PS651: Credibility & Time-Inconsistency of Monetary Policy

I. Neoclassical Model of Monetary Policymaking

A. Baseline (non-stochastic model): The Inflation Bias

1. The Model:

   a. **ECONOMY:** $y = y_n + \alpha(\pi - \pi^e)$

   b. **POLICYMAKER UTILITY:** $U = -\frac{1}{2}\left(\pi - \pi^T\right)^2 - \frac{A}{2}\left(y - y^T\right)^2$

   c. **PRIVATE ACTORS:** Fully described by RE: $\pi^e = \pi$

   d. Policymaker controls π directly or, $m+v=p+q$ with v & q fixed exog.

2. Equilibrium:

   a. Sub 1a into 1b $\Rightarrow$ $U = -\frac{1}{2}\left(\pi - \pi^T\right)^2 - \frac{A}{2}\left\{y_n + \alpha\left(\pi - \pi^e\right) - y^T\right\}^2$

   b.
$$\underset{\pi}{Max}\, U \Rightarrow \frac{\partial U}{\partial \pi} = -\left(\pi - \pi^T\right) - \alpha A\left\{y_n + \alpha\left(\pi - \pi^e\right) - y^T\right\} = 0$$
$$\Rightarrow \pi + \alpha^2 A\pi = \pi^T + \alpha A\left\{y^T + \alpha\pi^e - y_n\right\}$$
$$\Rightarrow \pi + \alpha^2 A\pi = \pi^T + \alpha^2 A\pi^e + \alpha A\left\{y^T - y_n\right\}$$

   c. Nothing stochastic & everything known $\Rightarrow$ can apply RE here, set $\pi^e = \pi$

   d. *The Discretionary Equilibrium:* $\pi_d^* = \pi^T + \alpha A\left(y^T - y_n\right)$

B. Stochastic Model: The Bias-Stabilization Tradeoff

1. The Model: As before except…

a. **ECONOMY:** $y = \pi - \pi^e + \varepsilon$ (i.e., *wflog*, $y_n = \alpha = 0$)

b. **POLICYMAKER UTILITY:** $U = -\frac{1}{2}\pi^2 - \frac{A}{2}\left(y - y^T\right)^2$ (i.e., *wflog*, $\pi^T = 0$)

2. Equilibrium:

a. Sub 1a into 1b $\Rightarrow$ $U = -\frac{1}{2}\pi^2 - \frac{A}{2}\left(\pi - \pi^e + \varepsilon - y^T\right)^2$

b.

$$\underset{\pi}{Max}\, U \Rightarrow \frac{\partial U}{\partial \pi} = -\pi - A\left\{\pi - \pi^e + \varepsilon - y^T\right\} = 0$$

$$\Rightarrow (1+A)\pi = A\left\{y^T + \pi^e - \varepsilon\right\}$$

$$\Rightarrow \pi = \frac{A}{1+A}\left\{\pi^e + y^T - \varepsilon\right\}$$

c. With stochastic π, must use $\pi^e = E(\pi)$ $\Rightarrow$

$$\pi^e = E(\pi) = E\left\{\frac{A}{1+A}\left(\pi^e + y^T - \varepsilon\right)\right\} = \frac{A}{1+A}\left(\pi^e + y^T\right)$$

$$\Rightarrow \pi^e\left(1 - \frac{A}{1+A}\right) = \frac{A}{1+A}y^T \Rightarrow \frac{1}{1+A}\pi^e = \frac{A}{1+A}y^T$$

$$\Rightarrow \pi^e = Ay^T$$

d. *The Discretionary Equilibrium:*

$$\pi^e = Ay^T$$

$$\Rightarrow \pi_d^* = \frac{A}{1+A}\left\{(1+A)y^T - \varepsilon\right\} = Ay^T - \frac{A}{1+A}\varepsilon$$

$$\Rightarrow y = Ay^T - \frac{A}{1+A}\varepsilon - Ay^T + \varepsilon = \frac{1}{1+A}\varepsilon$$

$$\Rightarrow E(\pi) = Ay^T \quad ; \quad V(\pi) = \left(\frac{A}{1+A}\right)^2 \sigma_\varepsilon^2$$

$$\Rightarrow E(y) = 0 \quad ; \quad V(y) = \left(\frac{1}{1+A}\right)^2 \sigma_\varepsilon^2$$

3. Optimal Rule: $\pi^* = -\frac{A}{1+A}\varepsilon \Rightarrow E(\pi) = E(y) = 0$; $V(\pi) = \left(\frac{A}{1+A}\right)^2 \sigma_\varepsilon^2$; $V(y) = \left(\frac{1}{1+A}\right)^2 \sigma_\varepsilon^2$

4. Commitment: $\pi_c = E(\pi) = E(y) = V(\pi) = 0$; $y = \varepsilon$; $V(y) = \sigma_\varepsilon^2$

5. Tradeoff: Prefer π_c to π_d *iff* $\sigma_\varepsilon^2 < (y^T)^2(1+A)$ (See Handwritten

Comparing $\pi = \pi_c = 0$ to $\pi = \pi_d = Ay^T - \frac{A}{1+A}\varepsilon$

$$V = -\tfrac{1}{2}\pi^2 - \tfrac{A}{2}(y-y^T)^2$$
$$= -\tfrac{A}{2}\cdot(\varepsilon - y^T)^2$$
$$= -\tfrac{A}{2}(\varepsilon^2 - 2\varepsilon y^T + y^{T^2})$$
$$\Rightarrow E(V) = -\tfrac{A}{2}(\sigma_\varepsilon^2 + y^{T^2})$$

$$V = -\tfrac{1}{2}\pi^2 - \tfrac{A}{2}(y-y^T)^2$$
$$= -\tfrac{1}{2}\left(Ay^T - \tfrac{A}{1+A}\varepsilon\right)^2 - \tfrac{A}{2}\left(\tfrac{1}{1+A}\varepsilon - y^T\right)^2$$
$$= -\tfrac{1}{2}\left((Ay^T)^2 - 2\cdot\tfrac{A^2}{1+A}\cdot y^T\cdot\varepsilon + \left(\tfrac{A}{1+A}\right)^2\varepsilon^2\right)$$
$$-\tfrac{A}{2}\left(\left(\tfrac{1}{1+A}\right)^2\varepsilon^2 - 2\left(\tfrac{1}{1+A}\right)\varepsilon y^T + y^{T^2}\right)$$
$$\Rightarrow E(V) = -\tfrac{1}{2}\left[(Ay^T)^2 + \left(\tfrac{A}{1+A}\right)^2\sigma_\varepsilon^2\right]$$
$$-\tfrac{A}{2}\left[\left(\tfrac{1}{1+A}\right)^2\sigma_\varepsilon^2 + y^{T^2}\right]$$

[mult both by $-\frac{2}{A}$]

Prefer Commit iff

$$\sigma_\varepsilon^2 + \cancel{y^{T^2}} < \tfrac{1}{A}\left[(Ay^T)^2 + \left(\tfrac{A}{1+A}\right)^2\sigma_\varepsilon^2\right] + \left[\left(\tfrac{1}{1+A}\right)^2\sigma_\varepsilon^2 + y^{T^2}\right]$$
$$< Ay^{T^2} + \tfrac{A}{(1+A)^2}\sigma_\varepsilon^2 + \tfrac{1}{(1+A)^2}\sigma_\varepsilon^2 + \cancel{y^{T^2}}$$
$$\sigma_\varepsilon^2 < Ay^{T^2} + \tfrac{1}{1+A}\sigma_\varepsilon^2$$
$$\sigma_\varepsilon^2 - \tfrac{1}{1+A}\sigma_\varepsilon^2 < Ay^{T^2}$$
$$\sigma_\varepsilon^2\left(\tfrac{A}{1+A}\right) < Ay^{T^2}$$

PREFER COMMIT IFF $\Rightarrow$ $\boxed{\sigma_\varepsilon^2 < y^{T^2}(1+A)}$

C. Optimal Delegation

1. One-time permanent delegation (Rogoff 1985): All, including median voter, prefer policymaker more conservative than self. (See Notes)

<u>Optimal Delegation</u> (Rogoff '85):

- Agent w/ parameter A can delegate perfectly to $\hat{A}$, but cannot force him to follow any policy but his preferred

$$\Rightarrow \max_{\hat{A}} E\left(V(A,\hat{A})\right) = \max_{\hat{A}} E\left[-\tfrac{1}{2}\left(\hat{A}y^T - \tfrac{\hat{A}}{1+\hat{A}}\varepsilon\right)^2 - \tfrac{A}{2}\left(\tfrac{1}{1+\hat{A}}\varepsilon - y^T\right)^2\right]$$

$$\frac{\partial E(V(\cdot))}{\partial \hat{A}} = E\left[-\left(\hat{A}y^T - \tfrac{\hat{A}}{1+\hat{A}}\varepsilon\right)\left(y^T - \tfrac{1}{(1+\hat{A})^2}\varepsilon + \tfrac{\hat{A}}{(1+\hat{A})^2}\right) + A\left(\tfrac{1}{1+\hat{A}}\varepsilon - y^T\right)\left(\tfrac{\varepsilon}{(1+\hat{A})^2}\right)\right]$$

$$= E\left[-\left(\hat{A}y^T - \tfrac{\hat{A}}{1+\hat{A}}\varepsilon\right)\left(y^T - \tfrac{\varepsilon}{(1+\hat{A})^2}\right) + A\left(\tfrac{\varepsilon}{1+\hat{A}} - y^T\right)\left(\tfrac{\varepsilon}{(1+\hat{A})^2}\right)\right]$$

$$= E\left[-\hat{A}y^{T^2} + \hat{A}y^T\varepsilon/(1+\hat{A})^2 + \tfrac{\hat{A}}{1+\hat{A}}\varepsilon y^T - \tfrac{\hat{A}}{(1+\hat{A})^3}\varepsilon^2 + \tfrac{A}{(1+\hat{A})^3}\varepsilon^2 - \tfrac{A}{(1+\hat{A})^2}\varepsilon y^T\right]$$

$$= -\hat{A}y^{T^2} + 0 + 0 - \tfrac{\hat{A}}{(1+\hat{A})^3}\sigma_\varepsilon^2 + \tfrac{A}{(1+\hat{A})^3}\sigma_\varepsilon^2 - 0$$

$$\Rightarrow \frac{\sigma_\varepsilon^2}{(1+\hat{A})^3}(A-\hat{A}) = \hat{A}y^{T^2}$$

$$\sigma_\varepsilon^2(A-\hat{A}) = (1+\hat{A})^3\hat{A}y^{T^2}$$

$$\sigma_\varepsilon^2 A = \sigma_\varepsilon^2\hat{A} + (\hat{A}+1)^3\hat{A}y^{T^2}$$

$$A = \hat{A} + \hat{A}(1+\hat{A})^3 y^{T^2}/\sigma_\varepsilon^2$$

$$\Rightarrow A > \hat{A}$$

2. Delegation with exogenous, lump-sum cost, c, to firing central banker (Lohmann 1992) $\Rightarrow$ $\pi = \begin{cases} \pi_b^*(\varepsilon) & for \quad \varepsilon < \psi(c) \\ \phi(\varepsilon)\cdot\pi_g^*(\varepsilon) + \left[1-\phi(\varepsilon)\right]\cdot\pi_b^*(\varepsilon) & for \quad \varepsilon > \psi(c) \end{cases}$

II. Interactions of Banks & Bargainers

A. Nominal Effects of Delegation to CB (Franzese '99, '03)

1. *Theory:* INF effects of monetary delegation depend on…

   a. Effectiveness of delegation from government to CB, ***c***, the ° of autonomy

   b. Factors to which govt-controlled mon. policy would respond, $\mathbf{X_g}$, and how it would respond, g(·), => g($\mathbf{X_g}$).

   c. Factors to which CB-controlled policy respond, $\mathbf{X_c}$, & how, f(·), => f($\mathbf{X_c}$)

2. *Implications:*

   a. INF = "convex combination": (EXAMPLE: linear weighted-average:)

$$Inflation \equiv \pi = c \cdot f(X_c) + (1-c) \cdot g(X_g)$$

   b. INF effect of delegation conditional:

      (1) *Formally:* INF-effect *c* depends on *everything* to which CB & govt respond diff'ly

$$d\pi/dc = f(\mathbf{X_c}) - g(\mathbf{X_g}) = h(x) \ \forall \ \{x : df/dx \neq dg/dx\}$$

      (2) *Intuitively:* The more (less) inflationary mon. policy would have been under full-govt control relative to under full-CB control, the more (less) anti-inflationary punch gained per ° effective delegation.

      (3) *Substance:* E.g., Anti-inflation impact of delegation to conservative ECB varied across country-times depending on how much inflationary pressure there would have been on govt of that country and its domestic CB autonomy & conservatism relative to ECB autonomy & conservatism & PE pressures on European govts.

III. Multiple Hands on the Wheel

A. **Overview**

1. Start w/ INF policy in non-exposed, flexible E.R. case (above)

2. Autonomy is a matter of degree ⇒

a. $\pi = C \cdot \pi_c(X_c) + (1 - C) \cdot \pi_g(X_g)$

b. ⇒ $d\pi/dC = f(\mathbf{X}_c, \mathbf{X}_g)$, not constant (as previously estimated)…

c. ⇒ all the converses: $d\pi/dx = g(C, \cdot)$

3. ⇒ Anti-INF benefit of C varies; suggests movements to/from CBI

4. ⇒ Institutional impacts "contextual" (classic & modern C&IPE theme)

5. Varying E.R. regime (P={0,1}) & int'l financial exposure (E={0..1}):

a.
$$\begin{aligned}\pi = {} & P \cdot E \cdot C \cdot \pi_1(X_1) + P \cdot E \cdot (1 - C) \cdot \pi_2(X_2) \\ & + P \cdot (1 - E) \cdot C \cdot \pi_3(X_3) + P \cdot (1 - E) \cdot (1 - C) \cdot \pi_4(X_4) \\ & + (1 - P) \cdot E \cdot C \cdot \pi_5(X_5) + (1 - P) \cdot E \cdot (1 - C) \cdot \pi_6(X_6) \\ & + (1 - P) \cdot (1 - E) \cdot C \cdot \pi_7(X_7) + (1 - P) \cdot (1 - E) \cdot (1 - C) \cdot \pi_8(X_8)\end{aligned}$$

b. Theory specifies $\pi_i(\mathbf{X}_i)$ ⇒ substantively & statistically informative estimates of proposition that domestic & foreign interests & institutions *all* interact to shape policies and outcomes.

