

Partially Independent Central Banks, Politically Responsive Governments, and Inflation

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Abstract: Theories of central bank independence have more exact implications regarding inflation in different political-economic environments than generally understood or empirically examined. They imply that inflation in any given country-time will be a weighted average of what it would be if the central bank completely controlled monetary policy and what it would be if the government completely controlled it, with the degree of central bank independence weighting the former. An equation embodying this theoretical expectation is estimated by constrained least-squares from a time-series cross-section of inflation rates in developed democracies since the Bretton Woods era. The results confirm that the anti-inflationary benefit of central bank independence is not constant but rather depends on *every* variable in the broader political-economic environment to which wholly autonomous central banks and governments would respond differently. Conversely, the inflationary impacts of *all* such political-economic variables depend on the degree of central bank independence.

1. Introduction

Political scientists and economists generally agree that central bank independence lowers inflation. Both also define central bank independence as the degree of autonomy of the conservative central bank from the political authority in making monetary policy. From the political scientist's view, central banks are bureaucratic institutions, populated by financial experts who are usually hawkish on inflation, whether socialized to that view or coming from population-groups with those interests. Contrarily, governments, especially democratic governments, are more responsive to various societal pressures favoring inflation. Only the most conservative of governments would be as anti-inflationary as the bank itself, so delegation of monetary-policy authority to the central bank reduces inflation. From the neoclassical economist's view, monetary policy involves a time-

inconsistency problem (described below) which produces an inflationary bias if a government responsive to societal pressures controls monetary policy. Credible delegation of monetary-policy authority to an independent and conservative central bank can serve as a commitment device circumventing the time-inconsistency problem and therefore the inflationary bias. Thus, central bank independence lowers inflation.¹

This paper stresses the simple point that the monetary-policy-making autonomy of central banks is, by definition, a matter of *degree*. Independence from political authority can never be complete because the bank's authority derives from statutes or constitutional provisions, either of which the political authority can change if the bank's policies were to become sufficiently distasteful. Nor is independence ever completely absent. Administering and monitoring monetary policy is costly, politically and economically, because banks enjoy expertise and/or informational advantages over governments and because time and other resources are required for governments to monitor banks. Thus, governments cannot costlessly ensure that central banks conduct policy precisely according to their current will. Accordingly, central bank independence must refer to how far the bank could stray from the current government's desires before the latter would prefer to pay the costs of altering the bank law or of seizing the monetary reins itself (see Lohmann 1992). Therefore, monetary policy and thus inflation are always partially controlled by central banks and partially by current governments.

Four conclusions follow. First, observed inflation will be a convex combination of the inflation rate that would prevail if the conservative central bank credibly and completely

¹ From economics, see Barro and Gordon (1983a, 1983b), Rogoff (1985), Lohmann (1992), Cukierman (1992), and Eijffinger and De Haan (1996). From political science, see Hirsch and Goldthorpe (1978), Beck (1984), Woolley (1984), Lindberg and Maier (1985), Mayer (1990), and Goodman (1992). Cf. Posen (1995a, 1995b) who argues essentially that central bank independence is epiphenomenal, being produced by other anti-inflationary forces that also produce low inflation.

autonomously controlled monetary policy and the inflation rate that would prevail if instead the current government controlled monetary policy wholly uninfluenced by the bank, with the degree of central bank independence indicating the weight on the former rate. This implies, second, that the anti-inflationary impact of central bank independence cannot be constant, as typically estimated previously, but rather must vary with the broader political-economic environment in which the bank operates—e.g., the anti-inflationary impact of central bank independence should be greater under left than under right governments. The converses are also implied—e.g., the difference between inflation under left and right governments should decrease in the degree of central bank independence. Thus, third, because their political-economic environments differ, central bank independence will be more advantageous on anti-inflationary grounds in some country-times than others, suggesting that increases or decreases in central bank independence will be more likely in some country-times than others, *ceteris paribus*. Finally, these specific arguments about central bank independence illustrate a broader point regarding institutional political economy: the effects of any given institution are contextual; they depend on the configuration of other political, economic, structural, and institutional features of the setting in which the institution in question interacts.

The next section introduces the monetary-policy model from which the neoclassical view of central bank independence and inflation derives. This expositional choice indicates neither agreement nor disagreement with the neoclassical model and, especially, implies no claims regarding that model's prediction that central bank independence has no real-economy effects (e.g., on unemployment) on average.² I follow the neoclassical economic exposition for its familiarity, internal cohesion, and clarity, and to demonstrate that even the relatively sparse neoclassical model

² For theoretical and empirical criticism of the model's real-economy implications, see Hall (1994), Franzese (1997), Iversen (1998b), Hall and Franzese (1998), Cukierman and Lippi (1997), and Iversen and Soskice (1997).

concludes that anti-inflationary impact of central bank independence depends on the broader political-economic configuration in which the bank interacts. The third section explains how to model that interactive prediction empirically and estimates such models from a time-series-cross-section of annual GDP-deflator inflation-rates in 18 developed democracies in the flexible-exchange-rate era (1972-90). The fourth section discusses the results substantively, using them to illustrate a range of further implications emerging from this fuller understanding of the theory of central bank independence and inflation and this better match of the empirical model thereto.

