obtained with the *domestic* autonomy-weighted combination of government and bank in monetary control and facing their *domestic* political-economic institutional-structural context to (*b*) the rate that obtains with the autonomy-weighted *ECB* and *European* governments combination in monetary control and facing their *European* political-economic context (see Franzese 2001b).

3.1.2 Political-Economic General-Equilibrium (*PE-GE*) Real Effects

Such nominal effects can induce governments that care about them to alter other policies that have *long-run, on-average* real effects. For example, because autonomous, conservative central banks reduce the inflation costs of inferior labor/goods-market organization, delegation to the *ECB* reduced *Euro*-member government incentives to enact economically beneficial but politically costly reforms (Ozkan *et al.* 1998), *i.e.*, insofar as their domestic political-economic context was more inflationary than the European context in the comparison just described. Similarly, because all *Euro* members receive the nominal benefits of any one's real reforms, mutual delegation to the *ECB* creates classic externalities with under-investment in reform (Calmfors 1998). On such accounts, the *ECB* has real costs in proportion to its nominal benefits (and to the number of *Euro*-members, reflecting the collective-action problem). Contrarily, if exchange-rate policy substituted for nominal flexibility in labor/goods markets, the single-*Euro* commitment increased the value of pro-flexibility reforms (Sibert and Sutherland 1998). Similarly, if *EMU* members whose inferior labor/goods-market institutions raised inflation temptations had received side-payments to ignore them, they had incentives to under-invest in reform that would disappear with the side-payments when *Euro* members

delegated monetary control to the *ECB* (Sibert 1999).²⁴ On these considerations, the *ECB* has real benefits proportional to its nominal benefits.

Thus, in *PE-GE* models where credibly conservative central banks interact with strategic governments that care about nominal outcomes and control some policies that can affect real ones, *CC* has *equilibrium* real effects that correlate, positively or negatively, with its nominal effects, which, in turn, depend on *BC* (see Table A1). For example, among several other short- and long-term real and nominal effects derived from the strategic interactions of partisan governments, credibly conservative central banks, and organized wage bargainers, Adolph (2001) shows that governments that control policies that, as side-payments, may dissuade wage/price bargainers from inflationary settlements will use them to a degree dampened by the *CC* of the central bank.

3.1.3 Transparency, Coordination, and Short-Term Real Effects

Another approach that retains classical nominal-real divides in long-run-equilibrium real *levels* emphasizes instead the dependence of the terms of short-run nominal-real tradeoffs—*i.e.*, Phillips Curve slopes, *a*, and sacrifice ratios—upon characteristics of monetary-signal senders (policymakers) and receivers (bargainers). Classic *CBI* arguments, *e.g.*, suggest that *CC* renders contraction less costly and expansion more effective, leading private actors to trust counter-inflationary commitments better and sooner and expect and credit expansionary moves less. Many interpret *CWB* theories similarly: *BC* enhances efficacy in both expansionary and contractionary macroeconomic management. Few have explored these asymmetrical hypotheses thoroughly.²⁵ However, Stasavage et al. (2002ab) and Stasavage (2003ab), *e.g.*, show that central bank transparency and wage/price-bargainer coordination each enhances the speed, accuracy, and certainty with which individual private actors learn and respond to monetary developments, and with which those individual degrees of knowledge and response become common knowledge. This suggests sacrifice ratios (*i.e.*, the contractionary part of Phillips Curve slopes, *a*), at any given degree of *CC*, should decrease with central-bank transparency and wage/price-bargainer coordination, which, indeed, their data support (see Stasavage 2003b).

3.2 Strategic Wage/Price Bargainers

All of the above approaches continue to debar strategic interactions between wage/price bargainers and monetary authorities. Such interactions, however, alter natural rates, y_n , rendering strict real-nominal divides unrealistic.

3.2.1 Monopolistic Strategic Bargainers

Soskice and Iversen (1998, 2000) show that strategic bargainers possessing monopolistic power induce *equilibrium, long-run, on-average* real effects for *CC*.²⁶ The non-neutrality stems from bargainers' collective-action problems, not from any credibility lack, so they model money supply as fully known to follow $M = P^{1-\beta}$ with aggregate price $P \equiv \prod_{i=1}^n (P_i^{n-1})$. $\beta \in [0..1]$ indexes monetary conservatism: $\mathbf{b}=0$ ($\mathbf{b}=1$) \Leftrightarrow full (non)accommodation. n equal-sized unions with perfect sectoral monopolies Bertrand compete under constant scale-returns and fixed labor productivity of one, giving good i 's price as equal to sector i 's wage: $P_i = W_i$. Lastly, they let real demand for i equal its employment, $q_i = e_i$, given by:

$$q_i = e_i = \frac{m}{n} - \mathbf{h}p_i = \frac{m}{n} - \mathbf{h}w_i \quad (5)$$

with real money-supply m , relative price $p_i = P_i/P$, and relative-price demand-elasticity \mathbf{h} . Sectoral-monopoly unions set W_i to maximize weighted products of their real consumption-wages, w_i , and their sector's employment, e_i , with weight \mathbf{a} on w_i . The symmetric equilibrium employment is:

$$e^* = \frac{\mathbf{h}(1 + \frac{\mathbf{b}}{n-1})}{\mathbf{a} - \frac{\mathbf{b}}{n-1}} \quad (6)$$

Thus, unless $n = \infty$, *i.e.*, outside perfect competition, monetary conservatism, \mathbf{b} , has real rational-expectations-equilibrium effects that depend on the number of unions, n .²⁷ Specifically, conservatism (higher \mathbf{b}) raises employment and does so increasingly as *BC* rises (n falls) from perfect competition, $n = \infty$, with zero real effects, to $n = 1$, where the equilibrium is undefined (see Table A1). Intuitively, when n is low, each large bargaining unit perceives its nominal gain to produce *aggregate* real-money-supply contraction, and more so the less accommodating the monetary authority (*i.e.*, the higher \mathbf{b}). Encompassing bargaining thus induces more restraint as conservatism, \mathbf{b} , increases. As n becomes large, however, this effect vanishes because real money supply becomes increasingly exogenous to the extremely atomized bargainers.

The Soskice-Iversen models conclude that *CC* has beneficial real effects that increase with *BC*. Classic *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 declines in n for $n < \infty$. By this analysis, highly conservative monetary rules (high \mathbf{b}) interact best with highly coordinated bargaining systems (low n), as in Germany under the *Bundesbank* and *IG Metal-Gesamptmetal*-led bargaining. The *ECB* conducting similarly conservative policy, however, faces a far less coordinated *European* bargaining system (higher n), and so will have had less

beneficial real effect. Soskice and Iversen (1998) emphasized that the European bargaining system to which the *ECB* must respond was undetermined then, and speculated that Europe could have evolved a system wherein lead-bargains in one country set wage-increase precedents that the rest followed, allowing the *ECB* to interact more directly with the pattern setter. Holden (2003), however, found that this was less likely the more non-accommodating the *ECB*, and, indeed, European-level wage setting and coordination remain as yet weak.