6. Findings, Implications, Further Research, and New Directions

a. Using thry to inform empirical exploration of interactions in C&IPE

b. ⇒ leverage on complex hypoth's of classical & modern CP in avail data

c. Insights for Endogenizing Institutions? *Reform* when least needed?

d. Most P-A & other delegation situations should exhibit similar features

e. Actors' rel wt in shared pol control: Pres v. cong., Ministerial Discretion…

f. Direct empirical exploration of determinants of wts in shared policy control

g. Other instances where instit's & interests interact, w/ one factor moderating impact of several others similarly to determine policies and outcomes.

h. Empirical Methodology: Use theory to specify more precisely & directly the empirical model for estimation. Often nonlinear ⇒ NLS:

NLS: $y_i = h(X_i, \beta) + \varepsilon_i$

$$\Rightarrow \tfrac{1}{2}\sum \varepsilon_i^2 = \tfrac{1}{2}\sum [y_i - h(X_i, \beta)]^2 \equiv SSE(\beta)$$

$$\underset{\beta}{\text{Min}}\, SSE \Rightarrow \frac{\partial SSE(\beta)}{\partial \beta} = \sum_{i=1}^{n} [y_i - h(X_i, \beta)] \frac{\partial h(X_i, \beta)}{\partial \beta} = 0$$

- The Normal Equation from LS; e.g., if $h(\cdot)$ linear

$$\Rightarrow \sum_{i=1}^{n} (y_i - X_i\beta) \cdot X_i = \underset{\sim}{0} \quad \text{i.e., } \sum_{i=1}^{n} e_i X_i = \underset{\sim}{0}$$

NLS: Use Taylor Series Approx. to $h(X, \beta)$

$$\Rightarrow h(X, \beta) \approx h(X, \beta^0) + \sum_{k=1}^{K} \frac{\partial h(X, \beta)}{\partial \beta_k^0} \cdot (\beta_k - \beta_k^0)$$

$$\Rightarrow h(X, \beta) \approx \left[h(X, \beta^0) - \sum_{k=1}^{K} \frac{\partial h(X, \beta^0)}{\partial \beta_k^0} \cdot \beta_k^0\right] + \sum_{k=1}^{K} \beta_k \cdot \frac{\partial h(X, \beta^0)}{\partial \beta^0}$$

letting $X_k^0 = \dfrac{\partial h(X, \beta^0)}{\partial \beta_k^0} \Rightarrow h(X, \beta) \approx [h^0 - \Sigma X_k^0 \beta_k^0] + \Sigma X_k^0 \beta_k$

$$y = h(X, \beta) + \underset{\sim}{\varepsilon} \approx h^0 - X^{0\prime}\beta^0 + X^{0\prime}\beta + \varepsilon$$

$\Rightarrow$ Replace usual regressors, X, w/ pseudoregressors X^0 & β^0 & iterate until β^0 not updated noticeably

$\Rightarrow$ If pseudoregressors well-behaved, $\hat{\beta}$ all usual properties.

B. **Two Hands on the Wheel:** *Partially Autonomous Central Banks, Politically Responsive Governments, and Inflation* (*AJPS 1999*)

1. Political scientists and economists generally agree:

   a. CBA lowers inflation

   b. Define CBA: *degree* of (conservative) CB autonomy from current political authority in monetary policymaking

c. From the political scientist's view:

(1) CB=bureaucratic institution, led by financial experts, generally inflation hawks, whether socialized to that view or coming from population w/ those interests.

(2) Govts, esp. in democracies, more responsive to societal pressures that may emerge for INF. Only most conservative of govts as anti-inflationary as its CB.

(3) ⇒ Monetary authority delegation to conservative CB (=CBA) reduces inflation.

d. From the (neoclassical) economist's view:

(1) Mon pol involves time-inconsistency prob ⇒ discretionary-INF bias (i.e., govts)

(2) Credible delegation to autonomous, conservative CB ⇒ commitment device circumventing time-inconsistency & therefore bias.

(3) ⇒ CBA lowers inflation.

2. Some critics argue that CBA is epiphenomenal

a. Standard "institutions don't matter" argument with standard weakness.

b. Evidence directly addressing this notion in this case soundly rejects it.

3. However derived, thesis that CBA lowers inflation…

a. …incompletely understood,

b. …misunderstanding translated into its empirical testing,

c. …so many important theoretical & empirical implications of arg missed

C. <u>The Theory of CBA & Inflation Reconsidered</u>

1. CB autonomy from current govt in mon policymaking matter of *degree*

a. Never full b/c CBA invariably derives from legal or constitutional provision

(1) Political authorities can change either if CB policies ever sufficiently distasteful to justify expenditure of necessary political capital to change CB status.

(2) Plus, (re-)appointment of CB authorities usually by government.

b. Govt can't costlessly ensure CB conducts policy fully by its current will either

(1) CB expertise &/or informational advantage regarding monetary policy,

(2) Opp Costs: Time etc. even to monitor CB, more to conduct mon pol itself.

c. ⇒ CBA must measure *how far* CB could stray from current govt's desires before govt would find political & economic costs of altering CB law or seizing monetary reins itself worth bearing (see, e.g., Lohmann 1992).

2. ⇒ Monetary-policy *cum* inflation-control shared by CB & current govt

a. ...*if* domestic economy not so financially exposed that international considerations and inflation abroad would dominate either's concerns.

b. ...*if* domestic authorities have not sacrificed policy autonomy for an exchange-rate-peg commitment.

3. Four substantive implications followed sequentially…

a. Observed inflation = some convex combination of…

(1) What it would be if conservative CB credibly, completely, & autonomously controlled monetary policy and

(2) What it would be if instead current govt controlled monetary policy w/o any influence from CB

(3) With weight on former (weakly) increasing in degree of CBA. ***For Example***:

$$\pi = C \cdot \pi_c(X_c) + (1 - C) \cdot \pi_g(X_g)$$

b. Anti-inflationary impact of CBA not constant, as previously estimated, but rather varies depending on every political-economic factor to which CB's and govts would respond differently. And *vice versa*. In the example:

$$\frac{\partial \pi}{\partial C} = -[\pi_g(X_g) - \pi_c(X_c)] = f(X)$$

$$\frac{\partial \pi}{\partial x} = C \cdot \frac{\partial \pi_c}{\partial x} + (1 - C) \cdot \frac{\partial \pi_d}{\partial x} = g(C, X, \cdot)$$

$$\frac{\partial^2 \pi}{\partial C \partial x} \equiv \frac{\partial^2 \pi}{\partial x \partial C} = -[\frac{\partial \pi_g}{\partial x} - \frac{\partial \pi_c}{\partial x}] = h(\cdot)$$

(1) *E.g.*, Anti-inflationary impact of CBA…

(a) …greater when left controls govt than when right

(b) …less in more trade-open economies, & those with larger financial sectors,

(c) …varies w/ labor- and goods-market institutions, *etc.*

(2) All the converses. *E.g.*,:

(a) difference b/w INF under left and right govts and anti-inflationary impact of trade-openness, financial-sector size, etc. should be less the greater is CBA, etc.

c. ⇒ Political-economic environments differ, so CBA will have more anti-inflationary bite in some country-times than others => some country-times more likely to see increases or decreases in CBA than others?

d. ⇒ broader institutional C&IPE point: effect of institutions tend to be contextual; depend on configuration of other political, economic, structural, and institutional features of setting in which they *inter*act.

D. Can but need not derived from neoclassical model of CB-&-INF:

$$V^m = -[\frac{A_g}{2}(N_g^* - N)^2 + \frac{1}{2}(\pi_g^* - \pi)^2]$$

$$N = N_n + \alpha(\pi - \pi^e)$$

$$\pi_d^* = \pi_g^* + A_g \alpha(N_g^* - N_n)$$

$$\pi_c^* = \pi_b^* + A_b \alpha(N_b^* - N_n)$$

1. If so, then predicted effects of CB and other factors can be specified:

First-Order Predictions of the Theory of CBA and Inflation

The Inflation effect of…

…central bank autonomy. . . . . $\frac{\partial \pi}{\partial C} = -\left[\pi_d^* - \pi_c^*\right] = -\left[\pi_g^T - \pi_c^T + A_g\alpha\left(N_g^T - N_n\right) - A_b\alpha\left(N_b^T - N_n\right)\right] < 0$

…the government's inflation target. . . . . $\frac{\partial \pi}{\partial \pi_g^T} = 1 - C \geq 0$

…the bank's inflation target.. . . . . $\frac{\partial \pi}{\partial \pi_b^T} = C \geq 0$

…the government's weight on employment relative to inflat $\frac{\partial \pi}{\partial A_g} = \alpha(1 - C)\left(N_g^T - N_n\right) \geq 0$

…the bank's weight on employment relative to inflation. . . . $\frac{\partial \pi}{\partial A_b} = \alpha C\left(N_b^T - N_n\right) \geq 0$

…the government's employment-rate target. . . . . $\frac{\partial \pi}{\partial N_g^T} = \alpha(1 - C)A_g \geq 0$

…the bank's employment-rate target. . . . . $\frac{\partial \pi}{\partial N_g^T} = \alpha C A_b \geq 0$

…the natural rate of employment.. . . . . $\frac{\partial \pi}{\partial N_n} = -\alpha\left[A_g - C\left(A_g - A_b\right)\right] \leq 0$

…monetary real-efficacy (i.e., slope of the Phill $\frac{\partial \pi}{\partial \alpha} = CA_b\left(N_b^T - N_n\right) + (1 - C)A_g\left(N_g^T - N_n\right) \geq 0$

Second-Order (Interactive) Predictions of the Theory of CBA and Inflation

Statement	Converse	Formal Expression
The inflation effect of *C* depends on the government's inflation-rate target.	The inflation effect of the government's inflation-rate target depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial \pi_g^T} \equiv \frac{\partial \frac{\partial \pi}{\partial \pi_g^T}}{\partial C} = -1$
The inflation effect of *C* depends on the bank's inflation-rate target.	The inflation effect of the bank's inflation-rate target depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial \pi_b^T} \equiv \frac{\partial \frac{\partial \pi}{\partial \pi_b^T}}{\partial C} = 1$
The inflation effect of *C* depends on the government's weight on employment.	The inflation effect of the government's weight on employment depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial A_g} \equiv \frac{\partial \frac{\partial \pi}{\partial A_g}}{\partial C} = -\alpha\left(N_g^T - N_n\right) < 0$
The inflation effect of *C* depends on the bank's weight on employment.	The inflation effect of the bank's weight on employment depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial A_b} \equiv \frac{\partial \frac{\partial \pi}{\partial A_b}}{\partial C} = \alpha\left(N_b^T - N_n\right) \geq 0$
The inflation effect of *C* depends on the government's employment-rate target.	The inflation effect of the government's employment-rate target depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial N_g^T} \equiv \frac{\partial \frac{\partial \pi}{\partial N_g^T}}{\partial C} = -A_g\alpha < 0$
The effect of *C* on inflation depends on the bank's employment-rate target.	The effect of the bank's employment-rate target on inflation depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial N_g^T} \equiv \frac{\partial \frac{\partial \pi}{\partial N_g^T}}{\partial C} = -A_g\alpha < 0$
The effect of *C* on inflation depends on the natural rate of employment.	The effect of the natural rate of employment on inflation depends on *C*.	$\frac{\partial \frac{\partial \pi}{\partial C}}{\partial N_n} \equiv \frac{\partial \frac{\partial \pi}{\partial N_n}}{\partial C} = \alpha\left(A_g - A_b\right) > 0$

The effect of *C* on inflation depends on the slope of the Phillips Curve.	The effect of the slope of the Phillips Curve on inflation depends on *C*.	$\frac{\partial \frac{\delta \pi}{\delta C}}{\partial \alpha} \equiv \frac{\partial \frac{\delta \pi}{\delta \alpha}}{\partial C} = -\left[A_g(N_g - N_n) - A_b(N_b - N_n)\right] < 0$

2. Thus, neoclassical model implies that anything that increases…
   a. …weight govt puts on employment relative to inflation (A_g), or…
   b. …real-effectiveness of surprise money, *i.e.* Phillips Curve slope (α)…
   c. …govt's desired employment and/or inflation levels (N_g^* &/or π_g^*)…
3. …increases discretionary INF while anything that increases…
   a. …the natural rate of employment (N_n) lowers discretionary inflation.
4. Contrarily, INF w/ autonomous CB generally lower ($\pi_c < \pi_d$) & often assumed unaffected by these other considerations ($A_b = 0$).
5. ⇒ actual INF, π, decreases proportionately from discretionary levels, $\pi_d(X_d)$, toward commitment levels, $\pi_c(X_c)$ as CBA ↑.
6. ⇒ INF effect, $\partial\pi/\partial C$, more/less neg the higher/lower disc INF *would have been* relative to what commit INF *would have been*.

E. Conclusions do ***NOT*** depend on neoclassical model.

1. Any model in which…
   a. …monetary policy matters,
   b. …CB can have at least some monetary-policy autonomy,
   c. …& CB & political authority would respond differently &/or to diff factors,
2. ⇒ some sort of convex-combinatorial prediction, which then implies interactive effects etc, as not generally applied or fully realized

F. Point applies to many other situations: e.g., all P-A?

1. Abstractly, some $\pi = C \cdot \pi_c(X_c) + (1 - C) \cdot \pi_g(X_g)$
   PA situations (& many other sit's of divided control over outcome).
2. Principal-agent relations are problematic because…

a. given full latitude & capability, agent would act by some function, $y_1=f(X)$,

b. but principal, given same freedom, would act differently, say by $y_2=g(Z)$.