2. Central bank independence and inflation: the neoclassical model

Given nominal and real rigidities in the economy, the monetary-policy authority has an incentive to create “surprise” inflation, thereby lowering real wages (prices), and thus spurring employment (output). The private sector is, however, aware of this incentive and incorporates its inflationary consequences into their wage and price setting. Accordingly, in rational-expectations equilibrium, the monetary authority cannot systematically surprise the private sector, so real wages (prices) and therefore employment (output) are unaffected on average while inflation is higher. If, by contrast, the monetary-policy authority could credibly commit to refrain from creating such surprise inflation, private-sector actors could set lower wage (price) increases without fear. Credible commitment, then, lowers inflation without affecting real wages (prices), and thus without affecting employment (output), on average. Institutionalizing a conservative central bank with substantial independence from political authority is held to provide such credibility for the monetary authority. Therefore, central bank independence reduces inflation without adverse real effects on average.³

Thus, the neoclassical argument equates central bank autonomy from political authority with monetary-policy credibility and conservatism and so concludes that central bank independence

³ See Cukierman (1992, ch. 3) for the standard formal economic model.

lowers inflation without real effects on average. The conclusion regarding the absence of real-economy effects is now contested (see note 2), but the conclusion that central bank independence lowers inflation remains relatively noncontentious (but cf. Posen 1995a, 1995b). If central banks are generally more anti-inflationary than governments, if central bank independence is defined as the bank's degree of monetary-policy-making autonomy from the current government, and if some effective autonomy is indeed possible, then central bank independence lowers inflation.

The empirical literature establishing a generally negative relationship between central bank independence and inflation is extensive. The typical procedure simply regresses postwar averages of inflation across some set of countries on some index of central bank independence. Occasionally some controls are added and/or the data are temporally disaggregated somewhat, but rarely has the relationship between central bank independence and inflation been estimated as anything other than linear-additive (see, e.g., Alesina and Summers 1993, and Eijffinger and De Haan 1996). Recently, some have begun to move beyond the simplest linear-additive models, examining the interaction of central bank independence with government partisanship (Jonsson 1995, Simmons 1995, and Clark et al. 1998) or with labor-market organization (Hall and Franzese 1998, and Iversen 1998a). Even these do not go far enough, though, missing the theoretical and empirical generality of the predicted interactions as demonstrated below. Far more usually, empirical research on central bank independence and inflation has implicitly assumed that each increment in the degree of independence has a fixed negative impact on inflation, *ceteris paribus*. Theories of central bank independence and inflation, however, suggest a considerably different, and considerably more revealing, specification.

Broadly, the theory implies that inflation depends, first, on who controls monetary policy,

an autonomous, conservative central bank or the current government. Inflation would be given by one function if the central bank perfect autonomously controlled monetary policy and by a different function, with policy responding differently to different political-economic factors, if instead the government had complete control. However, central bank independence is defined (and measured) as the *degree* to which the conservative central bank enjoys monetary-policy autonomy from the current government; thus, the theory more exactly states: to the degree the central bank is independent, it controls monetary policy and “commitment” inflation (π_c^*) prevails; to the degree the central bank is dependent, the political authority controls monetary policy and “discretionary” inflation (π_d^*) prevails. The inflation rate actually occurring in any given country-time (π) will therefore be some convex combination of π_c^* and π_d^* , with the weight on π_c^* increasing in the degree of central bank independence (CBI) (see, e.g., Lohmann 1992). For example, assuming a linear-weighted-average and normalizing $0 \leq CBI \leq 1$:

$$\pi = CBI \cdot \pi_c^* + (1-CBI) \cdot \pi_d^* \quad (1)$$

This conclusion does not depend on the neoclassical model; *any* model in which monetary policy affects inflation and which defines central bank independence as the bank’s degree of monetary-policy autonomy from current government produces some such convex-combinatorial prediction.

Equation (1) indicates that inflation, π , decreases from hypothetical pure-discretion levels, π_d^* , toward hypothetical pure-commitment levels, π_c^* , as the bank’s autonomy increases. Therefore, the anti-inflationary effect of central bank independence is *not* constant but rather is more (less) negative the higher (lower) discretionary inflation would have been relative to what commitment inflation would have been:

$$\frac{\partial \pi}{\partial CBI} = -[\pi_d^* - \pi_c^*] \quad (2)$$

Thus, *any* factor which influences governments and central banks differently alters the anti-inflationary impact of central bank independence, and, *vice versa*, central bank independence alters the inflationary impact of any such factor. In the neoclassical model, for example, anything increasing (i) the government's emphasis on employment relative to inflation, or (ii) the real-effectiveness of surprise money (i.e., the slope of the Phillips-Curve), or (iii) the government's targeted employment and/or inflation levels increases discretionary inflation, while (iv) anything increasing the natural rate of employment lowers discretionary inflation. Conversely, inflation with autonomous central banks is lower and generally unaffected by these other considerations.

In sum, the anti-inflationary impact of central bank independence depends on the configuration of many other political, economic, structural, and institutional features of the setting in which the bank operates. If the political economy creates little inflationary pressure on the discretionary authority, then π_d^* differs little from π_c^* . Each given free reign, the current government would act much like the bank would, so the independence of bank from government hardly matters in that country-time. If, instead, the political economy produces great inflationary pressures on the government, then π_d^* is considerably higher than π_c^* , and the bank would have to act quite differently from the current government's wishes to obtain desired inflation. Since the bank can act differently only insofar as it enjoys autonomy from government, the degree of central bank independence matters greatly under these conditions. Therefore, the anti-inflationary effect of any given degree of independence is greater (less) wherever the government has greater (less) incentive to pursue inflationary policies relative to the conservative central bank.

A large set of predictions regarding the inflation effects of central bank independence and of the other model parameters and how each of those effects themselves vary with the values of all

other parameters can be formally derived from equation **(1)**. Here I elaborate a subset of these implications intuitively. Points (i) and (iii) above, for example, suggest that central bank independence reduces inflation more when left parties govern than when right parties do. The left weights employment more relative to inflation (and/or has higher targeted employment and/or inflation) than the right, so left governments would produce higher discretionary inflation, π_d^* , than right. The independence of the central bank then lowers inflation from that π_d^* down to π_c^* as it increases, implying greater inflation-reductions for equal increases in central bank independence under left than under right governments. Conversely, equal ideological distances between governments produce lesser inflation-differences the greater is central bank independence.