Two aspects of the Soskice-Iversen model differentiate it and its conclusions from those below. First, monetary policy here is non-strategic; the exogenous money-supply rules do not derive from optimal policymaker responses to wage-price settlements. Second, relative-wage demand-elasticity, h , is exogenously fixed and, critically, independent of n . Relative-wage elasticity is more likely to diminish with the number of sectors encompassed in each wage/price bargain,²⁸ but no such Calmfors-Driffill competition effect operates here, so the benefits of *CC* increase monotonically and increasingly in *BC*. These differences, plus bargainer inflation-aversion, led others to markedly different conclusions about *CC*'s real effects.²⁹ Nonetheless, their core intuition is widely shared: strategic bargainers facing monetary-policy rules (reaction functions elsewhere) perceive an ability to affect *real* money supply in proportion to their share of the economy and the rule's conservatism. Thus, all agree the real effects of *CC* are generally non-zero and dependent on (and generally improving in) *BC*.

3.2.2 Monopoly, Strategic, Inflation-Averse Bargainers

Several others³⁰ explore interactions of a *strategic* monetary authority with *one* strategic monopoly bargainer. Here, *CC* has equilibrium real effects *if the wage/price bargainer is inflation-averse*. Empirically, private-actor inflation-aversion is large and well-documented (*e.g.*, Hibbs 1987 ch. 4); theoretically, inflation-aversion is justifiable on many grounds. First, monetary-policy models routinely assume inflation-averse policymakers, so symmetry demands private-actor inflation-aversion. Second, any actual government's utility must derive from some combination of private-actor's utilities, albeit with quite unequal weights likely especially in non-democracies; therefore, if policymakers dislike inflation, some private actors must also.³¹ Any reason adduced for policymaker inflation-aversion (*e.g.*, correlation of inflation levels and volatility) thus also justifies private-actor aversion. Third, inflation-aversion is standard, if often under-motivated, in *CWB* theory. Possible motivations include, fourth, private-actor holdings of non-fully indexed nominal assets, especially mandatory ones like some tax systems or pension schemes. Fifth, *domestic* inflation is *relative* price-rise in any open economy unless domestic consumption and production bundles are equal (*i.e.*, given trade).³² Regardless of theoretical motivation, a strategic inflation-averse bargainer will consider monetary-policy reactions to

its behavior, including the inflation-effects of such reactions, in its bargaining.

Gylfason and Lindbeck (1994), *e.g.*, take the quantity theory, $Y+P=M+V$, setting $V=0$, as “the simplest...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...aggregate supply as an increasing function of price for given nominal wage,” and set all elasticities to one for simplicity. Aggregate $AD=AS$ equilibrium then implies: $Y=1/2(M-W)$; $P=1/2(M+W)$. If the government and the monopoly union exogenously dictate money and wages respectively, then the equilibrium has standard Keynesian properties: $\frac{dY}{dM}, \frac{dP}{dM}, \frac{dP}{dW} > 0$; $\frac{dY}{dW} < 0$.³³

Cournot-Nash equilibria are more novel. Subject to $AD=AS$, governments minimize over M losses quadratic in output and inflation deviations from targets (standard); the union minimizes over W losses quadratic in real-wage, output, and inflation deviations from target (standard but adds inflation aversion). This gives reaction functions³⁴ where the union fully accommodates money, so real-nominal divides obtain, only if it disregards inflation, and the government fully accommodates wages, leaving union unable to affect output, only if it ignored inflation. The more each weighs inflation, the less it accommodates. Generally, output and prices depend on preference parameters of both parties; but, if union and government Y^T and DP^T targets 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 spawn *stagflation*: $Y < Y^T$ and $DP > DP^T$. If union targets lie on the curve, government conservatism, $DP_g^T < DP_u^T$, suffices to imply stagflation. Only with equal government and union targets and with the union’s targeted real-wage/employment combination *below* the labor-demand curve does CC have no real effect, but then it is neutral nominally also! If either condition fails, *i.e.*, generally, CC has both equilibrium real and nominal effects that each depend critically on both actors preferences.³⁵

One common, surprising result in such models is that *ultra-liberal* monetary authorities, those indifferent to inflation, may achieve optimal (zero inflation and unemployment) outcomes. Skott (1997) nicely summarizes the intuition:

...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 output and inflation]) 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^* . Between those extremes are outcomes with $p > 0$ and $y^{**} > y > y^*$ (p. 613).

Grüner and Hefeker (1997) and Zervoyianni (1997) analyze exchange-rate commitments and international exposure, respectively, assuming an inflation-averse monopoly union in each of two countries and monetary policy set by various combinations of the governments. They conclude, *inter alia*, that domestic monetary-policy credible-conservatism is *not* functionally equivalent to exchange-rate schemes because the set of wage/price-bargainers with which the relevant monetary policymakers interact differs.³⁶ Similar insights drive this review's application of these recent synthetic extensions to ECB-led European monetary policy. Single-bargainer models, however, are ill-suited to such analysis because bargaining structure cannot be varied and member-country delegations to the ECB neither start from nor end in monopoly-union settings.

3.2.3 Monopolistic, Strategic, Inflation-Averse Bargainers

Cukierman and Lippi (1999) and Velasco and Guzzo (1999) allow union concentration to vary, considering n unions and a monetary policymaker with utilities similar to section 3.2.2. The Cukierman-Lippi model assumes all labor unionizes by *craft*, making labor perfectly substitutable across industries but imperfectly so across unions. They allow higher centralization (lower n) to increase labor-demand elasticity to reflect Calmfors-Driffill's competition effect, but fix substitutability across crafts at g . 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 so inflation. Reflecting the unions' fully rational expectations, equilibrium is:

$$\pi = \frac{\alpha^2}{c} \varphi \quad ; \quad \varphi \equiv \bar{\omega} - \omega^c \quad (7)$$

$$u = \alpha \varphi \quad ; \quad \varphi \equiv \bar{\omega} - \omega^c \quad (8)$$

The bank weighs nominal relative to real targets by c ($=CC$); a serves similarly to a Phillips Curve slope. p ≡inflation; u ≡unemployment; w^c ≡market-clearing real-wage; $\bar{\omega}$ ≡ average real-wage. The key term, j , is the average *real-wage premium*. This would be exactly the classic CBI result, except j depends on c .

This strategic non-neutrality arises for two reasons. First, because unions dislike inflation, which the bank will spur in response to higher unemployment, unions may moderate their wage demands to lessen that temptation. The larger its share of the economy, the more union j perceives bank responses directly, so the more it moderates. Conversely, the more conservative the bank (higher c), the less j expects it to succumb to such temptations, so the less this restraint-inducing mechanism, which drove results in 3.2.2 also, operates. Second, the model also reveals a *competition-induced strategic non-neutrality (CISNN)*, which arises because the marginal *real-wage* effect j perceives from higher

nominal wages increases in c while the *relative-wage* effect perceived 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 CC 's effect on the *CISNN* depends heavily on elasticity assumptions, regarding \mathbf{a} and \mathbf{g} and their relation to n .³⁷