3. Some inst'l or other characteristics of environ then determine info, monitoring, enforcement, & other costs, ***c***, principal must incur to bring agent to act more according to $g(Z)$ and less according to $f(X)$.

4. ⇒ In any P-A situation, actually occurring *y* likely then given by some:

   a. $\mathbf{y=k(c)\cdot f(X)+[1-k(c)]\cdot g(Z)}$ with $\mathbf{0 \leq k(c) \leq 1}$ and $\mathbf{k(c)}$weakly increasing?

   b. So, effects of ***c*** generally depend on ***X*** and ***Z*** and effect of each element of ***X*** and ***Z*** generally depend on ***c*** and perhaps other elements of ***X*** and ***Z***.

5. Empirical applications of principal-agent models seem frequently to have missed this point.

G. Empirical Implementation in Simple, Closed-Econ Case

1. *AJPS* 43(3) identify 6 factors that should affect govt inflation policies and so whose inflationary impact degree of CBA would mitigate:

   a. **G**overnment **P**artisanship: left govts more inflationary than right (Higher A_g)

   b. **T**rade **E**xposure: more open economies inflation is more costly (Lower α)

   c. Inflation Abroad (π_a): ceteris paribus, inflation abroad generally imported

   d. **U**nion **P**ower: w/o coordination, leads to lack of wage restraint (Lower N_n)

   e. Wage/Price **B**argaining **C**oordination: wage/price restraint (Higher N_n)

   f. **F**inancial-**S**ector Employment-Share: recent version of epiphenomenality

   g. **E**lection **Y**ear indicator: added in international extension below.

2. ⇒ $\pi_g(\boldsymbol{X}_g) = \pi_g(GP, EY, UP, BC, AW, FS, TE, \pi_a)$

3. $\pi_c(\boldsymbol{X}_c) = \overline{\pi}_c$

4. ⇒ 3 Competing Empirical Models

a. *Standard Linear-Additive Model* (most previous analyses some version of this):

$$E(\pi) = B_0 + \beta_{gp}GP + \beta_{ey}EY + \beta_{up}UP + \beta_{bc}BC + \beta_{aw}AW + \beta_{fs}FS + \beta_{te}TE + \beta_{\pi a}\pi_a + \beta_c C \quad (1)$$

b. *Standard Linear-Interactive Model*: each PE factor operates differently on CB and Govt inflation policy:

$$E(\pi) = \begin{cases} B_0 + \beta_{gp}GP + \beta_{ey}EY + \beta_{up}UP + \beta_{bc}BC + \beta_{aw}AW + \beta_{fs}FS + \beta_{te}TE + \beta_{\pi a}\pi_a + \beta_{c2}C + \\ \beta_{cgp}C \cdot GP + \beta_{cey}C \cdot EY + \beta_{cup}C \cdot UP + \beta_{cbc}C \cdot BC + \beta_{caw}C \cdot AW + \beta_{cfs}C \cdot FS + \beta_{cte}C \cdot TE + \beta_{c\pi a}C \cdot \pi_a \end{cases} \quad (2)$$

c. *Theoretically Informed Model*: each PE influence operates only on Govt, not on (hypothetical) fully autonomous & conservative CB:

$$E(\pi) = \boldsymbol{B_0} + (\beta_{gp}GP + \beta_{ey}EY + \beta_{up}UP + \beta_{bc}BC + \beta_{aw}AW + \beta_{fs}FS + \beta_{te}TE + \beta_{\pi a}\pi_a) \cdot (1 - \beta_{c1}C) + \beta_{c1}C \cdot \beta_{c2} \quad (3)$$

5. Notes regarding these three models:

a. **(2)** and **(3)** encompass **(1)**; each offers direct test of usual linear-additive

b. **(3)** restricted version of **(2)**; direct test of that set of restrictions exists also

c. Many possibilities b/w **(2)** and **(3)** exist, other restrictions easily applied. None explored alter the substantive conclusions reached here.

6. *AJPS* 1999 showed that **(3)** substantively and statistically dominates **(1)** or **(2)**, and demonstrated the many interactive effects it implies.

IV. ***Varying Exchange Regimes & Int'l Financial Exposure***

$$\begin{aligned} \pi = {} & P \cdot E \cdot C \cdot \pi_1(X_1) + P \cdot E \cdot (1-C) \cdot \pi_2(X_2) \\ & + P \cdot (1-E) \cdot C \cdot \pi_3(X_3) + P \cdot (1-E) \cdot (1-C) \cdot \pi_4(X_4) \\ & + (1-P) \cdot E \cdot C \cdot \pi_5(X_5) + (1-P) \cdot E \cdot (1-C) \cdot \pi_6(X_6) \\ & + (1-P) \cdot (1-E) \cdot C \cdot \pi_7(X_7) + (1-P) \cdot (1-E) \cdot (1-C) \cdot \pi_8(X_8) \end{aligned} \quad (4)$$

A. Set-up & Central Conclusion Completely Analogous:

1. INF effects of E.R. regimes & int'l financial (monetary) exposure gen'ly depend on inst'l & struct characteristics of domestic & foreign

PE's

2. & *v. v.*, inflation effects of foreign & domestic PE institutions & structures depend on E.R. regime & international monetary exposure.

B. Above assumes domestic authorities retain mon-pol auton:

$$\pi_7 = \pi_c(\boldsymbol{X}_c) = \overline{\pi}_c \tag{5}$$

$$\pi_8 = \pi_g(\boldsymbol{X}_g) = \pi_g(GP, EY, UP, BC, AW, FS, TE, \pi_a) \tag{6}$$

C. Theoretical-ideal of fully financially exposed small econ, E=1,

1. ⇒ domestic concerns swamped by international considerations ⇒

$$\begin{aligned} &\pi_1(\boldsymbol{X}_1) = \pi_2(\boldsymbol{X}_2) = \pi_5(\boldsymbol{X}_5) = \pi_6(\boldsymbol{X}_6) = \pi_a \\ &\quad \Rightarrow \\ &\pi = \begin{cases} E \cdot \pi_a + P \cdot (1-E) \cdot C \cdot \pi_3(\boldsymbol{X}_3) + P \cdot (1-E) \cdot (1-C) \cdot \pi_4(\boldsymbol{X}_4) \\ + (1-P) \cdot (1-E) \cdot C \cdot \overline{\pi_c} + (1-P) \cdot (1-E) \cdot (1-C) \cdot \pi_g(\boldsymbol{X}_g) \end{cases} \end{aligned} \tag{7}$$

D. Fully effective fixed-exchange-rate regime ⇔ P=1,

1. Peg to single currency, SP=1, ⇒ π_p = inflation in that country.
2. Peg to currency-basket, MP=1, ⇒ π_p = basket-wtd-average of INF

$$\begin{aligned} &\pi_3(\boldsymbol{X}_3) = \pi_4(\boldsymbol{X}_4) = \pi_p \\ &\quad \Rightarrow \\ &\pi = E \cdot \pi_a + P \cdot (1-E) \cdot \pi_p + (1-P) \cdot (1-E) \cdot C \cdot \overline{\pi_c} + (1-P) \cdot (1-E) \cdot (1-C) \cdot \pi_g(\boldsymbol{X}_g) \end{aligned} \tag{8}$$

E. Express Theoretical Props in Estimable, Intuitive Reduced Form

$$\begin{aligned} \pi = {} & P \cdot E \cdot C \cdot \pi_1(X_1) + P \cdot E \cdot (1-C) \cdot \pi_2(X_2) \\ & + P \cdot (1-E) \cdot C \cdot \pi_3(X_3) + P \cdot (1-E) \cdot (1-C) \cdot \pi_4(X_4) \\ & + (1-P) \cdot E \cdot C \cdot \pi_5(X_5) + (1-P) \cdot E \cdot (1-C) \cdot \pi_6(X_6) \\ & + (1-P) \cdot (1-E) \cdot C \cdot \pi_7(X_7) + (1-P) \cdot (1-E) \cdot (1-C) \cdot \pi_8(X_8) \end{aligned} \tag{9}$$

1. Very simple (not too contentious?) contentions applied to **(9)** ⇒ much-reduced empirical form to estimate, yet gets all/most the substance:

$$\pi = E\cdot\pi_a + (1-E)\cdot\left\{P\cdot\pi_p + (1-P)\cdot\left[C\cdot\overline{\pi_c} + (1-C)\cdot\pi_g(\boldsymbol{X_g})\right]\right\}$$

$$\Rightarrow$$

$$\begin{aligned}
\frac{\partial\pi}{\partial E} &= \pi_a\left(P^*,E^*,C^*,\boldsymbol{X}^*,\pi_a^*\right) - \left\{P\cdot\pi_p\left(P^*,E^*,C^*,\boldsymbol{X}^*,\pi_p^*\right) + (1-P)\cdot\left[C\cdot\overline{\pi_c} + (1-C)\cdot\pi_g(\boldsymbol{X_g})\right]\right\} \\
\frac{\partial\pi}{\partial P} &= (1-E)\cdot\left\{\pi_p\left(P^*,E^*,C^*,\boldsymbol{X}^*,\pi_p^*\right) - \left[C\cdot\overline{\pi_c} + (1-C)\cdot\pi_g(\boldsymbol{X_g})\right]\right\} \\
\frac{\partial\pi}{\partial C} &= (1-E)\cdot\left\{(1-P)\cdot\left[\overline{\pi_c} - \pi_g(\boldsymbol{X_g})\right]\right\} \\
\frac{\partial\pi}{\partial x} &= (1-E)\cdot\left\{(1-P)\cdot\left[(1-C)\cdot\frac{\partial\pi_g}{\partial x}\right]\right\} \\
\frac{\partial\pi}{\partial x^*} &= E\cdot\frac{\partial\pi_a}{\partial x^*} + (1-E)\cdot\left\{P\cdot\frac{\partial\pi_p}{\partial x^*} + (1-P)\cdot\left[(1-C)\cdot\frac{\partial\pi_g}{\partial\pi_a}\cdot\frac{\partial\pi_a}{\partial x^*}\right]\right\}
\end{aligned} \tag{10}$$

2. Note that **(10)** is implicitly recursive and highly interactive: Domestic-inflation effect of domestic & foreign E.R. regimes, P & P^*, degrees of int'l exposure, E & E^*, and of CBA, C & C^*, and many other PE conditions, X_g & X_g^*, all generally depend on each others' levels.

F. Alternative Empirical Models of Central Conclusion: Domestic-INF effect of P, E, C, & each element of **X** generally depends on P, E, C, and perhaps the other **X** at home and abroad.

Assume: $\pi_g = f(GP, EY, UP, BC, AW, FS, TE, \pi_a) \equiv f(X_g)$ is linear.

1. **Standard Linear-Additive Model:**

$$E(\pi) = B_0 + \beta_{gp}GP + \beta_{ey}EY + \beta_{up}UP + \beta_{bc}BC + \beta_{aw}AW + \beta_{fs}FS + \beta_{te}TE + \beta_{\pi a}\pi_a + \beta_c C + \beta_{sp}SP + \beta_{mp}MP + \beta_e E \tag{12}$$

2. **Fully Interactive:** effect of each factor depends on configuration all others ⇒ 2^k terms (coefficient-estimates) required! (2048 terms here!)

3. **Pairwise Interactive:** effect of each factor depends on each of others but not the combinations of the others ⇒ N!/(2!(N-2)!) terms (coefficients) required! (55 terms in this case!)

4. **Hybrid Based on (10):** effect of each factor to which political authorities would respond, $\mathbf{X}_g$, depends on configuration of P, E, C ⇒ 2·2·2·8=64 terms (coefficients) required!

$$E(\pi) = B_0 + \begin{cases} E\cdot P\cdot C\cdot\left[\beta_{gp1}GP + \beta_{ey1}EY + \beta_{up1}UP + \beta_{bc1}BC + \beta_{aw1}AW + \beta_{fs1}FS + \beta_{te1}TE + \beta_{\pi a1}\pi_a\right] \\ E\cdot P\cdot(1-C)\cdot\left[\beta_{gp2}GP + \beta_{ey2}EY + \beta_{up2}UP + \beta_{bc2}BC + \beta_{aw2}AW + \beta_{fs2}FS + \beta_{te2}TE + \beta_{\pi a2}\pi_a\right] \\ E\cdot(1-P)\cdot C\cdot\left[\beta_{gp3}GP + \beta_{ey3}EY + \beta_{up3}UP + \beta_{bc3}BC + \beta_{aw3}AW + \beta_{fs3}FS + \beta_{te3}TE + \beta_{\pi a3}\pi_a\right] \\ (1-E)\cdot P\cdot C\cdot\left[\beta_{gp4}GP + \beta_{ey4}EY + \beta_{up4}UP + \beta_{bc4}BC + \beta_{aw4}AW + \beta_{fs4}FS + \beta_{te4}TE + \beta_{\pi a4}\pi_a\right] \\ (1-E)\cdot(1-P)\cdot C\cdot\left[\beta_{gp5}GP + \beta_{ey5}EY + \beta_{up5}UP + \beta_{bc5}BC + \beta_{aw5}AW + \beta_{fs5}FS + \beta_{te5}TE + \beta_{\pi a5}\pi_a\right] \\ (1-E)\cdot P\cdot(1-C)\cdot\left[\beta_{gp6}GP + \beta_{ey6}EY + \beta_{up6}UP + \beta_{bc6}BC + \beta_{aw6}AW + \beta_{fs6}FS + \beta_{te6}TE + \beta_{\pi a6}\pi_a\right] \\ E\cdot(1-P)\cdot(1-C)\cdot\left[\beta_{gp7}GP + \beta_{ey7}EY + \beta_{up7}UP + \beta_{bc7}BC + \beta_{aw7}AW + \beta_{fs7}FS + \beta_{te7}TE + \beta_{\pi a7}\pi_a\right] \\ (1-E)\cdot(1-P)\cdot(1-C)\cdot\left[\beta_{gp8}GP + \beta_{ey8}EY + \beta_{up8}UP + \beta_{bc8}BC + \beta_{aw8}AW + \beta_{fs8}FS + \beta_{te8}TE + \beta_{\pi a8}\pi_a\right] \end{cases} \quad (13)$$

[In each case, ignoring SP/MP complication, excluding constants & time-serial controls]

5. Model employing theoretically derived restrictions on **(9)** as in **(10)**:

$$E(\pi) = B_0 + \beta_e E\cdot\beta_{a*}\pi_a + (1-\beta_e E)\cdot\left\{\begin{bmatrix}(\beta_{gp}GP + \beta_{ey}EY + \beta_{up}UP + \beta_{bc}BC + \beta_{aw}AW + \beta_{fs}FS + \beta_{te}TE + \beta_{\pi g}\pi_a) \\ \cdot(1-\beta_{c1}C) + \beta_{c1}C\cdot\beta_{c2} \\ \cdot(1-\beta_{sp}SP - \beta_{mp}MP) + \beta_{sp}SP\cdot\beta_{a*}\pi_{sp} + \beta_{mp}MP\cdot\beta_{a*}\pi_{mp}\end{bmatrix}\right\} \quad (14)$$

a. Only 14 (!) Unique Coefficients (plus a constant and time-serial controls),

b. Each with Intuitive Substantive Meaning

(1) E.g., β_{sp} and β_{mp} are the estimated degrees to which SP's and MP's bind.