Points (ii) and (iv) suggest that, because labor-market institutions alter the real-effectiveness of monetary-policy and/or the natural rate of employment, they also modify the anti-inflationary impact of central bank independence. For example, Cukierman (1992, 39-42) notes that, in the neoclassical model, the incentive to create surprise inflation and therefore the inflationary bias of discretionary monetary-policy only exist to the degree real wages are excessive so that employment is demand determined. He suggests further that, given some monopoly power, unions can achieve real wages that exceed the market-clearing rate. Thus, he concludes, union power lowers the natural rate of employment and so increases discretionary inflation. Alternatively, consider the coordinated-wage-bargaining arguments (e.g., Lange 1984, Cameron 1984, Bruno and Sachs 1987, Calmfors and Driffill 1988, Soskice 1990, Layard et al. 1991, and Calmfors 1993). Unlike union power without coordination, coordinated bargaining produces real-wage restraint, not excessiveness, because encompassing wage-bargaining units internalize the employment costs associated with excessive wage-settlements whereas fragmented bargaining units can partially externalize them. Therefore,

wage-bargaining coordination lowers real-wage excessiveness, thereby increasing the natural rate of employment and thus decreasing discretionary inflation.⁴ In sum, discretionary inflation increases with union power and decreases with wage-bargaining coordination. These contentions now imply further that central bank independence lowers inflation more the greater is union power and less the greater is the coordination of wage bargaining and, *vice versa*, that union power increases and bargaining coordination decreases inflation less the greater is central bank independence.

Still further implications arise naturally. For example, discretionary inflation should decrease with trade-openness because the real effectiveness of monetary policy is lower in more open economies, implying that governments have less incentive to inflate (Romer 1993). Similarly, absent counteractive policy, inflation abroad will generally be imported, so (domestic) discretionary inflation should also increase with foreign inflation. These contentions now imply further that central bank independence lowers inflation more the less trade-open the economy and the greater inflation abroad and, conversely, that greater trade-openness and lower inflation abroad lower domestic inflation less the greater is central bank independence.

Like the broad prediction that central bank independence lowers inflation, none of these more specific predictions is unique to neoclassical theory. The point here is more general: however one derives the models of the inflation rate that prevails if the government completely controls monetary policy and of that which prevails if instead the central bank has unmitigated control, theories of central bank independence and inflation predict that actual, observed inflation will be a convex combination of those two polar-cases. That convex-combinatorial form implies further that

⁴ Calmfors and Driffill (1988) predict a curvilinear relation between wage restraint and wage-bargaining concentration; I separate that into two opposite linear relations. Union power, as defined by Cukierman (1992) and measured here by union density, increases monopoly-power and so reduces wage restraint. Bargaining coordination, as defined by Soskice (1990) and measured here by Hall and Franzese's (1998) index fosters internalization of externalities and so increases restraint. Soskice (1990) and Layard et al. (1991) similarly disaggregate the Calmfors-Driffill "hump" with empirically satisfactory results.

the inflation effect of central bank independence is not constant, as implicit in previous empirical specifications, but rather depends on everything that affects governments' and banks' desired inflation policies differently. I highlight partisanship, labor-market institutions, and international exposure and conditions in this regard; others might focus, say, on government stability (Cukierman et al. 1992) or electoral incentives for macroeconomic manipulation (Nordhaus 1975). Regardless, the more inflationary the politically responsive government relative to the conservative central bank, the greater the anti-inflationary impact of central bank independence. Conversely, other factors's inflationary impacts are greatest (least) when central bank independence is low (high).

Finally, consider the contention of some that central bank independence is epiphenomenal in inflation determination. For example, Posen (1995a, 1995b) argues that "effective financial opposition to inflation" causes both low inflation and high central bank independence. Properly controlling for financial-sector influence, he argues, central bank independence has no anti-inflationary impact. However, while powerful financial opposition to inflation may indeed bolster central banks in their policy pursuits, its influence on the policies of politically responsive authorities is likely to be even greater. Because observed inflation averages the inflation rates that would occur under complete central bank control and under complete government control of monetary policy, the financial-sector's differing inflation-impact under these polar cases can be compared. Thus, estimating a weighted-average model including effective financial opposition to inflation among the factors to which bank and government might respond differently will provide an appropriate and direct test of the epiphenomenality claim.

Summarizing, previous estimations of the inflation impact of central bank independence miss the simple but important point that observed inflation is a weighted average, so the statistical

analyses producing those estimates are mis-specified and give potentially misleading results.⁵ The statistical problem is, loosely speaking, “parameter averaging.” In assuming the inflation effect of central bank independence to be constant, previous work may only have provided reasonable estimates of its *average* impact across various configurations of the other factors that occur in the sample. Symmetrically, other factors’ inflation effects vary with central bank independence, so previous estimations also may have provided only reasonable estimates of their averages across the various degrees of central bank independence occurring in the sample. At best, such parameter-averaging leaves unexplored much information in the data and many implications of the theory; at worst, it misleads by doing so. Specifications truer to the theory of central bank independence and inflation, contrarily, must embody a convex-combinatorial form like **(1)** and will thereby provide more precise and more revealing estimates of the *varying* inflation effects of an independent, conservative central bank and, conversely, of other relevant factors included in the model.