Equilibrium nominal and real outcomes depend on c (or CC), n^{-1} (or BC), and their interaction, but highly non-linearly, complicating interpretation. The authors manage several propositions. (1) Greater union inflation-aversion, B , and cross-craft substitutability, \mathbf{g} reduce unemployment and inflation, though these effects vanish at $n=\infty$ (perfect competition). (2) Beyond a critical amount of inflation-aversion relative to other terms, $B_c = Ac^2 \mathbf{g}' \mathbf{a}^3$, a Calmfors-Driffill curve relates n^{-1} (BC) to real-wage premia, \mathbf{j} ; short of B_c , real and nominal outcomes strictly worsen in BC (competition effects dominate). (3) If inflation-aversion exceeds B_c , the Calmfors-Driffill curve adverse peak shifts toward decentralization as c rises (see Table A1); (4) $n=8$ always dominates $n=1$. The net of these interactive effects determine if Calmfors-Driffill curves exist— BC monotonically raises real-wage premia if not—and how CC - BC interactions shift and reshape that relation. The comparative statics of core interest here are as follows. If labor is incompletely substitutable and $n > 1$ (*i.e.*, outside perfect competition) *or* if unions are inflation averse, CC unambiguously *reduces* employment. (CC also generally lowers inflation, but sufficient union inflation-aversion can even upend that at some n .) Visually, in BC -unemployment space, Calmfors-Driffill curves at higher CC lie entirely above those at lower CC , and peaks accentuate and drift toward lower BC as CC rises (see Table A1). Unemployment peaks at intermediate BC with sufficient inflation-aversion but strictly rises in BC at less. Broadly, then, relations between BC and real outcomes depend on degrees of CC , but the nature of this shifting and reshaping of Calmfors-Driffill curves hinges critically on assumptions regarding substitution elasticities across labor and goods types (and other parameters) and how BC alters those elasticities. For these purposes, suffice to note that CC generally reduces employment, generally more at low-to-mid BC than at mid-to-high BC , although these effects fade at BC extremes. Thus, Cukierman-Lippi suggests that CC interacts best with mid-to-highly coordinated bargainers, producing low inflation at low, but positive, real costs. Monetary conservatism from the *ECB*, contrarily, likely achieves low inflation only at relatively high real cost because European labor and goods markets include many poorly coordinated bargaining units, each retaining appreciable monopoly power.

Certain model aspects warrant further scrutiny. European labor organizes mostly by industry or sector, so the craft-union assumption overemphasizes inter-union relative to inter-firm substitution. Also, as in Soskice-Iversen, only labor-demand *real-wage* (not *relative-wage*) elasticity depends on n , so BC has no competition-reducing effects, but, unlike Soskice-Iversen, inflation aversion

may reproduce a Calmfors-Driffill hump even with its original source (*relative-wage elasticity*) absent. Analyzing a Cukierman-Lippi model without inflation-aversion and a Soskice-Iversen model with strategic monetary policy may help clarify the *CISNN*. Lastly, employers and governments barely enter any of these models. Unions set wages and firms take them; the only bargains are of unions and central banks, each fully controlling its instrument: wages, money supply.

Velasco and Guzzo (1999) offer a model of a representative firm employing a continuum of labor types to produce one good, which endogenizes several key parameters. Profit maximization yields symmetric labor demand for each labor-type. Equal-sized unions maximize workers' intertemporal utilities, weighing consumption against labor and inflation. The strong symmetry implies unions optimally set equal wages for all workers. The model resembles Cukierman-Lippi otherwise. The unions' perceived real-wage labor-demand elasticity for each worker is again central. It again decreases in the number of unions, n , and increases in the substitution elasticity between worker-types, \mathbf{s} , and returns-to-scale, \mathbf{a} , though now *via* the firm's production function and profit maximization in general equilibrium. In Bertrand games among unions and between each and the central bank, unions set wages first, the bank sets inflation next, and the firm sets employment and output last, producing several startling results.

First, as in other such models, the strategic inflation-averse unions moderate wage demands to reduce policymakers' inflation temptations, more so the less conservative the policymaker, so *CC* hinders restraint and employment. Second, however, the *CISNN* operates very differently than in Cukierman-Lippi, where, given sufficient inflation-aversion relative to labor-demand real-wage-elasticity, a Calmfors-Driffill curve emerges that shifts up and peaks further left as *CC* increases. *CC* also shifts *BC*-unemployment relations upward here, but usual Calmfors-Driffill humps never emerge. Rather, if substitution elasticity across worker types is low enough, employment monotonically increases in n^{-1} (*BC*); otherwise, employment *peaks* at intermediate *BC*, giving an inverse Calmfors-Driffill curve (see Table A1). These differences arise because the high symmetry in Velasco-Guzzo yields equal equilibrium wages, thereby flattening Calmfors-Driffill curves. Also, Velasco-Guzzo allows competition-effects to increase as n rises, but toward a fixed production-function parameter rather than toward infinity as in Calmfors-Driffill and Cukierman-Lippi. Thus, as $n \rightarrow \infty$, the competition-reducing effects of *BC* remain limited in Velasco-Guzzo but become infinite in other models; so, again, the crucial parametric assumptions regard labor substitutability across unions, \mathbf{s} , and its relation to *BC*.

Despite these differences, the Velasco-Guzzo model also finds nominal and *CC* and *BC* real effects to be highly interactive, non-linear, and dependent on key parameter values. They graph several simulations that illustrate the core comparative statics (see Table A1). *CC*'s always positive real costs, R , depend on substitution elasticity of worker types, \mathbf{s} , scale returns, \mathbf{a} , *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 $n < 3 \pm$. Thus, $\frac{d^2R}{dCCdBC} \equiv \frac{df}{dBC} \geq 0$ as $\sigma(1-\alpha) \geq 1$. This last indeterminacy notwithstanding, the model implications for delegation to one conservative *ECB* monetary policy are one-sided. The move effectively decentralizes bargaining for most *Euro* members, but, even if $\sigma(1-\alpha) > 1$, so the lower BC would reduce the real costs of *ECB* conservatism, Europe would lie in that curve's flat range ($n \gg 3$). If $\sigma(1-\alpha) < 1$, contrarily, then the bargaining decentralization induced by raising monetary policy to the European level would increase the real costs of *ECB* conservatism appreciably.

3.2.4 Oligopolistic, Strategic, Differentiated Bargainers

Two final approaches emphasize differences among strategic bargainers in addition to their degree of coordination. Franzese (1994; 1996; 2001a; 2002b) stresses the differential effects of monetary conservatism on traded, non-traded, and public-sectors. Iversen (1998ab) stresses strategic unions that dislike wage disparity in addition to standard real-wage and employment goals, underscoring differences in productivity (growth) across and among bargaining units.

3.2.4.1 Traded, Non-Traded, and Public-Sector Bargainers

Franzese (*op. cit.*) argues that, since monetary policymakers do not directly control prices, they must control inflation *via* monetary-policy responses to wage/price bargains that induce non-inflationary settlements from monopolistic bargainers. 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 n^{-1} of threats directly. He also stresses, though, that monetary policy affects heterogeneous bargainers differently. Enacted threats (*i.e.*, real contractions) hinder domestic real-demand and so harm all actors dependent thereupon, including all private-sector but excluding public-sector bargainers. Monetary contraction also raises export relative to import prices, thereby especially injuring traded-sector bargainers. Because policymakers induce restraint by creating or threatening real slack sufficient to induce non-inflationary settlements, the rest of the economy must suffer disproportionately (*a*) less when traded-, (*b*) more when public-, and (*c*) 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* offers 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 Table A1).³⁸ However, for a given degree of *conservatism*, greater

credibility remains unambiguously beneficial because it reduces required threat-enactment.

CC, *BC*, and traded-relative-to-public-sector-dominance thus complement in producing real benefits but substitute (see equation 1) in producing nominal ones. The argument suggests that the strong nominal and real performance of postwar Germany derived partly from especially beneficial interactions between its high-*CC Bundesbank* and moderately high-*BC* led by *Gesamptmetal* and *IG Metal* (traded-sector confederations). *ECB Euro-policy*, contrarily, faces a less-beneficial mix: lower *European BC* with relatively weaker traded- and stronger public-sectors. As Soskice-Iversen conclude also, some pattern-setting among member-countries' bargaining organizations might improve matters, and, here, especially if traded-sector bargainers lead. Franzese (*op. cit.*), however, merely describes to guide argumentation the marginal (dis-)utilities to unions (firms) of nominal increases given $\frac{dP}{dW_j}$, which depend on *BC*, and threat schedules $\frac{dM}{dP}$, which depend on *CC*. Distinguishing conservatism from credibility, modeling union-firm *bargaining* directly, and considering heterogeneous bargainers in variegated strategic relation to policymakers, all seem promising advances, but full formal implementation in a closed equilibrium model remains.