(2) β_{c1} is the degree to which each unit increase in CB conservatism and autonomy mutes the inflation effects of variables to which domestic governments would have responded *when domestic authorities control inflation* (i.e., when P=E=0).

(3) β_{e1} is degree to which international exposure constrains domestic authorities &/or their hopes for an exchange-rate peg from determining domestic inflation.

(4) $[\beta_0+\beta_{c2}]/(1-\rho)$ is estimated constant inflation-target of (hypothetical) fully autonomous and conservative CB.

(5) Other β_x simply reflect inflation response to *x* when domestic governments

completely control domestic inflation-policies.

6. Estimation of **(14)** by NLS (see Greene 10.1-2); Can also do by MLE

Table 1: Alternative Models of Inflation in 21 Dev'd Dems, 1957-90

Independent Variable		Linear-Additive Model (12)	Linear-Interactive Model (13) P=1 E=1 C=1	P=0 E=1 C=1	P=1 E=0 C=1	P=0 E=0 C=1	P=1 E=1 C=0	P=0 E=1 C=0	P=1 E=0 C=0	P=0 E=0 C=0	Theory-Informed Model (14)
Intercept		+.80	+5.93								**+.53**
		(6.1)	(8.40)								**(.30)**
π_{t-1}		**+.65**	**+.51**								**+.55**
		(.05)	**(.06)**								**(.05)**
π_{t-2}		-.03	**-.10**								**-.12**
		(.04)	**(.04)**								**(.04)**
X_g (The factors to which domestic governments respond)	GP	**-.14**	*+.39*	-.09	***-3.37***	-1.37	-.15	-.30	***+1.82***	-.39	**-.60**
		(.08)	*(.80)*	(1.29)	***(1.31)***	(8.16)	(.47)	(.97)	***(.74)***	(4.68)	**(.30)**
	EY	**+.59**	+.75	*-2.06*	+.50	*-.88*	*-2.31*	***+6.03***	+1.87	+3.81	**+2.60**
		(.30)	(.80)	*(2.31)*	(3.07)	*(14.67)*	*(1.56)*	***(3.46)***	(1.81)	(6.88)	**(1.32)**
	UP	**+2.19**	***-16.59***	+9.51	*-3.82*	*-2.46*	***+33.95***	+2.44	*-11.88*	*-3.32*	**+16.2**
		(.74)	***(6.43)***	(17.42)	*(13.91)*	*(59.24)*	***(7.64)***	(15.92)	*(13.56)*	*(37.49)*	**(4.61)**
	BC	**-1.36**	*+4.38*	***+11.27***	+6.02	*-39.11*	***-15.61***	-11.69	*+2.20*	*+9.27*	**-10.7**
		(.41)	*(3.50)*	***(5.33)***	*(4.91)*	*(30.32)*	***(3.97)***	(9.79)	*(3.86)*	*(23.64)*	**(2.35)**
	AW	+.13	-.76	-2.37	+1.94	***+13.70***	-.56	-.66	-2.24	-3.43	**+1.18**
		(.71)	(1.15)	(1.51)	(1.43)	***(5.37)***	(1.10)	(1.38)	(1.91)	(2.35)	**(.49)**
	FS	**-.15**	**-.86**	***+2.00***	***+2.11***	***-11.13***	*+.55*	-1.64	-1.00	*+4.63*	**-1.09**
		(.10)	**(.36)**	***(.96)***	***(.79)***	***(4.61)***	*(.36)*	(1.26)	(.71)	*(3.90)*	**(.30)**
	TE	-.04	***+31.74***	***-50.21***	*-54.49*	*+50.81*	***-37.33***	***+104.56***	*+48.70*	*-120.5*	**-8.23**
		(.99)	***(14.33)***	***(25.31)***	*(39.85)*	*(176.99)*	***(14.87)***	***(30.40)***	*(33.74)*	*(103.79)*	**(4.92)**
	π_a	**+.39**	+.24	**+.89**	*-.07*	*-4.01*	**+.89**	+.18	**+.98**	*+2.65*	**+.64**
		(.07)	(.14)	**(.52)**	*(.59)*	*(3.94)*	**(.31)**	(.78)	**(.33)**	*(2.58)*	**(.24)**
E		+.29	—								**+.44**
		(.75)									**(.14)**
SP		-.33	—								**+1.04**
		(.49)									**(.05)**
MP		-.37	—								**+.22**
		(.38)									**(.12)**
π_{sp}, π_{mp}, π_a		—	—								**+.59**
											(.07)
C		**-1.62**	—								**+1.03**
		(.68)									**(.11)**
$\overline{\pi}_c$		—	—								**-.59**
											(1.18)
Obs. (° Free)		**660 (645)**	**660 (593)**								**660 (643)**
$\bar{R}^2$ **(S.E.R.)**		**.72 (2.48)**	**.75 (2.31)**								**.76 (2.30)**
D-W		**1.91**	**2.03**								**1.96**

NOTES: Estimation by NLS or OLS with Newey-West robust variance-covariance matrix. Standard errors in parentheses. Coefficients significant at the .10 level or better in bold; coefficients of implausible sign or magnitude in italics.

V. Model Results:

$$E(\pi) \approx \left\langle \begin{array}{l} .53^{.30} + 55^{.05}\pi_{t-1} - 12^{.04}\pi_{t-2} + .44^{.14}E \cdot \pi_a + \\ (1-.44^{.14}E)\cdot \left\{ \begin{array}{l} 1.0^{.05}SP \cdot .59^{.07}\pi_{sp} + .22^{.12}MP \cdot .59^{.07}\pi_{mp} + \\ (1-1.0^{.05}SP - .22^{.12}MP)\cdot \left[\begin{array}{l} 1.0^{.11}C \cdot (-.59^{12}) + \\ (1-1.0^{.11}C)\cdot \left(\begin{array}{l} -.60^{.30}GP + 2.6^{13}EY + 16^{4.6}UP - 11^{2.4}BC \\ +1.2^{.49}AW - 11^{.30}FS - 8.2^{4.9}TE + .64^{.24}\pi_a \end{array} \right) \end{array} \right] \end{array} \right\} \end{array} \right\rangle \quad (15)$$

A. Examples:

1. Each extra +.1 on Quinn index (rescaled 0-1) of int'l financial exposure reduce domestic inflation-autonomy 4.4±%.

2. Subject to that restraint, basket pegs constrain domestic authorities 22% further, while single-currency pegs seem remarkably effective, fully constraining domestic author from responding to domestic conditions

3. Central bank auton reduces political-economic influences on inflation by 10% for each +.1 CBA. (e.g., US-SZ-GE ascending +.1± series)

4. Each of these imply a series of interactive effects ⇒ Effect of peg generally depends on C, E, π_p, and all other elements of X. Through π_p, it also depends on peg-country values of all these factors.

   a. $E\left(\frac{d\pi}{dx}\right) = (1-.44E)\cdot\{(1-SP-.22MP)\cdot[(1-C)\cdot b_x]\}$

   b. $E\left(\frac{d\pi}{dC}\right) = (1-.44\cdot E)\cdot\{(1-SP-.22MP)\cdot[(.6GP-2.6EY-16UP+11BC-1.2AW+11FS+8.2TE-.64\pi_a)-.59]\}$

   c. $E\left(\frac{d\pi}{dP}\right) = (1-.44E)\cdot b_p\cdot\{.59\pi_p - [(1-C)\cdot(-.6GP+2.6EY+16UP-11BC+1.2AW-11FS-8.2TE+.64\pi_a)-.59C]\}$

   d. $E\left(\frac{d\pi}{dE}\right) = .44\cdot\left(\pi_a - \{b_p P\cdot .59\pi_p + (1-b_p P)\cdot[(1-C)\cdot(-.6GP+2.6EY+16UP-11BC+1.2AW-11FS-8.2TE+.64\pi_a)-.59C]\}\right)$

B. Further graphics and tables may also help:

Table 3: Estimated Immediate Domestic-Inflation Effect of the Political-Economic Conditions to Which Government Respond, as a Function of *CBA*, *E*, and *P*

		E=0.40			*E=0.65*			*E=0.90*		
		SP=MP=0	*MP=1*	*SP=1*	*SP=MP=0*	*MP=1*	*SP=1*	*SP=MP=0*	*MP=1*	*SP=1*
		Estimated Impact of 1-Unit Rightward Shift in Government Partisanship ($d\pi/dGP$)								
	0.26	$-0.359^{.17}$	$-0.281^{.15}$	$-0.000^{.02}$	$-0.311^{.15}$	$-0.243^{.13}$	$-0.000^{.02}$	$-0.262^{.12}$	$-0.206^{.11}$	$-0.000^{.01}$
CBA =	*0.46*	$-0.257^{.12}$	$-0.202^{.10}$	$-0.000^{.01}$	$-0.223^{.10}$	$-0.174^{.09}$	$-0.000^{.01}$	$-0.188^{.09}$	$-0.147^{.08}$	$-0.000^{.01}$
	0.66	$-0.156^{.07}$	$-0.122^{.06}$	$-0.000^{.01}$	$-0.135^{.06}$	$-0.106^{.05}$	$-0.000^{.01}$	$-0.114^{.05}$	$-0.089^{.05}$	$-0.000^{.01}$
		Estimated Impact of a Post-Election Year ($d\pi/dEY$)								
	0.26	$+1.563^{.79}$	$+1.224^{.61}$	$+0.000^{.09}$	$+1.352^{.69}$	$+1.059^{.53}$	$+0.000^{.07}$	$+1.142^{.60}$	$+0.894^{.47}$	$+0.000^{.06}$
CBA=	*0.46*	$+1.120^{.57}$	$+0.877^{.44}$	$+0.000^{.06}$	$+0.970^{.50}$	$+0.759^{.39}$	$+0.000^{.05}$	$+0.819^{.44}$	$+0.641^{.34}$	$+0.000^{.05}$
	0.66	$+0.678^{.37}$	$+0.531^{.29}$	$+0.000^{.04}$	$+0.587^{.32}$	$+0.459^{.25}$	$+0.000^{.03}$	$+0.495^{.28}$	$+0.388^{.22}$	$+0.000^{.03}$
		Estimated Impact of 10% Increase in Union Density ($0.1 \cdot d\pi/dUP$)								
	0.26	$+0.98^{.25}$	$+0.76^{.18}$	$+0.00^{.05}$	$+0.84^{.21}$	$+0.66^{.16}$	$+0.00^{.04}$	$+0.71^{.19}$	$+0.56^{.14}$	$+0.00^{.04}$
CBA=	*0.46*	$+0.70^{.18}$	$+0.55^{.13}$	$+0.00^{.04}$	$+0.61^{.15}$	$+0.47^{.11}$	$+0.00^{.03}$	$+0.51^{.14}$	$+0.40^{.10}$	$+0.00^{.03}$
	0.66	$+0.42^{.13}$	$+0.33^{.10}$	$+0.00^{.02}$	$+0.37^{.11}$	$+0.29^{.08}$	$+0.00^{.02}$	$+0.31^{.10}$	$+0.24^{.08}$	$+0.00^{.02}$
		Estimated Impact of 0.25 Increase in Bargaining Coordination ($0.25 \cdot d\pi/dBC$)								
	0.26	$-1.61^{.30}$	$-1.26^{.21}$	$-0.00^{.08}$	$-1.39^{.26}$	$-1.09^{.19}$	$-0.00^{.07}$	$-1.17^{.25}$	$-0.92^{.19}$	$-0.00^{.06}$
CBA=	*0.46*	$-1.15^{.20}$	$-0.90^{.15}$	$-0.00^{.06}$	$-1.00^{.18}$	$-0.78^{.13}$	$-0.00^{.05}$	$-0.84^{.18}$	$-0.66^{.14}$	$-0.00^{.04}$
	0.66	$-0.70^{.15}$	$-0.55^{.12}$	$-0.00^{.03}$	$-0.60^{.13}$	$-0.47^{.11}$	$-0.00^{.03}$	$-0.51^{.13}$	$-0.40^{.10}$	$-0.00^{.03}$
		Estimated Impact of Unit Increase in ln(real GDP per Capita) ($d\pi/dAW$)								
	0.26	$+0.71^{.27}$	$+0.56^{.20}$	$+0.00^{.04}$	$+0.62^{.23}$	$+0.48^{.17}$	$+0.00^{.03}$	$+0.52^{.20}$	$+0.41^{.15}$	$+0.00^{.03}$
CBA=	*0.46*	$+0.51^{.20}$	$+0.40^{.15}$	$+0.00^{.03}$	$+0.44^{.17}$	$+0.35^{.12}$	$+0.00^{.02}$	$+0.37^{.14}$	$+0.29^{.11}$	$+0.00^{.02}$
	0.66	$+0.31^{.13}$	$+0.24^{.10}$	$+0.00^{.02}$	$+0.27^{.11}$	$+0.21^{.08}$	$+0.00^{.01}$	$+0.23^{.09}$	$+0.18^{.07}$	$+0.00^{.01}$
		Estimated Impact of 1% Increase in Financial-Sector Employment-Share ($d\pi/dFS$)								
	0.26	$-0.66^{.18}$	$-0.52^{.12}$	$-0.00^{.03}$	$-0.57^{.16}$	$-0.45^{.11}$	$-0.00^{.03}$	$-0.48^{.15}$	$-0.38^{.11}$	$-0.00^{.03}$
CBA=	*0.46*	$-0.47^{.13}$	$-0.37^{.09}$	$-0.00^{.02}$	$-0.41^{.12}$	$-0.32^{.08}$	$-0.00^{.02}$	$-0.35^{.11}$	$-0.27^{.08}$	$-0.00^{.02}$
	0.66	$-0.29^{.10}$	$-0.22^{.07}$	$-0.00^{.01}$	$-0.25^{.09}$	$-0.19^{.06}$	$-0.00^{.01}$	$-0.21^{.08}$	$-0.16^{.06}$	$-0.00^{.01}$
		Estimated Impact of 10% Increase in Trade Exposure ($.1 \cdot d\pi/dTE$)								
	0.26	$-0.50^{.28}$	$-0.39^{.19}$	$-0.00^{.03}$	$-0.43^{.23}$	$-0.34^{.16}$	$-0.00^{.02}$	$-0.36^{.19}$	$-0.28^{.14}$	$-0.00^{.02}$
CBA=	*0.46*	$-0.36^{.19}$	$-0.28^{.13}$	$-0.00^{.02}$	$-0.31^{.16}$	$-0.24^{.11}$	$-0.00^{.02}$	$-0.26^{.14}$	$-0.20^{.09}$	$-0.00^{.01}$
	0.66	$-0.22^{.11}$	$-0.17^{.08}$	$-0.00^{.01}$	$-0.19^{.10}$	$-0.15^{.07}$	$-0.00^{.01}$	$-0.16^{.08}$	$-0.12^{.06}$	$-0.00^{.01}$
		Estimated Impact of 1% Increase in Average Inflation Abroad ($d\pi/d\pi_a$)								
	0.26	$+0.49^{.14}$	$+0.41^{.13}$	$+0.11^{.05}$	$+0.50^{.12}$	$+0.43^{.11}$	$+0.17^{.07}$	$+0.52^{.10}$	$+0.46^{.10}$	$+0.24^{.09}$
CBA=	*0.46*	$+0.38^{.10}$	$+0.32^{.09}$	$+0.11^{.04}$	$+0.41^{.08}$	$+0.36^{.08}$	$+0.17^{.06}$	$+0.44^{.08}$	$+0.39^{.08}$	$+0.24^{.08}$
	0.66	$+0.27^{.06}$	$+0.24^{.06}$	$+0.11^{.04}$	$+0.32^{.06}$	$+0.28^{.06}$	$+0.17^{.06}$	$+0.36^{.06}$	$+0.33^{.06}$	$+0.24^{.08}$