3. Central bank independence and inflation: the empirical models

We expect discretionary inflation to respond, *inter alia*, to: (a) government partisanship, G; (b) union power, U; (c) wage-bargaining coordination, CWB; (d) trade-openness, T; (e) financial-sector political-strength, F; and (f) inflation abroad, π^a . The usual linear-additive model simply adds central bank independence, CBI, to this list of (linear) determinants of inflation:

$$E(\pi_{i,t}) = \beta_0 + \mathbf{B}'_1 \mathbf{C}_{i,t} + \beta_g G_{i,t-1} + \beta_f F_{i,t-1} + \beta_t T_{i,t-1} + \beta_u U_{i,t-1} + \beta_{cwb} CWB_i + \beta_{\pi a} \pi^a_{i,t-1} + \beta_{cbi,1} CBI_{i,t-1} \quad (3)$$

$\mathbf{C}_{i,t}$ is a vector of time-series controls (two lags of $\pi_{i,t}$) and \mathbf{B}_1 its coefficient-vector; subscripts i and

⁵ Hall and Franzese (1998), Iversen (1998a), Jonsson (1995) and Simmons (1996), and Clark et al. (1998) consider the interaction of central bank independence with wage-bargaining institutions, with government partisanship, or with partisan/electoral cycles, but the theoretical and empirical generality of the mitigating role of central bank independence has universally been missed. Equation **(1)** implies all these interactions (and others). Their empirical models are also mis-specified and only slightly less so than pure linear-additive models. Relative to the models estimated here, their models are almost as inefficient as the linear-additive model; their coefficient estimates should approximate the unconstrained linear-interactive model’s estimates regarding the interactions they do consider and the linear-additive model’s estimates regarding all others.

t refer to country and year respectively.⁶ If, controlling for these six factors, central bank independence reduces inflation, then we should estimate $b_{cbi,1} < 0$; if not—if, e.g., central bank independence were epiphenomenal controlling for these six (which, notice, include financial-sector political-strength)—then we expect $b_{cbi,1} \approx 0$.

An appropriate empirical model to test the theory and estimate its parameters, however, will embody the weighted-average form of (1). Assuming, as is standard in the theoretical literature, that the inflationary impetuses of all other factors [(a)–(f) above] are equally resisted by autonomous, conservative central banks, such a model could be written:

$$E(\pi) = \beta_0 + B_1' C + \beta_{cbi,1} CBI + \beta_g G + \beta_f F + \beta_t T + \beta_u U + \beta_{cwb} CWB + \beta_{\pi a} \pi^a + \beta_{cbi,2} CBI \cdot (\beta_g G + \beta_f F + \beta_t T + \beta_u U + \beta_{cwb} CWB + \beta_{\pi a} \pi^a) \quad (4)$$

The key parameter in model (4) is $\beta_{cbi,2}$; its estimate will reflect the degree to which a hypothetical perfectly independent central bank would resist inflationary pressures emerging from other political-economic factors relative to what a government perfectly in control of monetary policy would do.⁷ Model (4) also nests the usual linear-additive (3) within it. If the linear-additive model were correct, we would estimate $b_{cbi,1} < 0$ and $b_{cbi,2} \approx 0$, so that (4) reduces to (3). If, instead, the weighted-average model is correct and if perfectly autonomous central banks target low, relatively constant inflation, we would estimate $b_{cbi,1} \leq 0$ and $b_{cbi,2} \approx -1$ so that (a) when $CBI=1$, the estimate is just commitment inflation, modeled here as $E(\pi_c^*) = b_0 + B_1' C + b_{cbi,1}$, (b) when $CBI=0$, the estimate is just discretionary

⁶ Two inflation-lags sufficed in all models to capture the dynamics; no model indicated any difference in dynamics by degree of central bank independence. The 18 larger, continuously democratic OECD countries, 1972-90, comprise the sample. The flexible-exchange-rate era is chosen because, insofar as capital is mobile, fixed exchange-rates remove national monetary-policy autonomy from all but one country. Note 9 gives further methodological details.

⁷ $b_{cbi,2} < -1$ would imply, substantively problematically, that wholly independent central banks more than 100% mitigate other variables' inflationary impacts. Thus, restricting $0 \geq \beta_{cbi,2} \geq -1$ would further improve model-specification; I ignore this complication for expositional simplicity.

inflation, modeled here as $E(\pi_d^*)=b_0+B_1C+b_gG+b_tT+b_fF+b_{\pi a}\pi^a+b_uU+b_{cwb}CWB$, and (c) when $0<CBI<1$, estimated inflation weights (a) by CBI and (b) by $1-CBI$. And if, controlling for these other factors, central bank independence were epiphenomenal or otherwise did not affect inflation in either modality, then we would estimate $b_{cbi,1}\approx b_{cbi,2}\approx 0$.

Finally, a model allowing all of factors (a)–(f) to affect both governments’ and central banks’ desired policies, but potentially differently, can be written as a standard interactive linear regression. Every other factor is interacted with central bank independence thereby allowing each a different inflation effect depending on the degree of independence and *vice versa*:

$$\begin{aligned}
 E(\pi) = & \beta_0 + B_1' C + \beta_{cbi,1} CBI \\
 & + \beta_g G + \beta_f F + \beta_t T + \beta_u U + \beta_{cwb} CWB + \beta_{\pi a} \pi^a \\
 & + \beta_{c,g} CBI \cdot G + \beta_{c,f} CBI \cdot F + \beta_{c,t} CBI \cdot T + \beta_{c,u} CBI \cdot U + \beta_{c,c} CBI \cdot CWB + \beta_{c,\pi a} CBI \cdot \pi^a
 \end{aligned} \tag{5}$$

Models (3) and (4) are both nested within (5). If linear-additive (3) were correct, all the interactive coefficients [the third row of (5)] would be zero, $b_{c,x} \approx 0 \forall x$, and $b_{cbi,1}$ would be negative. This reduces (5) to (3). If the restricted weighted-average (4) is correct and if central banks target low, constant inflation, we would find $b_{cbi,1} \leq 0$ and each interactive coefficient ($b_{c,x}$) would be roughly the negative of its non-interactive counterpart (b_x): $b_{c,x} \approx -b_x \forall x$. This reduces (5) to (4) with $b_{cbi,2} \approx -1$.