3.2.4.2 Wage Disparity and Bargainers of Different Productivity

Iversen (1998ab) studies differentiated bargainers, stressing strategic unions that, beyond standard real-wage and employment goals, dislike wage disparity. Here, highly centralized bargaining compresses the nominal-wage distribution, which induces the *wage creep* wherein high-skill and other market-empowered workers wring supplementary raises from employers, which in turn requires lax monetary policy to accommodate and to erode real-wage disparity. Aggregate efficiency requires more such nominal laxity as more-encompassing bargaining units compress the wages of more-disparate-productivity workers. Therefore, monetary conservatism has adverse real effects at very-high *BC*. Contrarily, at perfect competition, marginal-value productivity, not bargaining, determines wages and disparity, so *CC* is neutral. Lastly, intermediate centralization allows wage-disparity to reflect productivity differentials, and monetary conservatism there enforces cooperative lead-bargain coordination on aggregate restraint.³⁹

Again, *CC* has equilibrium real effects that depend on *BC* and, here, also on varying productivity (growth) in and across bargaining units (see Table A1). The model, however, seems to rely on differential money illusion among bargainers as high-productivity-growth workers tolerate wage-creep to erode their relative gains. Also, why centralized settlements cannot include productivity-scheduled deviations from restrained average wage-increases is under-explicated.⁴⁰ Still, the model clearly expounds differences in preferences across low- and high-productivity-growth workers, both intrinsically and in their strategic interaction with monetary authorities, and derives its substantive

implications from a fully closed model. *European* pattern-setting bargaining would be optimal, nominally and really; very-high coordination is undesirable; and deregulatory moves may be beneficial if from near-full to near-zero *BC*, but would still be dominated by moderate coordination *via* pattern setting. However, the *ECB*'s impact would also depend on the variation in productivity growth of those in any European lead-bargaining scheme. The radically different productivity levels and growth across Europe may make balancing appropriately the benefits of pattern-setting *BC* and the costs of wage compression without nominal laxity difficult. The historical parallel, sadly, may be absorption of the East into the West German bargaining system, rather than the postwar success of the West German system.

3.2.4.3 Partisan Governments, Central Banks, Strategic Bargainers

Adolph (2001) adds to the Iversen model partisan governments that conduct Keynesian counter-cyclical policies and can offer social-policy side-payments to unions. He argues and finds that this induces both temporary and permanent partisan cycles. *BC* conditions both partisan cycles, with the left yielding lower unemployment, as in Lange and Garrett (1985) except having greatest impact here at intermediate *BC* as in Iversen (1998ab). *CC* does not mitigate temporary cycles, but likely only because the model does not allow it to dampen partisan Keynesian-policy oscillation. Also as in Iversen (1998ab), *CC* interacts most beneficially with intermediate *BC*. However, unlike that model, *CC* has little effect at high *BC*, and has small deleterious unemployment effects at low *BC* (as in Cukierman and Lippi 1999 and Hall and Franzese 1998). The differences arise because two mechanisms exist to reinforce restraint at moderate *BC*: central bank threats and social-policy side-payments, whose relative incidence and efficacy rise under greater *CC* and more-left government respectively. The two mechanisms are substitutes in this regard. Governmental social-policy, *e.g.*, counteracts the deleterious *CC* effect at high *BC* from the Iversen model. The deleterious effects of *CC* at low *BC* arise by a mechanism similar to the *PE-GE* models discussed above, with side-payment usage and efficacy declining as *CC* rises at low *BC*. The model is thus the first to consider governmental, central-bank, and wage/price-bargainer policies, and it accordingly produces a rich set of interactive effects. However, monetary and fiscal authorities do not interact fully, rendering some conclusions preliminary. Adolph's arguments, though, share most of nascent agreement. Moving from moderately high toward low *BC*, an increase in *CC* produces less and less unemployment benefit, becoming an actual detriment at very low *BC*. The benefit also diminishes moving from moderately high toward highest *BC*, but this alteration is small (see Table A1).

4. THE ACCUMULATING EMPIRICAL SUPPORT

Rapidly amassing evidence supports many of these claims. Hall (1994) first charted postwar-average inflation and unemployment by CC and BC , revealing an interactive pattern. Hall and Franzese (1998) tabulate that pattern, finding postwar-average inflation falls in CC and in BC and unemployment falls in BC and rises in CC . The unemployment fall per unit BC (rise per unit CC) is larger (smaller) at higher CC (BC): real complementarity. The inflation reduction per unit CC and BC each diminishes in the other: nominal substitutability. Their regression analyses, using postwar-average, *decade*,⁴¹ and annual data from 18 OECD countries 1950-90, reinforce these conclusions (the last only weakly).

Franzese (1994, 1996:ch.4) explored interactive real effects of CC , BC , and sectoral structure in *decade* data from 21 OECD countries. Beyond CC - BC interactions (consistent with and statistically stronger than Hall-Franzese), he included traded-sector and government employment-shares and interactions with CC . Strong evidence of detrimental interactions of public-employment and CC emerged. At high (low) CC , higher public employment-shares spur (reduce) unemployment. Also, though less strongly statistically, traded employment-share improves unemployment outcomes, more so the greater CC .

Garrett and Way (1995a) criticize the subjective BC indices used in these studies, replacing BC with *union strength* (concentration plus coverage rates), a procedure others (*e.g.*, Swenson 1989, Soskice 1990) decry. Nonetheless, they find, in postwar quinquennial data from 13 OECD countries, beneficial CC and BC interactions in regulating real growth (strongly), inflation (weakly), and unemployment (moderately): as in Hall-Franzese. Garrett and Way (1999) give evidence, more-direct than in Franzese (1994), of the deleterious effect of public-sector weight within bargaining on BC propensity to deliver wage/price restraint. They estimate a nonlinear relation of *union strength* to unemployment, allowing *public-sector strength* within unions (public-sector share of total members) to alter that relation. In quinquennial data from 13 OECD countries, they find a standard Calmfors-Driffill hump between union strength and unemployment at low public-sector strength, but that union strength becomes increasingly a monotonic real detriment as public-sector strength rises.

Cukierman and Lippi (1999) regress unemployment and inflation 1978-82, 1988-92, and 1992-96 averages in 19 OECD countries on high, medium, low BC dummies from OECD(1997); Cukierman's (1992) LVAU index of CC ; and their interactions. At low BC , they find CC raises unemployment as expected, but CC reduces unemployment at intermediate BC and also, insignificantly and slightly less so, at high BC .⁴² Their inflation results similarly mix. Their results do accord with their predictions and previous findings, though, in that $\frac{dR}{dCC} > 0$ at low BC and that $\frac{d^2R}{dCCdBC}$ is generally negative. *I.e.*, CC has real costs at low BC , and these costs decline as BC increases, here becoming benefits.