NOTES: Standard errors noted in superscripts.[1]

Table 2: Estimated Immediate Effect of .1 Increase in *CBA* as a Function of *E*, *P*, and $\pi(X_g)$

Inflation Under Full Domestic Government Control [$\pi(X_g)$]		$\pi(X_g)$= 2.00			$\pi(X_g)$= 6.00			$\pi(X_g)$= 10.00		
International Financial Exposure [E]		**0.40**	**0.65**	**0.90**	**0.40**	**0.65**	**0.90**	**0.40**	**0.65**	**0.90**
Exchange-Rate Regime [P]	**SP=1**	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$	$-0.00^{.01}$
	MP=1	$-0.17^{.07}$	$-0.15^{.05}$	$-0.12^{.04}$	$-0.43^{.08}$	$-0.37^{.06}$	$-0.31^{.06}$	$-0.68^{.11}$	$-0.59^{.10}$	$-0.50^{.10}$
	SP=MP=0	$-0.21^{.09}$	$-0.19^{.07}$	$-0.16^{.05}$	$-0.54^{.07}$	$-0.47^{.05}$	$-0.40^{.05}$	$-0.87^{.06}$	$-0.76^{.06}$	$-0.64^{.09}$

NOTES: Standard errors noted in superscripts.

[1] Standard errors for all conditional effects reported derived from a/f where f is the square root of the F-statistic for the Wald test that the effect is zero and a is the estimated effect

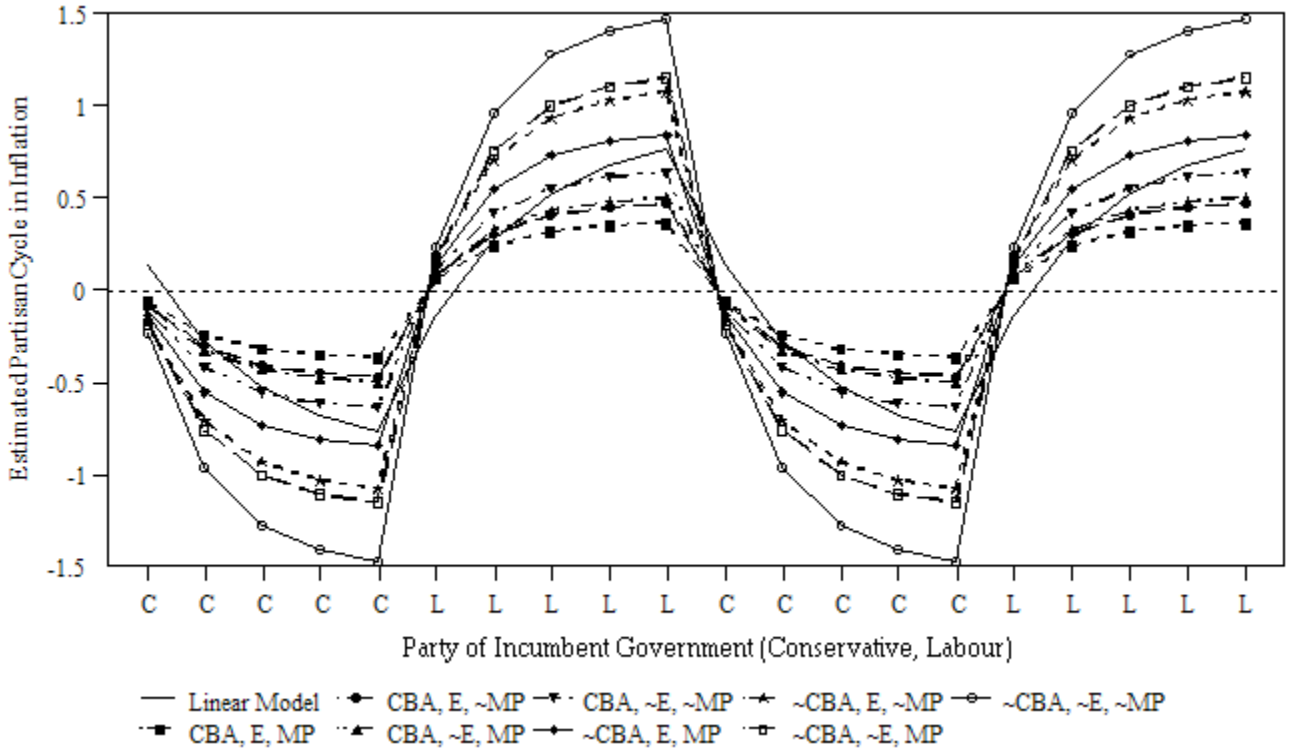


Figure 13: Estimated Partisan Cycles in the Linear & Theoretically Informed Models at High & Low CBA, E, & MP

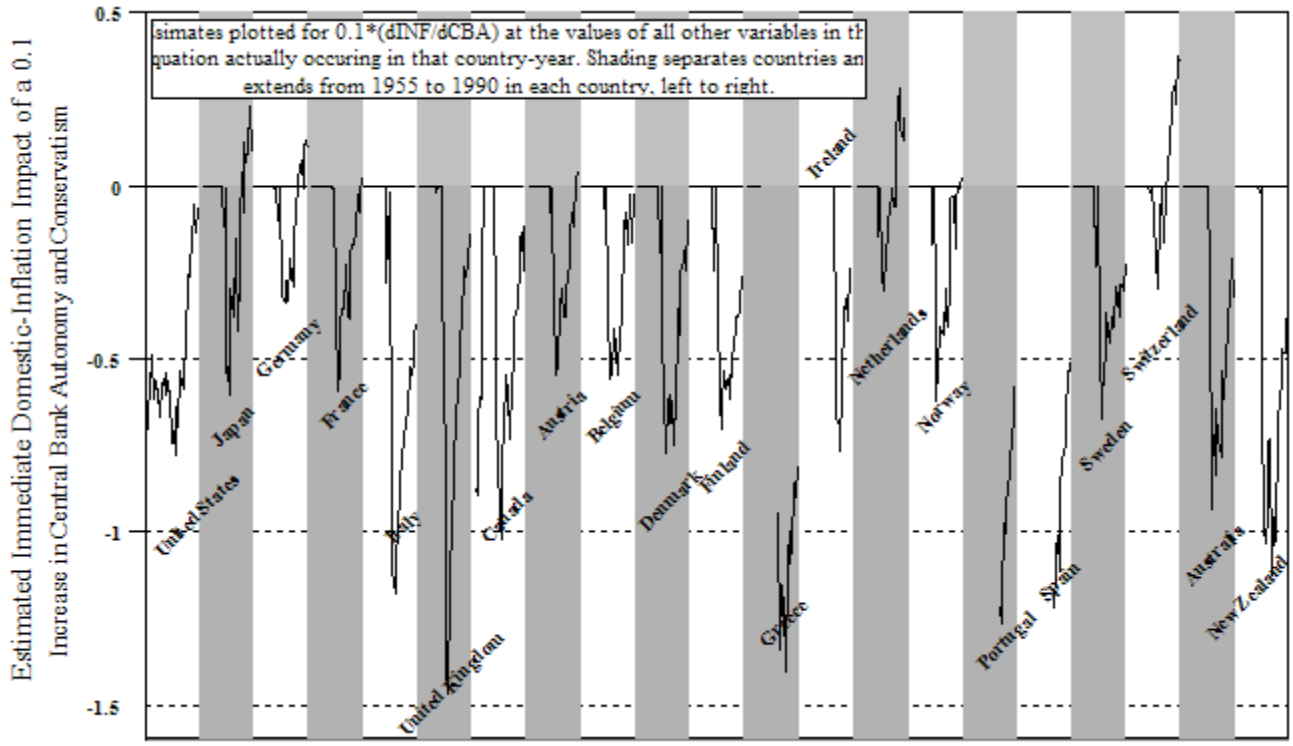


Figure 14: Estimated Immediate Domestic-Inflation Impact of 0.1 Increase in CBA in 21 Countries, 1957-90

Table 4: Estimated Domestic-Inflation Impact of a Single-Country Exchange-Rate Peg (*SP*) as a Function of the Difference between Domestic and Peg-Country Inflation and of *E*

	E=.40			*E=.65*			*E=.90*		
$\pi(C,X_g)=$	*2*	*6*	*10*	*2*	*6*	*10*	*2*	*6*	*0*
2	$-0.67^{.14}$	$-3.96^{.41}$	$-7.25^{.71}$	$-0.58^{.14}$	$-3.43^{.53}$	$-6.28^{.96}$	$-0.49^{.15}$	$-2.90^{.68}$	$-5.30^{1.2}$
$\pi_p(Z_p^*)=$ *6*	$+1.29^{.41}$	$-2.01^{.43}$	$-5.30^{.66}$	$+1.11^{.34}$	$-1.74^{.42}$	$-4.59^{.78}$	$+0.94^{.34}$	$-1.47^{.44}$	$-3.87^{.94}$
10	$+3.24^{.71}$	$-0.05^{.60}$	$-3.34^{.72}$	$+2.81^{.64}$	$-0.04^{.52}$	$-2.89^{.70}$	$+2.37^{.69}$	$-0.04^{.44}$	$-2.44^{.73}$

NOTES: Standard errors, in superscripts, assume hypothetical π_p and $\pi(C,X_g)$ known without error.

Table 5: Estimated Immediate Domestic-Inflation Effect of a Multi-Country Peg (*MP*) as a Function of the Difference between Domestic and Peg-Country Inflation and of *E*

	E=.40			*E=.65*			*E=.90*		
$\pi(C,X_g)=$	*2*	*6*	*10*	*2*	*6*	*10*	*2*	*6*	*0*
2	$-0.15^{.09}$	$-0.86^{.50}$	$-1.57^{.91}$	$-0.13^{.08}$	$-0.74^{.43}$	$-1.36^{.79}$	$-0.11^{.07}$	$-0.63^{.38}$	$-1.15^{.69}$
$\pi_p(Z_p^*)=$ *6*	$+0.28^{.18}$	$-0.44^{.26}$	$-1.15^{.67}$	$+0.24^{.15}$	$-0.38^{.23}$	$-1.00^{.58}$	$+0.20^{.13}$	$-0.32^{.20}$	$-0.84^{.51}$
10	$+0.70^{.42}$	$-0.01^{.13}$	$-0.73^{.44}$	$+0.61^{.37}$	$-0.01^{.11}$	$-0.63^{.38}$	$+0.51^{.32}$	$-0.01^{.09}$	$-0.53^{.33}$

NOTES: Standard errors, in superscripts, assume hypothetical π_p and $\pi(C,X_g)$ known without error.