Model (5)’s generality also allows that some factors might influence perfectly autonomous central banks’ and governments’ desired policies the same ($b_{c,x} \approx 0, b_x \neq 0$ for such x); some might influence both but differently ($b_{c,x} \neq 0, b_x \neq 0, b_{c,x} \neq -b_x$); some might affect only autonomous central banks’ desired policies ($b_{c,x} \neq 0, b_x \approx 0$); and some might influence only governments’ desired policies ($b_{c,x} \approx -b_x, b_x \neq 0$). When this last holds for all x , (5) reduces to (4) with $b_{cbi,2} \approx -1$ as already noted. Two further possibilities remain. For any x affecting neither banks’ nor governments’ desired policies,

we expect $b_{c,x} \approx 0$ and $b_x \approx 0$; and, if, controlling for these x , central bank independence were epiphenomenal or otherwise had neither linear nor linear-interactive inflation-effects, then we would expect $b_{cbi,1} \approx 0$ and $b_{c,x} \approx 0 \forall x$. Model **(4)** is thus a constrained version of **(5)**, forcing proportionately equal reduction by the degree of central bank independence of all other factors' inflation-effects: $b_x/b_{c,x} = b_z/b_{c,z} \forall x,z$. Similarly, **(3)** constrains **(4)**, forcing $b_{cbi,2} = 0$, and **(5)**, forcing $b_{c,x} = 0 \forall x$.⁸

The neoclassical model of inflation was not at issue theoretically above nor is it being empirically tested here. The alternative hypotheses are not neoclassical political-economy and something else; rather, a theory of inflation in which conservative central banks control monetary policy to a degree measured by CBI and governments control it to the remaining degree [as in **(4)** or **(5)**] confronts theories in which central bank independence has simple negatively additive inflation effects [as in **(3)**] or no effects controlling for other factors [**(3)** with $b_{cbi,1} = 0$]. The empirical corrective here is as general as the theoretical corrective above; *any* model in which governments and banks respond differently to different politico-economic factors suggests **(4)** or **(5)** not **(3)**.

The appendix gives definitional details, sources, and descriptive statistics for the data, so I only briefly introduce the variables here. Government partisanship is indexed 0=far-left to 10=far-right ($G \in [0..10]$), and the degree of wage-bargaining coordination is indexed 0=none to 1=full ($CWB \in [0, .25, .5, .75, 1]$). Union power is measured by union density (union-membership/labor-force: $U \in [0..1]$); trade-openness by exports-plus-imports/GDP ($T \in [0..2]$); financial-sector strength by that sector's employment-share ($F \in [0..1]$); inflation by the GDP deflator ($\pi = x\%$); and inflation abroad by average GDP-deflator inflation in the other countries that sample-year ($\pi^a = x\%$). **Table 1** presents the estimation results.⁹

⁸ Theory and/or empirics could easily suggest alternative constraints on the most general **(5)**. I considered many, but the most constrained **(4)** statistically and substantively dominates. Contact author for details.

⁹ Methodological Notes:

[Table 1 Here]

Model (5) is the most general, encompassing the others, so I begin there. One problem with models employing so many interactive factors is the inevitably high correlation among independent variables, especially when, as in (5), the six interactions all involve a common variable. Bivariate correlations in this sample are as high as 0.84 (CBI and CBI·G) and 0.83 (CBI and CBI·F); the multiple correlation of central bank independence with the six interactive factors is 0.93! The relatively large standard errors in (5) were to be expected then. However, despite the severe multicollinearity, the results indicate clearly enough that minimally openness and inflation abroad and possibly also union power have different inflationary impacts depending on the degree to which monetary policy is controlled by conservative central banks or politically responsive governments. Coefficients on these terms' interactions with central bank independence are individually significant

To mitigate endogeneity concerns, all independent variables are lagged one year.

Model (4) is estimated by constrained least-squares (CLS), the others by OLS. CLS parameter estimates are found numerically since analytic solutions do not exist; the estimated coefficients' estimated variance-covariance matrix differs accordingly (Greene 1997, 453-8).

Controlling for two lags of inflation, residual-correlation tests found no significant serial correlation remaining in the residuals. Still, I proceed cautiously, retaining the two lags and employing Newey-West autoregressive-and-heteroskedasticity-consistent covariance-matrices (truncation at five lags), largely because estimating consistent variance-covariance matrices should aid regarding contemporaneous correlation (see below). Inflation dynamics do not depend on the degree of central bank independence: interactions of central bank independence with lagged inflation produced coefficients substantively near zero and statistically insignificant individually or jointly.

Beck and Katz (1996) demonstrate that feasible generalized least-squares estimates of error-covariance structures that allow contemporaneous correlation are not advisable in data sets of these proportions and that estimating variance-covariance matrices consistent in the presence of heteroskedasticity and contemporaneous correlation (panel-corrected standard-errors: PCSE's) is superior. PCSE's are complicated in CLS settings, though, so I rely on π^a to bring contemporaneous correlation into the systematic component (in all models for comparability). Especially given that π^a is a regressor, the Newey-West covariance matrix should aid further regarding whatever contemporaneous correlation may remain in the stochastic component.

Interactive models usually assume that coefficients on some variables are *deterministic* functions of others. Western (1997) notes that assuming *probabilistic* interactive relations makes more substantive and statistical sense, and demonstrates Bayesian techniques for estimating and analyzing such random-coefficient models. His suggestions apply here and complement the present approach emphasizing theoretically derived restrictions on the form of interactions considered. Also, Bayesian techniques would especially suit the evaluation of several possible models between most-unconstrained (5) and most-constrained (4). I advocate the combination of these approaches but, given the present emphasis on simplicity, employ only more familiar techniques here.

at $p \approx .02$, $p \approx .04$, and $p \approx .07$ levels respectively, and at $p \approx .03$ jointly.¹⁰

Perhaps the other expected interactions exist also, but standard errors are much too large in **(5)** to distinguish them individually. That is, possibly owing to high correlations among the interaction terms, only half of the interactions are individually significant at $p = .10$ even though jointly their significance surpasses $p = .001$. The latter result alone suffices to reject overwhelmingly the linear-additive model for a linear-interactive one, lending some credence to the weighted-average argument. The joint significance of all terms involving CBI also overwhelmingly ($p < .0005$) indicates that, even controlling for financial-sector size, central bank independence is *not* epiphenomenal.