Iversen (1998ab) also finds real effects of CC that depend on BC and *vice versa*. He argues, and finds in 15 OECD countries' quinquennial 1973-93 data, that CC reduces unemployment at moderate bargaining *concentration*, raises it at high, and has little effect at low. Although sample and CC and BC measures differ,⁴³ these results imply that CC has real benefits over most of BC 's sample-range, and real costs *only* at very high BC whereas, disturbingly, others argue and find almost the opposite. Franzese (2001a; 2002b) offers arguments and evidence that may resolve this (see below), but notice the persisting agreement that shifts from low to mid BC reduce real costs (raise real benefits) of CC . *I.e.*, Iversen too finds that $\frac{dR}{dCC}$ slopes downward from low to moderately high BC .

Franzese (2001a; 2002b) relates real and nominal outcomes in annual 1974-90 data from 21 OECD countries to CC , BC , G/T , and $(G/T)^2$, where G is government- and T is traded-sector employment-share. He finds that BC is more beneficial in real and nominal terms as traded sectors dominate public sectors more; indeed, BC becomes detrimental with sufficient public-sector dominance. CC has nominal benefits that diminish as traded-sector-led BC rises and that increase as BC falls or becomes increasingly public-sector led. CC has real costs that diminish as traded-sector-led BC rises but that rise 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 traded-sector-led BC are strategic complements (substitutes) in determining real (nominal) outcomes.

Adolph (2001) regresses quarterly unemployment from 15 OECD countries 1975-98, in deviations from G7 average, on an interactive set of government-partisanship measures and Iversen's CC and BC (plus BC^2) measures. He finds, as Iversen does, that CC interacts most beneficially with intermediate BC , but also a continuing but smaller and insignificant benefit at high BC , as Cukierman and Lippi do, and also a small but significant deleterious effect at low BC , as Cukierman and Lippi, Franzese, and Hall and Franzese do.⁴⁴ These findings too, then, share the nascent agreement. Moving from moderately high toward low BC , increasing CC produces smaller unemployment benefits, becoming costs at very low BC . Here, the benefit also diminishes moving from moderately high toward highest BC , but this alteration is small and insignificant (see Table A1).

Iversen (1998ab) finds real costs of CC at very high BC , little effect at low, and benefits at moderate; Cukierman and Lippi (1999) and Adolph (2001) find real benefits at mid, slightly lesser benefits at high, and real *costs* at low BC . Others find *just* real *costs* that diminish monotonically in BC (although their specifications preclude nonlinear interactions). Franzese (2001a; 2002b) offers a possible resolution. He argues and finds CC to interact detrimentally with high *public-sector-led* BC ; meanwhile, Iversen's predicted adverse $\frac{dR}{dCC}$ at high BC requires that workers of very disparate productivity growth adopt common settlements. Traded-and-public-sector and high-and-low-productivity-growth

workers are empirically much the same sets, so this would reconcile findings if this particular sectoral composition tended to occur at high BC . Franzese notes that, if high BC induces wage-compression, this would tend to price the private sector out of, and so the public into, services where much employment growth has occurred, so the requisite composition would tend to evolve at high BC . Because it did not always do so, and because some high- BC systems allowed sizable wage disparity (e.g., Austria), this may also explain the slightly smaller and less-significantly beneficial CC - BC interaction that Cukierman and Lippi (1999) and Adolph (2001) find at high BC .

Such dispute notwithstanding, all the empirical work agrees 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, *i.e.* conservatism, is not. Second, all find wage/price-bargaining institutional-structural organization and the nature of monetary policymaking *interact* to determine both nominal *and* real outcomes. CC 's effects depend on BC and *v.v.* Third, all find the real effects of CC less unpalatable or more palatable with mid-to-high BC than with low-to-mid BC ; *i.e.*, all find $\frac{dR}{dCC}$ slopes downward ($\frac{d^2R}{dCCdBC} < 0$) over the empirically intermediate BC -range. Discord 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 also 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 substitutes in nominal and complements in real outcomes, 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 German to *ECB*-led European monetary policy. That move is from moderately high BC , led by traded sectors, to relatively low BC of unknown, likely less, traded-sector leadership, with CC remaining high. By any of these analyses, German institutional-structural conditions effected relatively favorable long-run real-nominal tradeoffs, achieving equilibrium low inflation at moderate real cost or even at some benefit. European institutional-structural conditions promise much less favorable terms.

5. CONCLUSION

5.1 Concluding the Review

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 then suffices to imply interactive real effects for CC also. If, *e.g.*, governments enact real reforms partly to reduce inflation biases, the incentives to do so depend on bias size, which depends, *inter alia*, on degrees of CC , BC , and their interaction. Second, all agree that strategic bargainer interaction with monetary authorities undermines the strong neutrality of classic CBI theory. This is *a fortiori* true if any private actor is inflation averse (and if none are, then inflation is irrelevant). Moreover, all would agree with the general statement that strategic bargainer reaction to the expected nature of monetary policy shifts and reshapes the relation of BC to real outcomes. Such strategic non-neutralities arise because:

- a) other actors adjust real policies to the monetary policymaking stance, *or*
- b) more coordinated inflation-averse bargainers moderate their wage/price demands more the less credibly conservative the monetary authority, *or*
- c) credibly conservative monetary policy affects real- and relative-wage labor-demand elasticities differently, altering wage/price settlements in ways that depend on bargaining organization, *or*
- d) conservative monetary policy affects differentiated bargainers differently, producing on-average real effects that depend on the shares of bargainer types in the aggregate of settlements.

Discord regards the exact shifting and reshaping of Calmfors-Driffill curves that these strategic interactions b)-d) induce and stems mostly from assumptions about real and relative wage (price) elasticities of labor (goods) demand, and how each changes with wage/price bargaining organization. The empirical work also shares core conclusions despite disagreeing disturbingly in some specifics. All found that CC is generally non-neutral in ways depending 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 . Disagreement surrounds the effect at very-high and -low BC and the sign of CC 's non-neutrality over BC 's range (see Table A1).

Given the diverse sources of the non-neutralities and that history offers only moderate temporal variation in BC and CC and 13-21 units of potential spatial variation with which to estimate a hump-shaped but otherwise unspecified relation of BC to real outcomes that is itself reshaped nonlinearly by CC , the theoretical and empirical literature has surprisingly uniform implications for the effect of *Euro*-members delegation to a common, credibly conservative, *ECB*-led monetary policy. With the German (Swiss, 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 gains at little or no equilibrium real costs. The new consensus suggests, though, that postwar Germany's success in combining low inflation and unemployment derived, not from the CC of the *Bundesbank* alone, but from its interaction with mid-to-highly coordinated bargaining with dominant traded- and dominated public-sector bargainers. European wage/price bargainers, contrarily, comprise

smaller (*relative to Europe*), more numerous, and less coordinated bargaining units, though still not even approaching perfect competition in most industries. Therefore, the *ECB*'s autonomous conservatism is likely more costly (or less beneficial) than the *Bundesbank*'s had been in Germany.⁴⁵

Obviously, other factors, like reduced exchange-rate uncertainty and other transaction costs, also enter. These studies did not claim that the effects they isolated dominate, or even are major; rather, they sought to clarify *one* set of previously missed effects of delegation to an autonomous, conservative central bank. 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. They did claim, however, that the terms of such tradeoffs depended at least in part on the institutional (*CC*, *BC*) and sectoral (*G/T*, etc.) structure that each member-country exchanged for Europe's political-economic structure in delegating to the *ECB*. (Also, by implication, those constituencies within countries more hurt by unemployment would tend to suffer and those more harmed by inflation to gain.) The (aggregate and distributional) tradeoffs, moreover, were expected to be less pleasant for most polities than the popular historical examples suggested because the institutional and sectoral structure of Europe would interact much less favorably with the *ECB* than, *e.g.*, the German institutional and sectoral structure had with the *Bundesbank*.