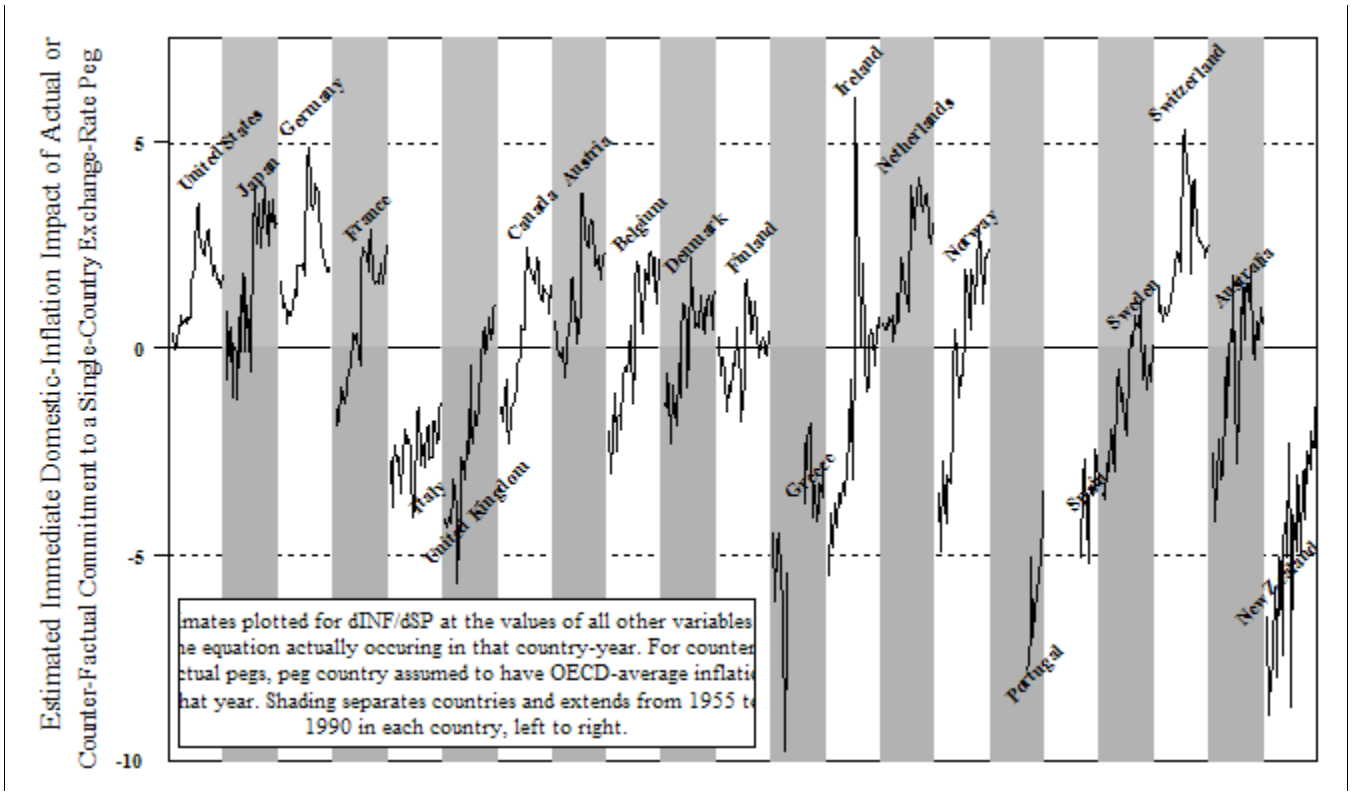


Figure 15: Estimated Immediate Domestic-Inflation Impact of Actual or Counter-Factual SP in 21 Countries, 1957-90

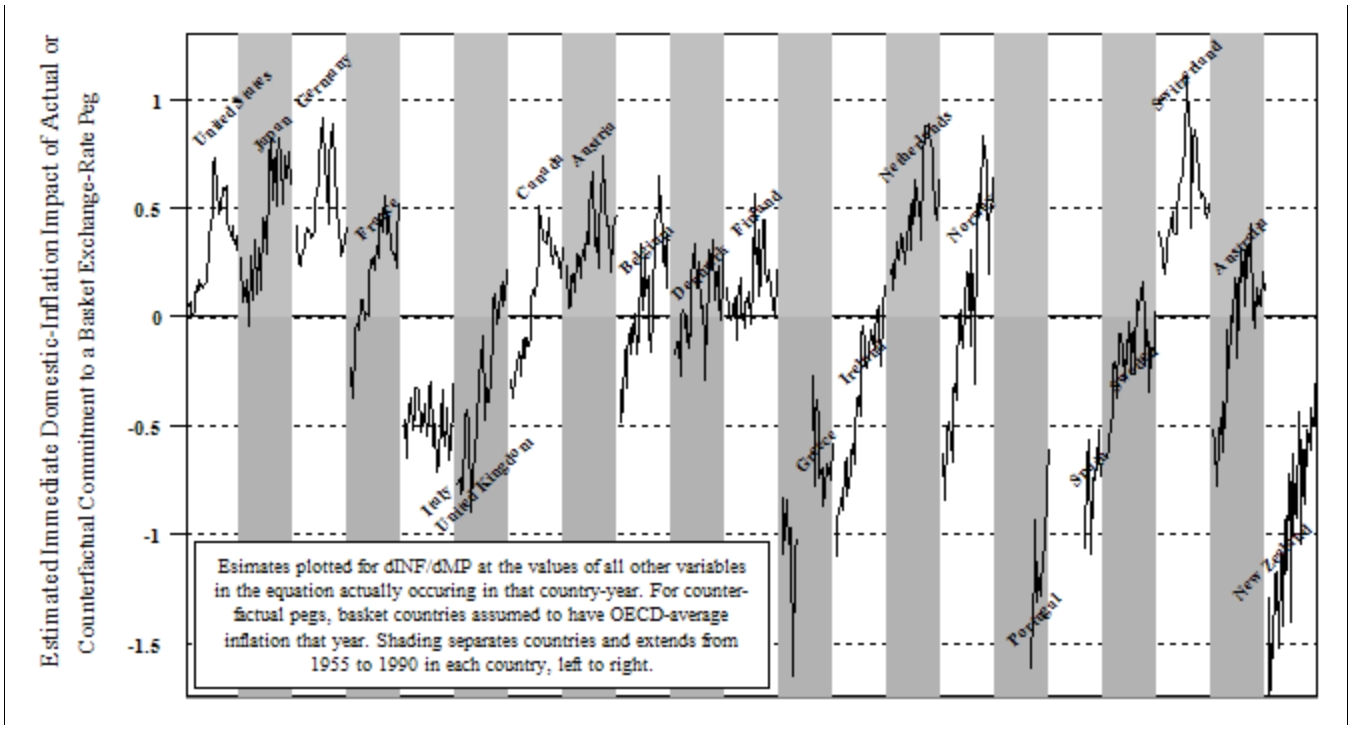


Figure 16: Estimated Immediate Domestic-Inflation Impact of Actual or Counter-Factual MP in 21 Countries, 1957-90

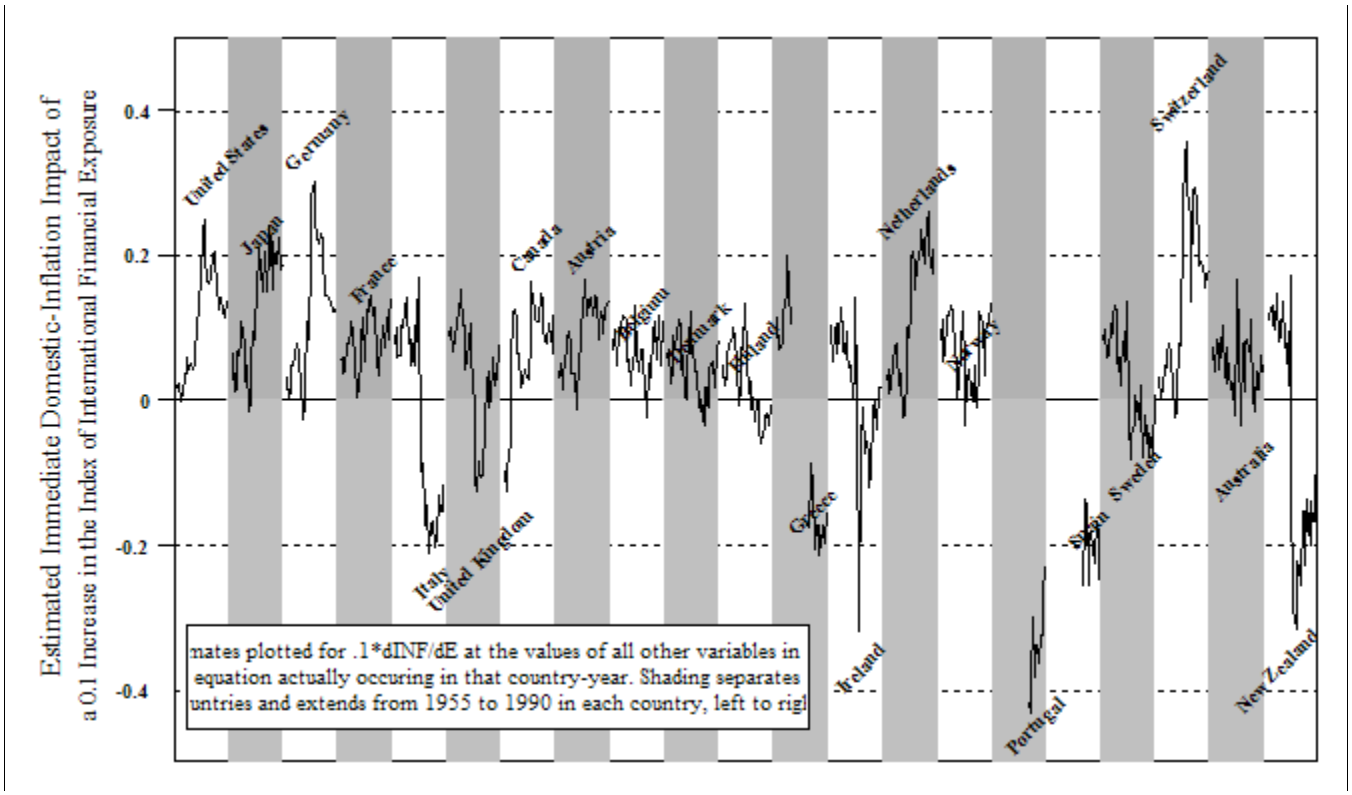


Figure 17: Estimated Immediate Domestic-Inflation Impact of 0.1 Increase in *E* in 21 Countries, 1957-90

C. Conclusions and Where Next?

1. Back to Foundations of C&IPE:

   a. Foreign & domestic inst's & interests interact to shape policies & outcomes (Katzenstein, Gourevitch, Hall; Hall-Soskice; Rogowski, Frieden, Garrett).

   b. A compromise to gain empirical leverage on these complex contentions. *Empirical analysis must be theoretical informed to be theoretically informing.*

2. Endogenizing the Institutions: Findings again suggested that institutional *reforms* generally occur when least effective economically

3. Extensions (*NOTE* empirical-leverage tradeoff as complications ↑)

   a. Substitute model for now-assumed-constant parameters like… "effective degree of commitment to various exchange-rate regimes" ⇒

$$\pi = C \cdot \left\{ \pi_c + f(E, TE, P) \cdot \pi_a \right\} + (1 - C) \cdot \left\{ \pi_g(X_g) + g(E, TE, P) \cdot \pi_a \right\}$$

   b. Similarly, model effective ° CBA rather than assume fixed & estimate…

      (1) Federalism & bureaucratic autonomy (e.g., Lohmann, Weingast)

      (2) Divided interest w/in government and CBA (e.g., most recently, Bernhard)

   c. More generally, # & location of Veto Actors (e.g., Tsebelis)

   d. Other Delegation & P-A situations (e.g., bureaucratic (e.g., CB) influence):

      (1) Generally, P-A relations problematic b/c, w/ perfect latitude & capability, *A* would act as $y_1=f(X)$, while *P*, w/ same freedom & capacity, $y_2=g(Z)$.

      (2) Some institutional &/or other aspects of environ. ⇒ information, monitoring, enforcement, & other costs, *c*, *P* must incur to force *A* by g(Z) instead of f(X).

      (3) Will often ⇒ observed $y=k(c)\cdot f(X)+[1-k(c)]\cdot g(Z)$ w/ $0 \le k(c) \le 1$ with $k'(c) \ge 0$

      (4) ⇒ effects of *c* generally depend on *X* & *Z* & effect of each *x* & *z* depend on *c*.

   e. Presidential and bi-/uni-cameral systems

      (1) *If* partisanship or other *measurable* aspects of branches differ (constit. struct.?),

(2) & theory => differing policy or outcome functions if each had full control, *then*

(3) Convex-combinatorial model would enable estimation of each degree of control.

(4) Might originally assume constant and subsequently model as above.

f. PM, *v.* cabinet-average/-median, *v.* portfolio-minister, *v.* bargaining power of cabinet members, control of policy in parliamentary democracy. E.g.:

(1) Laver-Shepsle coalition-form./portfolio-alloc. model & ministerial autonomy

(2) *If* data show sufficient partisan variation b/w PM & portfol. min.'s, degree that each controls various policy-outcomes model-able this way.

(3) Again, might originally model as constant, then use theory to inform exploration of conditions that determine degree of ministerial discretion.

g. Opposition & Extra-parliamentary influence on policy, etc., etc.

h. Partisan & electoral economic-policy manipulation: Excellent venue to explore such things at C&IPE Core: Multiple policies available; multiple constraints on policymaker discretion; multiple domestic, foreign, int'l inst's & struct's that modify effectiveness of diff policies; multiple policymakers.