Many empirical researchers have, however, abandoned our other central proposition—that a given institution’s impact depends on many other features of its political-economic environment—because of the practical difficulty evidenced here: the highly correlated data usually involved make distinguishing precise estimates of so many distinct interactive relationships extremely difficult. In this case, though, theory can and should inform empirical analysis, suggesting useful model-specification refinements. Specifically, theories of central bank independence and inflation imply restrictions on the sort of interactive effects expected: not just any set of interactions but rather a convex-combinatorial formulation in which π_d^* is progressively mitigated toward π_c^* as central bank independence increases. Model **(4)** imposes equal (linear-proportional) mitigation by central bank independence of all other factors’ inflationary impacts as a constraint on the estimation, thereby allowing more precise and more substantively relevant estimates of those interactive effects.

Adjusting for degrees of freedom, the weighted-average model fits the data better (i.e., has

¹⁰ Wald tests (not ΔR^2 F-tests) reported because they are more appropriate with consistent variance-covariance matrices.

smaller standard error) than the linear-additive or the unconstrained linear-interactive model. Model (4) also provides more precise estimates of all coefficients than (5).¹¹ Crucially, the 95% confidence interval for the degree to which central bank independence mitigates other factors' inflationary impacts is fairly compact (63% to 104% \pm ; point-estimate: $b_{cbi,2} \approx -.838$). The evidence also continues to support interactive models, now specifically a weighted-average, over linear-additive ones ($H_0: \beta_{cbi,2} = 0 \Rightarrow p < .000001$) and continues to reject soundly any claims of epiphenomenality ($H_0: \beta_{cbi,1} = \beta_{cbi,2} = 0 \Rightarrow p < .0000005$). The estimates also allow considerable confidence that the inflation policies of politically responsive governments do respond to all six other factors being considered ($p < .001$ for all except T, for which $p \approx .019$). In short, model (4) statistically dominates the others¹² and strongly supports all our theoretical expectations. I therefore proceed to substantive and theoretical interpretation using model (4).

4. Substantive and theoretical implications

First, the epiphenomenality argument would imply that, controlling for other anti-inflationary influences in the polity, especially financial-sector strength, central bank independence has no remaining anti-inflationary impact. That hypothesis is rejected at $p < .01$ in the linear model, at $p < .0005$ in the unconstrained interactive model, and at $p < .0000005$ in the constrained weighted-

¹¹ The comparisons are not transparent from **Table 1**. The model (4) quantity corresponding to $b_{c,x}$ of model (5) is $b_{cbi,2} \cdot b_x$, the standard error of which is $([b_x, b_{cbi,2}] \cdot V[b_{cbi,2}, b_x] \cdot [b_x, b_{cbi,2}]')^5$.

¹² A direct test of (4) as a restriction on (5) is actually rejected: (i) $H_0: \beta_{c,g} = \beta_g = \beta_{c,f} = \beta_f = \beta_{c,t} = \beta_t = \beta_{c,u} = \beta_u = \beta_{c,cwb} = \beta_{cwb} = \beta_{c,\pi a} = \beta_{\pi a} \Rightarrow p \approx .02$. That rejection is, however, entirely due to nonsensical estimates of $b_{c,t}$ and b_t in model (5): they are oppositely signed as expected, but $|b_{c,t}|$ greatly exceeds $|b_t|$, implying that central bank independence (trade openness) actually *increases* inflation where openness (independence) is high. However, equal mitigation by central bank independence of all other factor's impacts does not approach rejection: (ii) $H_0: \beta_{c,g} = \beta_g = \beta_{c,f} = \beta_f = \beta_{c,u} = \beta_u = \beta_{c,cwb} = \beta_{cwb} = \beta_{c,\pi a} = \beta_{\pi a} \Rightarrow p \approx .99$, yet these other factors do interact with CBI: (iii) $H_0: \beta_{c,g} = \beta_g = \beta_{c,f} = \beta_f = \beta_{c,u} = \beta_u = \beta_{c,cwb} = \beta_{c,\pi a} = 0 \Rightarrow p \approx .003$. Meanwhile, placing any restriction on (5) that forces sensible estimates of $b_{c,t}$ and b_t yields results in which all $b_{c,x}$ more nearly equal $-b_x$ and are more significant and in which model (4) cannot nearly be rejected. Moreover, a model applying only (ii) as a restriction, leaving $b_{c,t}$ and b_t unconstrained, substantively alters nothing. Therefore only (4) is presented here. Contact the author for detailed results of several intermediately constrained models [all of which ultimately support estimating (4)].

average model. There can be little question that the degree of central bank independence affects inflation even controlling for financial-sector strength. Rather than strong epiphenomenality, the evidence supports a subtler view of the anti-inflationary impact of central bank independence. Independence does indeed have little further anti-inflationary impact where the structure of polity and economy would lead governments to produce low inflation anyway. However, where the political economy would induce inflationary policies from politically responsive governments yet the central bank's independence nonetheless remains high,¹³ the anti-inflationary impact of central bank independence is great.