5.2 The Early *ECB* and *Euro* Experience

Table 1: The Inflation and Real-GDP-Growth Experiences of *Euro* Members

Change in BC Induced by Move to Euro	Increase in Credible Conservatism (CC) from Delegation to ECB					
	Approx. +0.8	Approx. +.65	Approx. +.58	Approx. +.52	Approx. +.40	Approx. +.07
Large Decrease (-.75)					Austria dp: -1.1 dY: -1.0	
Moderate Decrease (-.5)				Finland dp: -4.0 dY: -1.0		Germany dp: -1.4 dY: -1.4
Small Decrease (-.25)			Belgium dp: -1.0 dY: -1.0		Neth. dp: +3.2 dY: -0.7	
No Change	Portugal dp: -9.4 dY: -3.7	Italy dp: -4.6 dY: -1.5	France dp: -2.5 dY: -0.8			
Small Increase (+.25)	Spain dp: -4.1 dY: -1.5	Greece dp: -13 dY: +2.3		Ireland dp: +0.2 dY: +4.2		

Notes: Cell entries chart the change in average GDP-deflator inflation (dp) and real-GDP growth (dY) rates from 1986-1989 to 1999-2002 by the change in *CC* and *BC* entailed in delegating monetary-policy-making authority to the *ECB*. Row-heading variable unavailable

for Luxembourg, leaving 11 entries.

On 1 January 1999, eleven countries—Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain—ceded monetary-policymaking authority to the *ECB* and created the *Euro*. Greece, the twelfth, joined 1 January 2001. *Euro* notes and coins became legal tender a year later (Jeffrey 2001). One year after seems an appropriate time to offer an early assessment. Taking Hall and Franzese's (1998) *BC* and *CC* codes as a baseline, and assuming the *ECB* has $CC=1$ (just above the Bundesbank's .93) on that $\{0...1\}$ scale, and the European bargaining system to have $BC=.25$ on that $\{0,.25,.5,.75,1\}$ scale, Table 1 compares 1986-1989 average inflation and real-growth rates to their 1999-2002 averages as one such (very rough) analysis. As most of these interactive arguments would have predicted, the anti-inflationary bite of the delegation to the *ECB* was generally greatest for countries whose domestic *CBI* and bargaining coordination had both been relatively low (toward the bottom-left). Excluding the two countries that actually experienced a real-GDP-growth increase, Greece and Ireland—which were also, interestingly, two of the three that may even have seen a coordination increase from the expansion of the relevant bargaining arena to the European level—the real cost paid *per* point inflation reduction was much larger for countries that had had higher *BC* and, in delegating to the *ECB*, effectively sacrificed it: typically near 1-for-1 toward the top-right, but nearer 3- or 4-for-1 toward the bottom-right. Straining these mere 11 data-points harder, an interactive regression analysis similar to Hall and Franzese (1998) produces these results in these new data:

$$d\pi = 8.20 - 15.95dCC - 27.03dBC + 32.12dCC \cdot dBC \quad ; \quad R^2 = .41 \quad (9)$$

(7.4) (13.14) (16.23) (26.08)

$$dY = 6.77 - 0.94dCC - 14.41dBC + 13.81dCC \cdot dBC \quad ; \quad R^2 = .52 \quad (10)$$

(3.3) (3.65) (6.42) (8.90)

Recalling that dBC is negative for most *Euro* members, (10) indicates, rather surprisingly strongly given the meager sample, that those *Euro* members who bought more *CC* by delegating to the *ECB* paid some real cost, and greater real cost the higher their domestic *BC* had been that this delegation swapped for the European level. Finland, *e.g.*, roughly effectively lost .5 *BC* and gained .5 *CC*, in our crude assumption, by delegating to the *ECB*. Based on these few, very early post-*Euro* experiences, the data suggest such a move would cost almost 1.76% in real growth and gain just 1.46% inflation reduction. Perhaps because Finland faced such rough times a decade ago, its actual real-growth slowing was less (-1%), and its inflation reduction stronger (-4%), but this are what the data suggest a country like these eleven would on-average tend to lose and gain by such *BC* and *CC* changes. By the same analysis, Austria, experiencing a

greater reduction in BC (-.75) and lesser increase in CC (+.4) stood to gain less, an estimated -2%, on inflation but to pay more, an estimated, -3% in growth for it. In actuality, both Austrian inflation and growth did slow, but less than this.⁴⁶

Thus, the (early and very limited) experiences of *Euro* members after having ceded monetary authority to the *ECB* seem to support the point of agreement identified in this literature. First, the anti-inflationary gains were smaller than some might have expected for some members because they already had strong CC and/or they lost effective BC in the enlargement of the relevant wage/price-bargaining arena to Europe. Second, and more unexpectedly from a neoclassical view, these gains came at some real costs, real costs that were certainly long-term if not proven equilibrium, and real costs that were generally higher for those countries who lost more in terms of BC in adopting the *Euro* and thereby delegating monetary-policy-making authority to the *ECB*.

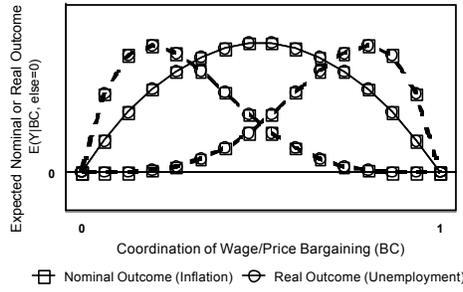
APPENDIX

Table A1. Illustration of the Theories and Predictions from the Reviewed Work

Theory	Predictions	Graphical Illustration
Standard <i>CBI</i> Theory	<p>CC has nominal benefits, greater the more inflationary government policy would be:</p> $\frac{dp}{dCC} = \pi_c(X_c) - \pi_g(X_g) < 0$ <p>CC has no real effect:</p> $\frac{dUE}{dCC} = 0$	<p>Expected Nominal or Real Outcome $E(Y CC, \text{else}=0)$</p> <p>Credible Monetary Conservatism (CC)</p> <p>■ Nominal Outcome (Inflation) ● Real Outcome (Unemployment)</p>
Traditional <i>CWB</i> Theory	<p>BC has real benefits:</p> $\frac{dUE}{dBC} < 0$ <p>BC has, perhaps smaller, nominal benefits:</p> $\frac{dp}{dBC} < 0$	<p>Expected Nominal or Real Outcome $E(Y BC, \text{else}=0)$</p> <p>Coordination of Wage Bargaining (BC)</p> <p>□ Nominal Outcome (Inflation) ○ Real Outcome (Unemployment)</p>

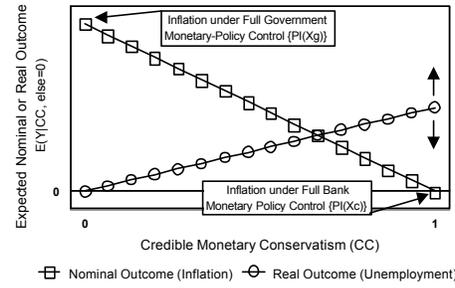
Modern
CWB
Theory

BC has non-monotonic real and nominal effects, with most-adverse outcome between its extremes.
Exact shape indeterminate.