4. Multiple constituencies: E.g., Weingast-Shepsle-Johnson & Distributive Politics. BUT What's a constituency? (Franzese, Jusko, and Nooruddin '05)

5. Veto actors "status-quo-biasing" alter many other factors' impact sim'ly

6. Anywhere policy control shared, or where one or some set of factors modify the impact of several others similarly…

II. Interactions of Banks & Bargainers

A. Nominal Effects of Delegation to CB (Franzese '99, '02)

1. *Theory:* INF effects of monetary delegation depend on…

a. Effectiveness of delegation from government to CB, ***c***, the ° of autonomy

b. Factors to which govt-controlled mon. policy would respond, $\mathbf{X_g}$, and how it would respond, g(·), => g($\mathbf{X_g}$).

c. Factors to which CB-controlled policy respond, $\mathbf{X_c}$, & how, f(·), => f($\mathbf{X_c}$)

2. *Implications:*

a. INF = "convex combination": (EXAMPLE: linear weighted-average:)

$$Inflation \equiv \pi = c \cdot f(X_c) + (1-c) \cdot g(X_g)$$

b. INF effect of delegation conditional:

(1) *Formally:* INF-effect *c* depends on *everything* to which CB & govt respond diff'ly

$$d\pi/dc = f(\mathbf{X_c}) - g(\mathbf{X_g}) = h(x) \ \forall \ \{x : df/dx \neq dg/dx\}$$

(2) *Intuitively:* The more (less) inflationary mon. policy would have been under full-govt control relative to under full-CB control, the more (less) anti-inflationary punch gained per ° effective delegation.

(3) *Substance:* E.g., Anti-inflation impact of delegation to conservative ECB varied across country-times depending on how much inflationary pressure there would have been on govt of that country and its domestic CB autonomy & conservatism relative to ECB autonomy & conservatism & PE pressures on European govts.

B. Real (Unemployment) Effects of Delegation to ECB

1. Std Thry, Simple Evidence, Anecdotes => Conv. Wisdom

a. *Std Thry:* (Kydland-Prescott, Barro-Gordon, Rogoff, Lohmann, Cukierman)

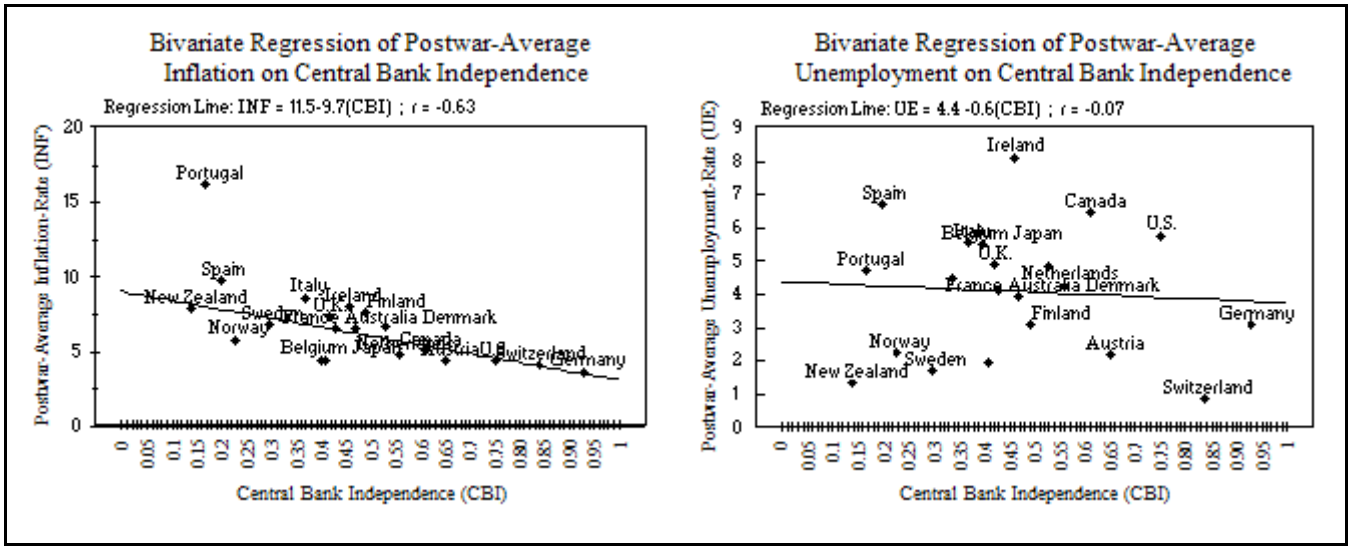
(1) *Nominal+Real Rigidities (e.g., barg.) => incentive for surprise inflation*

(2) Private actors know this, & incorporate inflationary consequences into bargains. RE ⇒ can't systematically surprise private sect ⇒ avg real-effect=0; π high

(3) If could *credibly* commit to refrain from surprises, private actors could set lower wages (prices) without fear, so inflation low & no real-effect.

(4) CB autonomy & conservatism = credible promise to forego monetary surprises, so reduces inflation without real cost on average.

2. *Std Simple Evidence:* (Cukierman, Alesina-Summers, others)



a. *Prominent "Real-World" Anecdotes:* US, GE, SZ: most famously auton & conserv of CB's, share low-inf., widely varying UE.

b. ⇒ *Conventional Wisdom:* deleg to cons CB ⇒ ↓INF at *(virtually)* no cost!

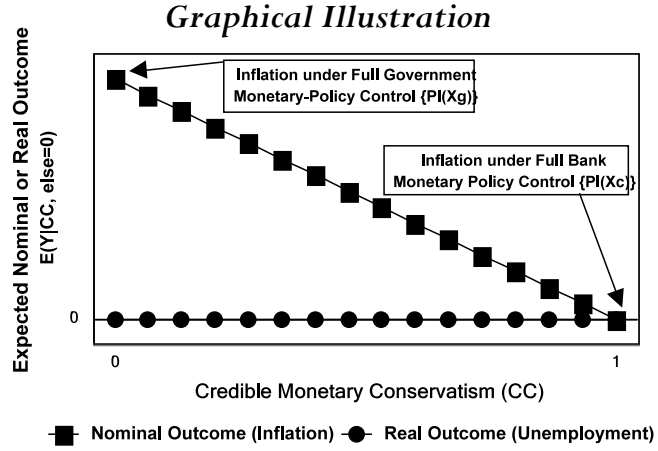
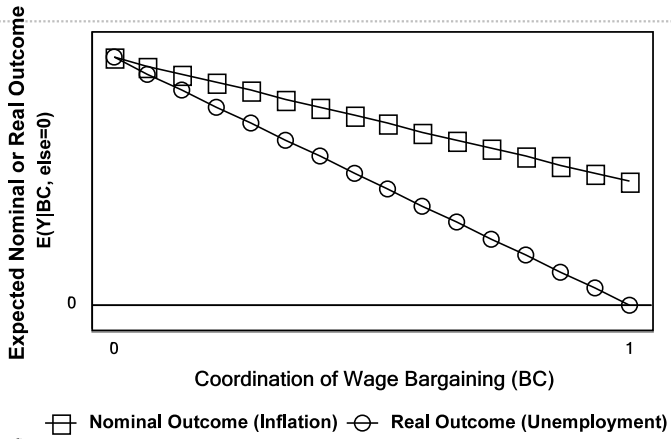
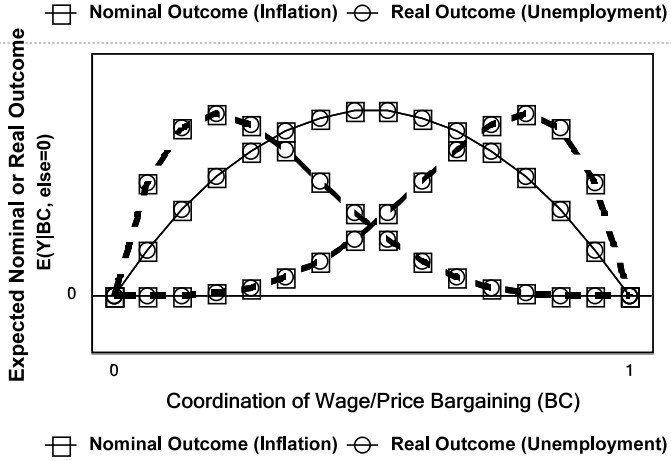
3. How Conventional CBI Wisdom Might Mislead

a. *Core Insight:*

(1) (Lindbeck:) std thry assumes core result *ad initio*: $y=y_n+a\cdot(\pi-\pi^e)$, & $\pi^e=\pi$, *with* y_n & a <u>*exogenous*</u>. If endogenous…

(2) When other <u>*strategic*</u> actors' (e.g., bargainers) choices that affect y_n or *a* depend on nature of monetary policy, real-neutrality conclusion overturned.

b. *Std CBI & CWB Theories (Conventional Wisdom)*

Illustration of the Theories and Predictions from the Reviewed Work		
Theory	***Prediction***	***Graphical Illustration***
Standard CBI Theory	Credible Conservatism has greater nominal benefits the more inflationary government policy would be: $\frac{d\pi}{dCC} = \pi_c(\mathbf{X}_c) - \pi_g(\mathbf{X}_g)$ Credible Conservatism has no real effect in equilibrium: $\frac{dUE}{dCC} = 0$	
Standard CWB Theory	Bargaining Coordination has real benefits and (perhaps, possibly smaller) nominal benefits: $\frac{dUE}{dBC}, \frac{d\pi}{dBC} < 0$	
Modern CWB Theory	Bargaining Coordination has non-monotonic real and nominal effects, with most-adverse outcome between its extremes. Exact shape indeterminate.	

C. Strategic Interaction of Monetary Policymakers & Private Actors

1. PE-GE: (Calmfors, Ozkan, Sibert, Sutherland)

a. *"Discretionary inflation bias" from gap b/w govt target & y_n*

(1) y_n "too low" for many reasons, including, e.g., "bad" labor-market policies, which, importantly, government also controls.

(2) By ↓ y_n, "bad" structural policies also ↑ INF, which govt also dislikes.

(3) Delegation to conservative CB strongly reduces these INF effects, and so incentives for govt to undertake difficult beneficial real "reforms"

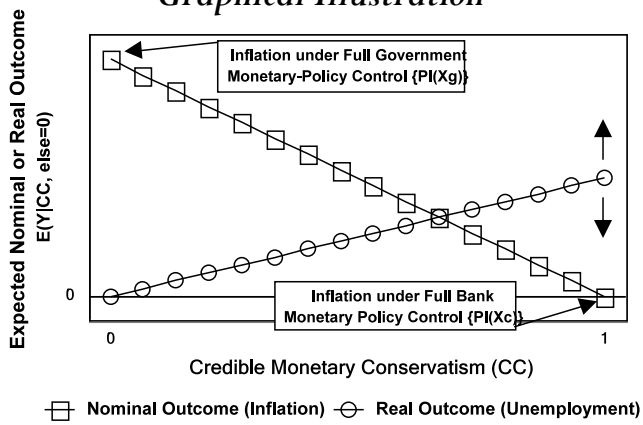
⇒ *Delegation to credibly conservative CB lowers govts' incentives to undertake beneficial reforms & thereby has PE-GE real costs proportional to its nominal benefits.*

b. Alternative Specific Versions of PE-GE Effects:

(1) Above = essentially the Ozkan, Sibert, and Sutherland (1998) version.

(2) Calmfors (1998): since all Euro members receive nominal benefits of any one's real reforms, delegation to ECB creates classic collective-action externalities with under-investment in politically costly real reforms.

(3) Other hand: if exchange flexibility was substitute for real reform (Sibert & Sutherland 1998), or if EMU members received side-payments to ignore infl. temptations (Sibert 199), delegation to ECB ↑ real-reform incentives.

Illustration of the Theories and Predictions from the Reviewed Work		
Theory	***Prediction***	***Graphical Illustration***
GE-PE Theories	Credible conservatism has real costs proportional to its nominal benefits: $\frac{dUE}{dCC} \propto \frac{d\pi}{dCC}$	

2. Strategic Bargainers w/ Varying Coord. (Soskice-Iversen '98, 99)

a. *Coordinated bargaining does two things:*

(1) Internalizes more of real-wage externalities of nominal-wage increases w/in more-coordinated bargaining-units, which reduces unemployment.

(2) But also reduces relative-wage (competition) effects on one unit's nominal-wage increases, which increases unemployment.

(3) Combo => Calmfors-Driffill (1988) hump: moderate coord. is bad & *both* highly coordinated and highly competitive bargaining is better.

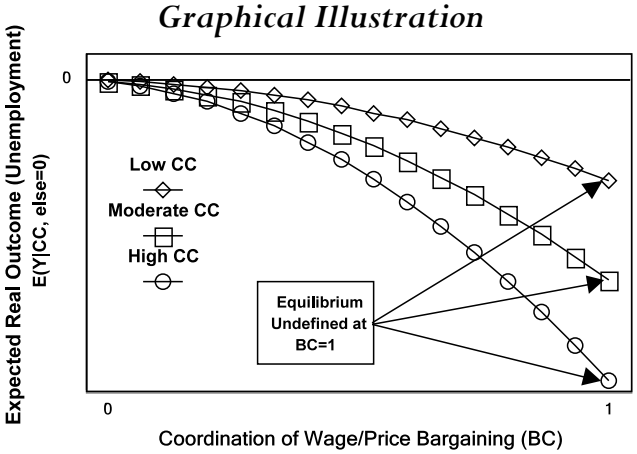
b. *Delegation to conservative CB reduces degree monetary policy will accommodate excessive nominal settlements.*

(1) Non-accommodation ↑ the (beneficial) real-wage effect of coordination.

(2) Non-accomm. affects all bargains equally, so no impact on (deleterious) relative-wage effect (competition-suppression) of coordination.

(3) Combo ⇒ *equilibrium, real* benefits (or costs) of credible monetary conservatism increase (or decrease) in the coordination of bargaining.