Second, the evidence unequivocally supports highly interactive specifications over the linear-additive sort previously estimated in the literature. Model (4) demonstrates this most simply in the overwhelming significance of $b_{cbi,2}$.¹⁴ The joint-hypothesis test that all the interaction terms in (5) have zero coefficients establishes the same empirical fact nearly as strongly.¹⁵ Furthermore, model (4)'s statistical dominance of (5) (see also note 12) establishes that the interaction takes specifically a weighted-average form as suggested here. I conclude, therefore, that inflation is a weighted-average of the rates sought by central banks and governments with the weight on the former given

¹³ Central banks can be (in)dependent when other factors are (not) conducive to low inflation: regressing central bank independence on government partisanship, union density, trade openness, financial-sector employment-share, and wage-bargaining coordination (decade-averages) reveals that these five factors explain maximally 50% of the variation in central bank independence.

¹⁴ $b_{cbi,2}$ is close to the -1 expected if banks targeted low, constant inflation rates but differs marginally significantly ($p \approx .065$, one-sided). Strictly, $0 > \beta_{cbi,2} > -1$ would imply that even perfectly independent banks respond somewhat to other political-economic conditions. However, we expect $b_{cbi,2} = -1$ exactly *iff* central bank independence were measured perfectly, the true model were exactly a linear weighted-average with exactly these variables, and they were all measured perfectly. I therefore resist placing too much emphasis on the exact magnitude of $b_{cbi,2}$. More critical is that reasonable alternative specifications always yielded $-.7 < b_{cbi,2} < -1.2$, clearly indicated approximate weighted-average models, and overwhelmingly supported such over linear-additive models.

¹⁵ The highly interactive (4) and (5) also dominate models like Jonsson (1995), Simmons (1996), and Clark et al. (1998), or Hall and Franzese (1998) and Iversen (1998a) which interact only government partisanship or wage-bargaining coordination with central bank independence. Rejection of excluding all but CBI-G or CBI-CWB from (5) occurs at $p \approx .004$ and $p \approx .0006$ respectively.

by the degree of central bank independence. Thus, the anti-inflationary impact of central bank independence depends on many other features of the political economy in which it interacts. Specifically, central bank independence has most anti-inflationary bite when (a) the government is most left, (b) union density is highest, (c) the economy is least open, (d) inflation abroad is highest, (e) the financial sector is smallest, and (f) wage-bargaining coordination is lowest, and *vice versa*. Conversely, these other factors' inflationary impacts, positive or negative, are greatest when central bank independence is lowest and least when central bank independence is highest.

I now examine a small subset of the findings more closely to illustrate the substantive importance of the weighted-average corrective, beginning with the domestic-inflation effects of international conditions. One interesting question concerns the inflationary impact of the oil crises and the collapse of the Bretton Woods fixed-exchange-rate regime. Average inflation in the OECD rose about 4.6 points from year-end 1972 to year-end 1974: just after Bretton Woods' fall and during OPEC I. Taking that 4.6% jump as an (admittedly crude) estimate of the (assumed-exogenous) foreign-inflation shock from these events, our estimates indicate that the domestic-inflation response will have varied across countries by the independence of their central banks as shown in **Figure 1**.

[Figure 1 Here]

The graphic reveals an initial response in New Zealand ($CBI \approx 0.15$, sample minimum) of about +2.25%, rising to almost +3.75% after three years, then settling back to about +3.4% in the long run (7 years \pm by our estimates). In Finland ($CBI \approx 0.49$), the estimated immediate response to the same shock is only +1.5% (\pm), with a peak +2.5% (\pm) effect, and a long-run +2.25% (\pm) effect. In Germany ($CBI \approx 0.93$, sample maximum), domestic inflation barely responds to such foreign developments: analogous estimates being +.57%, +.95%, +.86%. The standard linear-additive model

would conclude, contrarily and quite incorrectly, that all countries incurred an immediate +1.2%, peak +2.2%, and long-run +2% impetus to inflation from these events (shown in bold in **Figure 1**). More generally, the linear-additive model simply misses the fact that more independent central banks successfully resisted more of the inflationary impulse originating from the international arena during this time (and others) than more dependent banks could.

Consider next the inflation effects of government partisanship. Our results indicate both that central bank independence has greater anti-inflationary impact under left than under right governments and that partisan differences in inflation are greater the more dependent is the central bank. This differs from the somewhat misleading conclusions derived from linear-additive models. The linear-additive estimates imply that unit rightward shifts in government partisanship (about the distance between typical Republican- and Democratic-presidency US governments) always produce a .3% (\pm) inflation decrease, with a 90% confidence interval stretching from -.13% to -.45%. The weighted-average model, however, reveals that this estimate is considerably inaccurate in countries with low or high central bank independence (including the US). Where independence is extremely low, such as it was in New Zealand, the same unit rightward shift produces a .46% inflation reduction (90% c.i.=[-.24,-.68]), while where independence is extremely high, as in Germany, unit rightward shifts only reduce inflation .12% (90% c.i. [-.03,-.20]). Thus, *ceteris paribus*, identical ideological swings in New Zealand produced inflation movements over 150% as large as those estimated by the linear-additive model, while identical ideological swings in Germany produced inflation movements only about 40% as large.

Also, over most of the sample range of central bank independence, the confidence interval for the partisan impact is smaller in the weighted-average than the linear-additive model. This

illustrates that the more exact weighted-average specification provides more precise estimates (i.e., smaller standard errors) of the substantive impact of, for example, partisanship as well as truer estimates of it (i.e., estimates which vary according to the degree of central bank independence as, substantively, they should). The same two benefits accrue to the weighted-average model's estimates of the inflation impacts of central bank independence and of all other variables in the model. Trade openness, for example, is noticeably more significant in the weighted-average model ($p \approx .037$)¹⁶ than in the linear-additive model ($p \approx .056$), suggesting that, had it been closer, linear-additive models could easily have caused researchers to conclude erroneously that trade openness had no perceivable inflation effect. This point is worth elaborating.