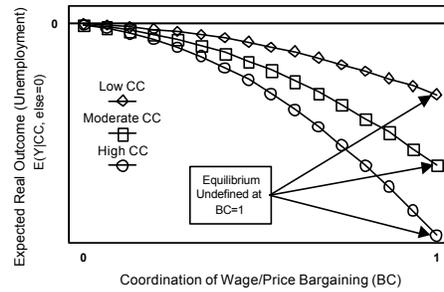
Political-Economic
General-Equilibrium
Theories

CC has nominal benefits as in classical *CBI* theory:
 $\frac{dp}{dCC} = \pi_c(X_c) - \pi_g(X_g) < 0$
CC has real costs proportional to its nominal benefits:
 $\frac{dUE}{dCC} \propto \frac{dp}{dCC}$



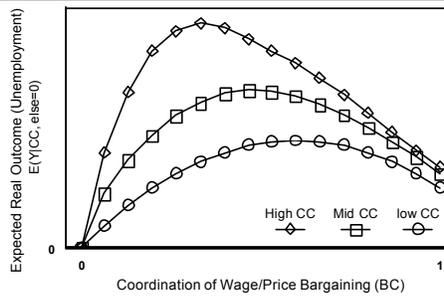
Strategic Bargainers
(Soskice & Iversen)

CC has real benefits that increase in *BC*:
 $\frac{dUE}{dCC} < 0, \frac{dUE^2}{dCCdBC} < 0$



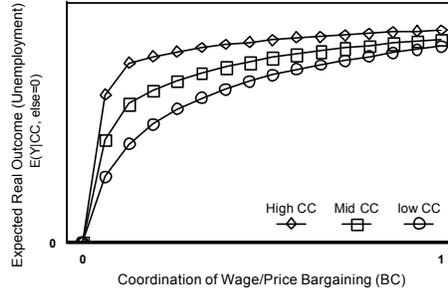
Strategic Bargainers
(Cukierman & Lippi)

At high inflation-aversion ($B > B_c$), Calmfors-Driffill hump emerges whose peak accentuates and shifts up-and-leftward as *CC* rises.



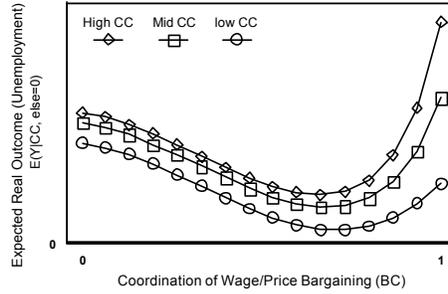
Strategic Bargainers (Cukierman & Lippi)

At low inflation-aversion ($B < B_c$), BC has monotonic real costs, which CC magnifies more at high BC .



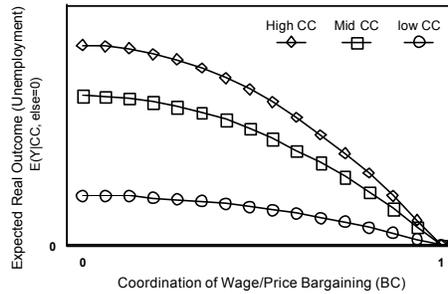
Strategic Bargainers (Velasco & Guzzo)

At high labor-substitutability relative to economies of scale, $s(1-a) > 1$, an inverse Calmfors-Driffill hump emerges, which CC raises, more at very high BC and less noticeably at most levels.



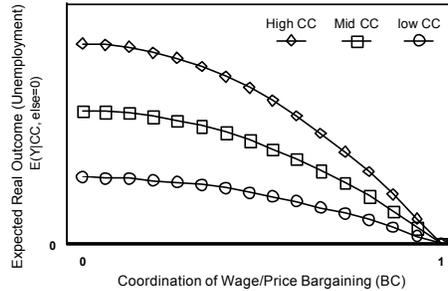
Strategic Bargainers (Velasco & Guzzo)

At low labor-substitutability relative to economies of scale, $s(1-a) < 1$, BC has monotonic real benefits, and CC has diminishing costs that are greater at lower than higher BC .



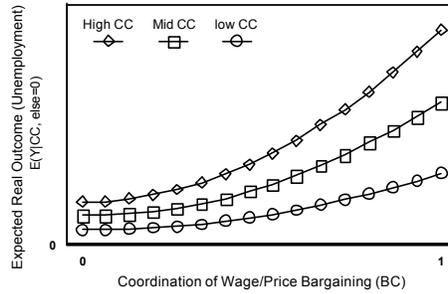
Strategic, Differentiated Bargainers (Franzese)

At high traded-relative-to-public-sector strength, BC is beneficial, and CC has real costs that decrease in BC :
 $\frac{dUE}{dCC} > 0$ and $\frac{d^2UE}{dCCdBC} < 0$



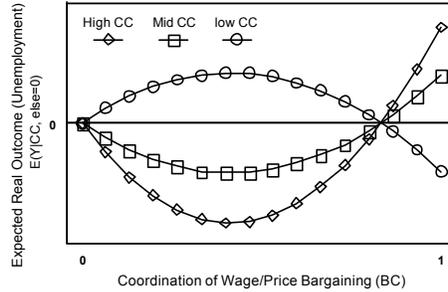
Strategic, Differentiated Bargainers (Franzese)

At sufficiently high public-to-traded-sector strength, BC is detrimental, and CC has real costs that increase in BC :
 $\frac{dUE}{dCC} > 0$ and $\frac{dCCdBC}{dCCdBC} > 0$



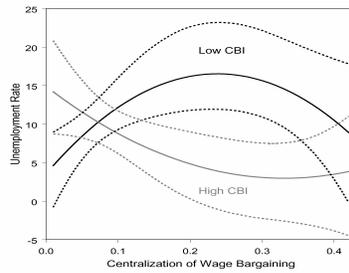
Strategic, Differentiated Bargainers (Iversen)

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.



Partisan Governments and Strategic, Differentiated Bargainers (Adolph)

CC has real benefits that decrease, eventually becoming costs, from moderately high BC through low. The benefits also diminish somewhat from moderately high to highest BC .



Notes: The *PE-GE*, Soskice-Iversen, and Velasco-Guzzo models have not received empirical exploration. Empirical results for 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 42). The Adolph figure, reproduced with permission, reflects his empirical estimates.

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NOTES

- 1 This review extends Franzese 2000 and 2001c to consider the early Euro experience and to review new models in which central bank behavior (a) induces changes in the organization of wage/price bargaining and (b) induces both governmental and bargainer policy reactions.
- 2 Conservative commitments also debar monetary stabilization, effective given uncertainty or incomplete information (Cukierman 1992), yet the core conclusion remained that *CBI* lowers inflation virtually costlessly, especially since evidence lacked that *CBI* raises real variance (e.g., Alesina and Summers 1993).
- 3 The relationship may be non-linear (see Calmfors and Driffill 1988).
- 4 Distinguishing the monetary policymaker's *autonomy* from its *conservatism* and wage/price bargaining's concentration units from its coordination will become important later.
- 5 The standard view builds 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.
- 6 Ball and Romer 1990 showed that small nominal rigidities, e.g., 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. Akerloff-Yellen 1985 near-rationality or calculation costs, or bargaining power in labor/goods markets, would suffice.