⇒ *Delegation to credibly conservative CB greater (less) real costs (benefits) the less coord bargaining*

Illustration of the Theories and Predictions from the Reviewed Work		
Theory	***Prediction***	***Graphical Illustration***
Soskice-Iversen Model (strategic bargainers)	Credible Conservatism has real benefits that increase in the coordination of wage/price bargaining: $\frac{dUE}{dCC} \leq 0, \frac{d^2UE}{dCCdBC} < 0$	

3. Strategic, Inflation-Averse Bargainers: ({many}, Cukierman & Lippi 1999, Velasco & Guzzo 1999)

a. *Justifying Inflation Aversion:*

(1) Empirics: private-sector inflation-aversion is large and well-documented

(2) Symmetry: Std theory inconsistent: monetary authorities dislike inflation, no private actor cares (actually, this is logically impossible for any govt)

(3) Inflation-aversion std in CWB thry (if often under-motivated & -specified)

(4) Non-full private-holding indexation (esp. mandatory: taxes due, pensions)

(5) *Domestic* infl. is a relative (i.e., real) price outside *perfect* float and PPP

b. *Strategic, inflation-averse union v. monetary policymaker* {many}

(1) Yashiv (1989); Cubitt (1992,1995); Agell and Ysander (1993); Gylfason and Lindbeck (1994); Grüner and Hefeker (1997); Jensen (1997); Skott (1997); Zervoyianni (1997). Grüner and Hefeker (1997), and Zervoyianni (1997) expand to two union/monetary-authority pairs in two countries.

(2) ⇒ CC neutral in real terms *iff* union ignores inflation, Otherwise:

(a) Equilibrium real costs increase in monetary conservatism.

(b) *Hyper-Liberal* (US sense) CB optimal in real & nominal terms!

c. *Strategic, Inf.-Averse Bargainers w/ Varying Coord.* (C&L, V&G):

(1) Effects from different impact of monetary reactions on real and relative wage effects of nominal wage-increases, hold here too. Plus…

(2) Private-sector inf.-aversion adds another effect to coordinated bargaining that is also modified by the CC of the monetary authority

(a) More-coord. bargainers internalize more of the inflation effects of their excess nominal settlements, this increases the benefits of BC.

(b) But, if delegation to ECB creates more non-accommodation, inf. effects dampened and, with them, bargainers incentives to restraint.

(3) Combo => *real, eqbm* effects of CC that generally worsen going from very-low to low-mid coord. & then improve going from high-mid to very-high.

⇒ *Delegation to credibly conservative CB greater real costs (less benefits) the more low-to-mid-level bargaining coordination*

4. Strategic, Inf.-Averse, Varying Coordination, Continued:

a. Two sources of non-neutrality of CC

(1) "Competition-Induced Strategic Non-Neutrality" ("CISNN"):

(a) (parallels Soskice-Iversen non-neutrality) arises b/c monetary policy magnifies *real* but leaves *relative* effect of nominal hikes unchanged.

(b) Increasingly converts C-D hump into monotonic benefit for BC that increases with higher CC (see figure in *B.*).

(2) Inflation-Aversion-Induced Strategic Non-Neutrality:

(a) (parallels monopoly-union or PE-GE effect) arises b/c bargainers less incentive to moderate to keep inflation low the greater CC, & esp. so the higher BC (b/c they internalize more of the CB response)

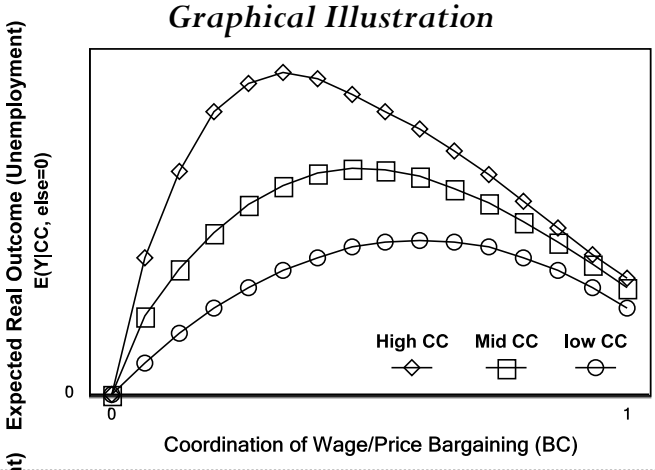
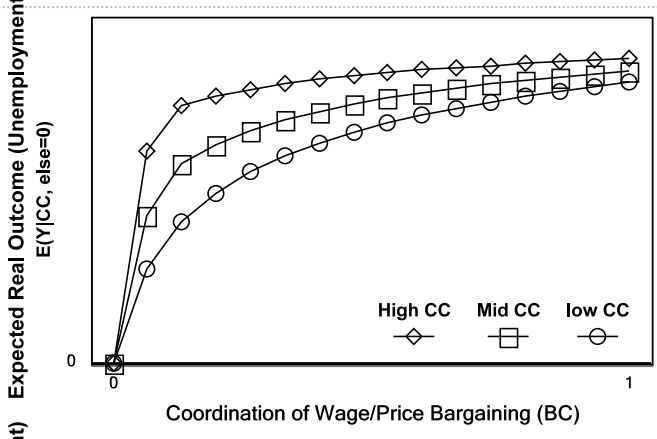
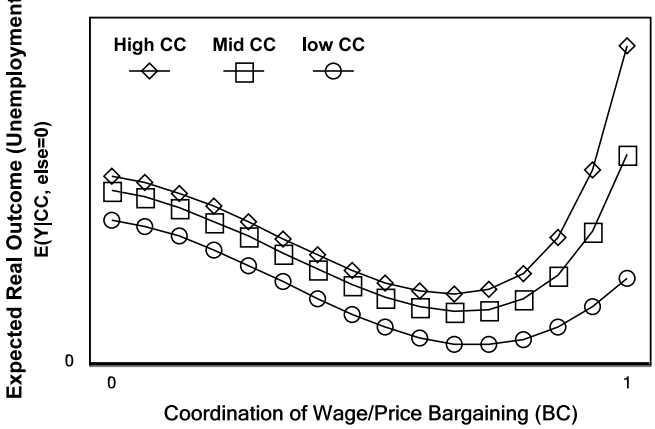
(b) Increasingly converts Calmfors-Driffill hump to monotonic detriment for BC that worsens with higher CC.

(3) *Net impact depends critically on assumptions about elasticity of labor demand with respect to real and relative wages and how each changes w/ coordination* (exactly the source of the Calmfors-Driffill indeterminacy)

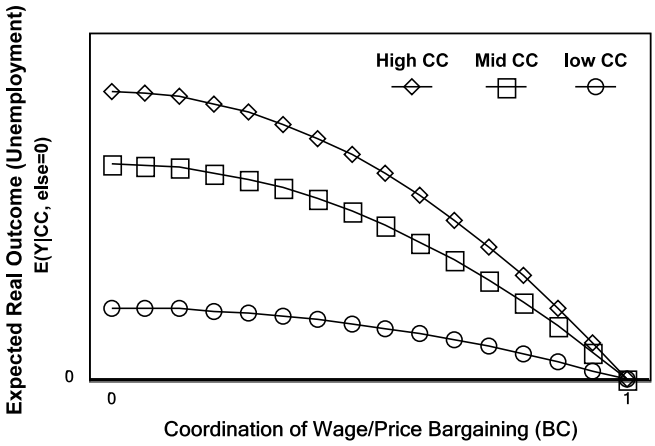
(a) V-G & C-L differ: in C-L, elasticities go to ∞ with the number of bargainers; in V-G, they go to fixed parameter of production function.

(b) In each, there are also critical parameter values that alter the substantive conclusions:

Illustration of the Theories and Predictions from the Reviewed Work

Theory	*Prediction*	*Graphical Illustration*
Strategic Inflation-Averse Bargainers (C&L)	At high inflation-aversion, Calmfors-Driffill hump emerges whose peak accentuates and shifts up-and-leftward as CC rises.	
	At low inflation-aversion, BC has monotonic real costs, which CC magnifies more at low than at high BC.	
Strategic Inflation-Averse Bargainers (V&G)	At high labor-substitutability relative to economies of scale, an inverse Calmfors-Driffill hump emerges, which CC raises, more at very high BC and less noticeably at most levels.	

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



5. Strategic, Differentiated Bargainers: (Iversen, Franzese)

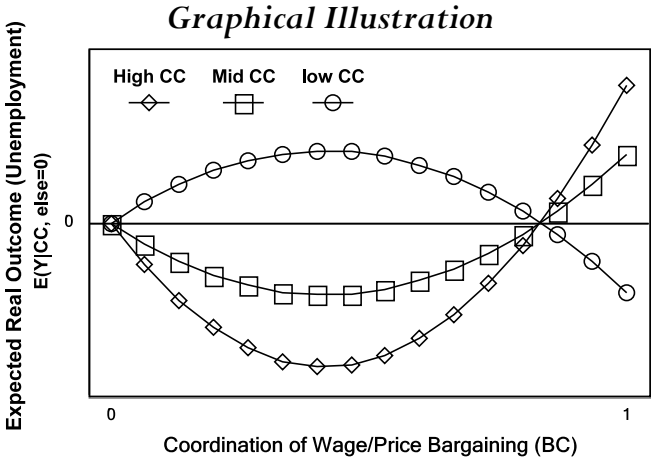
a. Strategic, Differentiated, Wage-Inequality-Averse Bargainers: (Iversen '98ab)

(1) High BC also tends to equalize wage increase across workers of more-disparate productivity growth=> ↑ inefficiency unless *wage-drift* allowed

(2) Non-accommodating monetary authorities now radically worsen the real effects of very-high coordination. The rest is similar to the above.

⇒ *Delegation to credibly conservative CB generally has smaller real benefits at lower BC than at mid-to-high, but sizable real costs at very high BC.*

Illustration of the Theories and Predictions from the Reviewed Work

Theory	*Prediction*	*Graphical Illustration*
Strategic, Differentiated, Wage-Inequality-Averse 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.	

(Strategic, Differentiated Bargainers, Continued)

6. Strategic, Sectorally-Differentiated Bargainers: (Franzese '94,'96,'01, '02)

a. Above+monetary contraction hits traded, non-traded, & public differently

(1) Hinders real demand, which hurts all private sectors, but public less.

(2) Raises relative price of traded goods, esp. harming traded sector.

(3) Therefore, monetary policy need do least (most) to restrain traded-sector-led bargains, with private, sheltered sector intermediate.

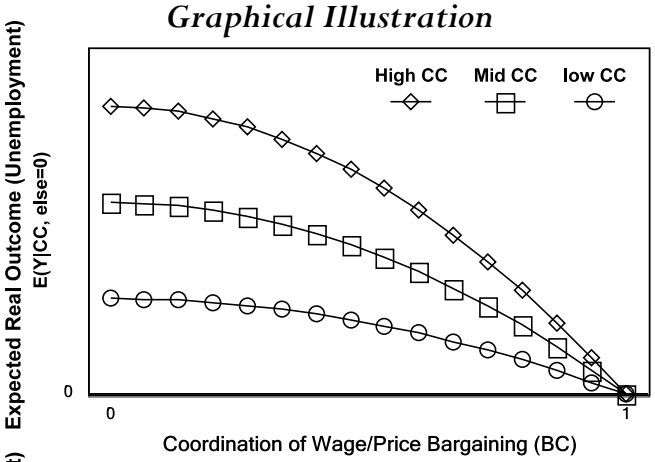
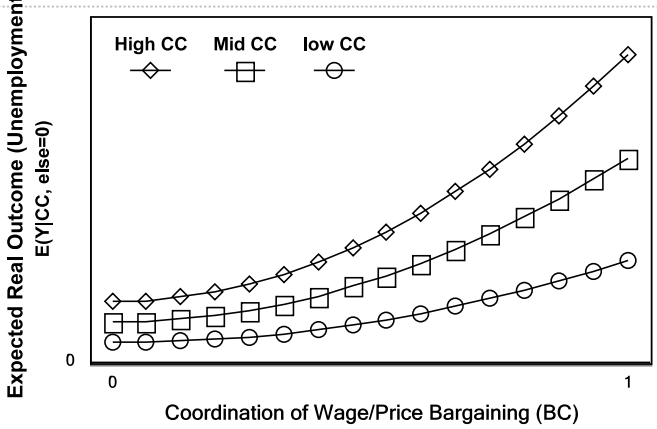
b. *1* monetary policy => effects depend on relative size & strength of sectors

(1) Traded-sector-dominated bargaining w/ large public ⇒ best effect for BC, most magnified by CC.

(2) Public dom. bargaining w/ large traded worst; sheltered intermediate.

⇒ *Greatest (least) real costs (benefits) of delegation to credibly conservative CB where BC low or high-but-pub-sect-led.*

Illustration of the Theories and Predictions from the Reviewed Work

Theory	*Prediction*	*Graphical Illustration*
Strategic, Sectorally-Differentiated Bargainers (Franzese)	At high traded-relative-to-public-sector strength, BC is beneficial, and CC has real costs that decrease in BC: $\frac{dUE}{dCC}>0, \frac{d^2UE}{dCCdBC}<0$	
	At sufficiently high public-to-traded-sector strength, BC is detrimental, and CC has real costs that increase in BC: $\frac{dUE}{dCC}>0, \frac{d^2UE}{dCCdBC}>0$	

D. Evidence: (Hall, Franzese, Iversen, Hall-Franzese, Cukierman-Lippi)

1. (Mostly agree with authors' predictions; details in paper.)

2. As w/ theory, *a "fair amount" of disagreement*. Problem:

   a. Theory suggests complex, non-linear relations b/w bargaining institutional-structure and labor-market outcomes,

   b. & then those complex effects are further modified/interact in complex ways by/with delegation to monetary conservatives.

   c. Tall order for data from 21 countries over 40 years +/-, esp. since…

   d. These institutions exhibit so little cross-time variation

3. **Nevertheless, like the theory, *<u>two points of agreement</u>*:**

   a. *CC has real long-run effects that depend on lab.-mrkt institutional structure, especially the coordination of wage/price bargaining*

   b. *Moving from mid-to-high BC to low-to-mid BC increases (lowers) real costs (benefits) of delegation to CC.*

   c. I.e., agree that dUE/dCC=f(BC), and that this function downward-sloping over low to mid-high range. (Disagree on +/- & details)