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- 7 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.
 - 8 Eijffinger and De Haan 1996 review previous empirical studies, listing few with controls (add Al-Marhubi and Willett 1995; Havrilesky and Granato 1993) and no interactive models.
 - 9 Indeed, *incipient inflationary pressures* do not strictly exist in standard models where inflation *is* money-supply growth, which banks fully control. Further, financial-stability motives for counter-cyclical policy (Cukierman 1992:ch.7) cannot explain the Fed's justification for its behavior even if they might explain the counter-cyclicality.
 - 10 The Fed rarely 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.
 - 11 Development follows Olson 1965; Headey 1970; Berger 1981; Lehmruch 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.
 - 12 Bargains are often modeled as prisoners' dilemmas with i 's most-preferred outcome that all $\sim i$ exercise restraint, then all, then none, then only i . The ordering implicitly assumes considerable market power, as the most-preferred outcome implicitly assumes highly wage-inelastic employment. See below; Calmfors and Driffill 1988; Calmfors 1993.
 - 13 The UK and Italy, e.g., scrambled briefly, mostly unsuccessfully, to institute *CWB* in their economies (Regini 1984).
 - 14 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.
 - 15 E.g., Soskice 1990 and Calmfors and Driffill 1988 dispute Japan's and Switzerland's *BC*.
 - 16 Cf. Hall 1994; Garrett and Way 1995ab; Iversen 1998ab; Hall and Franzese 1998; Franzese 2001a, 2002b.
 - 17 One can exclude zero and full *BC*, though. Bargaining implies some market power and so non-zero *BC*. Conversely, any international mobility in goods or labor likely precludes full coordination among all bargainers as some are foreign.
 - 18 Arguments in, e.g., Golden 1993, Thelen 1994, Golden et al. 1999, Lange et al. 1995 suggest that union-membership structure will not suffice.
 - 19 Curvature of relations between *BC* and restraint can be estimated directly (see, e.g., Iversen 1998ab), or competition-reducing and internalization-increasing features of wage/price-bargaining organization can be separated (see, e.g., Layard et al. 1991). Attempts at this rely on union density to represent the former and *BC* indices the latter.
 - 20 Scharpf's 1984, 1987, 1991 exceptional (both senses) work foreshadowed recent syntheses.
 - 21 Franzese 2001b extends the model to open economies under varying exchange-rate regimes. (a) Bleaney 1996, Forteza 1998, Hall and Franzese 1998, Iversen 1999, and those reviewed below, and (b) Jonsson 1995, Simmons 1996, Clark et al. 1998, Oatley 1999, Way 2000 more thoroughly explore a subset of the implied interactions, regarding *CBI* interactions (a) with *BC* and (b) with government-partisanship and/or the electoral cycle.
 - 22 Scale a to 0=full dependence, 1=full autonomy; n.b., the convex combination need not be a linear weighted average. Lohmann 1992 shows that, for similarly scaled costs of replacing bankers, r , equilibrium policy is essentially $r\mathcal{C}+(1-r)\mathcal{G}$, where \mathcal{C} is banks' and \mathcal{G} governments' desired policy, but she does not explore the interactive implications. Jonsson 1995 and Bleaney 1996 posit (1) but also ignore its general implications.
 - 23 Bleaney 1996; Forteza 1998; Hall and Franzese 1998; and Iversen 1999 such nominal effects of strategic interaction directly. Work reviewed below analyzes nominal and real effects of such interactions, so further discussion is deferred.
 - 24 De Haan 1999 and Berger et al. 2002 review more such *PE-GE* approaches.

- 25 Andersen and Wascher 1999, DeBelle and Fischer 1995, Hutchinson and Walsh 1998, Posen 1998, Walsh 1995, and others find, *contra* standard logic, no relation or a positive one of *CBI* to sacrifice ratios in pre-1990 data. Hutchinson and Walsh 1998 suggest a positive relation may arise if greater *CC* led bargainers to sign longer-duration or less-indexed contracts. If so, *CBI* would affect sacrifice ratios *via* greater credibility and nominal rigidities; so the observed correlation would depend on which effect dominated.
- 26 The review follows the simpler 1998 model; the 2000 model derives similar results from 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 2000).
- 27 Conversely, of course, n has real effects that depend on β .
- 28 Similar concerns may apply to the exogeneity of α .
- 29 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 $\alpha = \infty$).
- 30 Others include Yashiv 1989; Cubitt 1989, 1992, 1995; Agell and Ysander 1993; Gylfason and Lindbeck 1994; Grüner and Hefeker 1997; Jensen 1997; Skott 1997; Zervoyianni 1997.
- 31 If not, then inflation is irrelevant. Benevolent planners also combine private-actor utilities, usually with equal weights.
- 32 Rama 1994, Grüner and Hefeker 1997, Zervoyianni 1997, Franzese 1999a stress this point.
- 33 They note that standard *CBI* models are even simpler as output is at least endogenous here.
- 34 With v the government weight on prices relative to output, and u, q the union weights on output and prices relative to real wages, the reaction functions are:
- $$W = w_2 + w_1 M \text{ where } w_2 \equiv \frac{2w_u^T - 2uY_u^T + 2qP_u^T}{1+u+q} \text{ and } w_1 \equiv \frac{1+u-q}{1+u+q}$$
- $$M = m_2 + m_1 W \text{ where } m_2 \equiv \frac{2Y_g^T + 2vP_g^T}{1+v} \text{ and } m_1 \equiv \frac{1-v}{1+v}$$
- 35 Cubitt 1992 considers games where union, government, both, or neither can commit to M or W : government-led Stackelberg, union-led Stackelberg, Nash with, and without commitment. Results differ with who leads; interestingly, government may prefer to follow. Cubitt 1995 explores three aspects of corporatism beyond 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 are intuitive.
- 36 Soskice and Iversen 1998, 2000, Hall and Franzese 1998, and Franzese 1999a concur.
- 37 Cukierman-Lippi and Soskice-Iversen both assume α and γ exogenous and independent of n .
- 38 More completely, *CC* interacts best (worst) with small traded (public) sectors leading large public (traded) 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 A similar coordination-enforcement mechanism operates in Soskice and Iversen 1998, 2000 and Franzese 2001a, 2002b.
- 40 E.g., such complicated contracts may be difficult to write at such high aggregation levels.
- 41 Henceforth *decade* refers to Cukierman’s 1992 periodization of LVAU—the most frequently measured index available: 1950-9, 1960-72, 1973-9, 1980-9.
- 42 Examining the Cukierman-Lippi row of Table A1 carefully, one sees that such results could emerge if *CC*/mid-to-high-*BC* interactions confer some benefit their model misses. Iversen 1998ab, Franzese 1994, 1996, 2001a, 2002b and Soskice and Iversen 1998, 2000 all suggest, e.g., higher *CC* may help enforce coordination on restrained settlements in non-centralized

systems of “pattern-setting” coordinated bargaining.

- 43 Iversen 1998ab uses actual exchange-rate movements in addition to an average of standard *CBI* indices to gauge *CC*. His *BC* measure notably disagrees with others regarding Japan and Switzerland (cf., Soskice 1990, Calmfors and Driffill 1988). However, his sensitivity analysis leans against the latter being the sole source of the different findings.
- 44 He also finds temporary and permanent partisan cycles, conditioned by *BC*, and with the left associated with lower unemployment, as he argued.
- 45 Hall 1994 and Hall and Franzese 1998 elaborate a similar argument. Soskice and Iversen 1998 2000 emphasize that Europe could evolve a more beneficial pattern-setting bargaining system, which Franzese 2001a, 2002b would imply would be best if traded-sector led.
- 46 These results seem most directly to support the Hall and Franzese (1998) version in the above disputes, but, noting the tiny sample here and the adoption of their *CC* and *BC* measures and their linear-interactive specification, this crude analysis offers little on those issues.