Because the linear-additive model basically averages the varying impact of other political-economic factors across the empirically existing range of central bank independence, it underestimates the substantive magnitude of those effects *per se* (i.e., apart from their mitigation by central bank independence). For example, in an environment with a perfectly dependent central bank, the impact of trade openness is more than twice its average impact across all types of banks as estimated by the linear-additive model. The former effect is also unambiguously significant ($p \approx .019$) while the latter is more marginally so ($p \approx .056$). Additionally, the mis-specification of the linear-additive model contributes to a general statistical inefficiency (i.e., higher standard errors than the lowest possible given the information in the data) which further hinders the discovery of effects which actually exist. In sum, by failing to incorporate the manner in which central bank independence mitigates the inflationary impacts of other political-economic institutional and structural factors, most previous estimates of those impacts have mis-stated them, understating their

¹⁶ The reported joint hypothesis test is the one least favorable to this comparison: $H_0: \beta_t = \beta_t \cdot \beta_{c,t} = 0$. One could also argue, though, that $H_0: \beta_t = 0$, which produces $p \approx .019$, is sufficient in model (4).

magnitude and their certainty, and thus may have failed to find some of them.

Specifically regarding political and partisan business cycles, previous evidence of which is often viewed as weak, the implications are profound. For example, US governments with Republican presidents and those with Democratic presidents are typically about 1 point apart ideologically on our scale (6.5-5.5±, depending on the partisan composition of Congress). Thus, were the Federal Reserve perfectly dependent (CBI=0), and were typical Democratic- and Republican-president governments to oscillate in office for one term each, inflation would oscillate with an amplitude of .9% (±, *ceteris paribus*). If, conversely, the Fed were perfectly independent (CBI=1), inflation would barely oscillate (amplitude<.1%) in response to such government-partisanship changes. And if the Fed had 75% independence (as its CBI index-value suggests), it would mitigate the partisan-induced oscillation by about 63% [i.e., .75(-.838)], to an amplitude just over 0.3%. Scholars focusing on the US case might easily have missed that much smaller amplitude, not because partisan cycles in US monetary-policy do not exist, but because the Fed so reduces them that they are hard to discover. The implication is that comparative political economists should expect larger (smaller) partisan cycles in inflation, *ceteris paribus*, where central banks are more (in-)dependent.^{17,18}

Finally, compare directly the estimates of the inflation impact of central bank independence in these developed democracies from 1972-90 from the weighted-average model and from the

¹⁷ However, even the linear-additive model evidenced clear partisan effects; the exclusive post-Bretton-Woods focus here may explain these stronger-than-usual results. See Clark et al. (1998) for more thorough discussion of this and related points.

¹⁸ The mitigation of partisan-inflation-cycles by central bank independence exemplifies a more general property. Whether the bank explicitly seeks to reduce inflation variance or not, inflation-variance reduction is inherent in the bank's responding less and/or to other and/or to fewer factors than does the discretionary authority. Note the inflation-variance implications of (1):

$$V(\pi) = CBI^2 \cdot V(\pi_c^*) + 2 \cdot Cov(\pi_c^*, \pi_d^*) \cdot CBI \cdot (1 - CBI) + (1 - CBI)^2 \cdot V(\pi_d^*)$$

Provided $Cov(\pi_c^*, \pi_d^*)$ is not too positive and $V(\pi_c^*)$ is not too much larger than $V(\pi_d^*)$, central bank independence reduces inflation volatility simply because it diversifies the "portfolio" of politico-economic signals to which policy responds. Thus, the much-celebrated finding that central bank independence reduces inflation variance simply reflects that diversification moderates volatility or, even more generally, that averaging reduces variance.

(theoretically and empirically dominated) linear-additive model. As **Figure 2** reveals, the linear-additive model estimates a constant anti-inflation benefit from each bank which depends only on its degree of independence; countries with high central bank independence like the US, are estimated to have received some (fixed) inflation benefit while those with lower independence, like Japan, received a lesser (but still fixed) benefit. However, as the superimposed estimates from the weighted-average model strikingly demonstrate, the fixed estimate can be considerably misleading across countries and across time, because the anti-inflationary impact of central bank independence has varied dramatically as the domestic and international political-economic structural and institutional features of these developed democracies changed over this period.

Figure 2 highlights, for example, that the inflationary benefit of central bank independence has been declining in all countries since the early 1980s (\pm), implying that the developed democracies' political economies have been becoming increasingly anti-inflationary with or without highly independent central banks. This is largely due to two structural trends: increasing trade-openness and increasing financial-sector strength (and in some places also increasing right-partisanship and decreasing union density). In fact, so strong have these anti-inflationary forces become that in most countries today, the central bank adds nothing further to the anti-inflationary stance of monetary policy however independent it may be.¹⁹ Only Italy, Finland, Ireland, Sweden, Australia, and New Zealand (1/3 of the sample) had any further anti-inflationary bite to gain in 1990 from increasing the independence of their central banks, whereas, at least through the early 1980s, central bank independence provided large anti-inflation benefits everywhere.

¹⁹ Current estimates in some countries imply that independent central banks increase inflation somewhat relative to what the (apparently extremely conservative) social and political structure would have produced itself. I take such estimates, hard to interpret substantively but thankfully rare in the sample, as indication that an anti-inflationary monetary-policy stance is over-determined in these country-times. **Figure 2** suppresses such estimates.

[Figure 2 Here]

Considering that central bank independence had become almost superfluous as an anti-inflation device in these countries, why so many moved to increase it in the 1990s and not before is a puzzle. Certainly international compromises surrounding the drive to European Monetary Union are proximately central, but an intertemporal perspective on the present theory and evidence may add to that understanding of this conjunction of events. Central bank independence has little anti-inflationary impact in most places now because the structure of political interests push discretionary policy-makers to pursue anti-inflationary policy anyway, which is to say that anti-inflationary forces currently hold the political edge. Central bank independence will be most needed, from their anti-inflationary standpoint, should they lose this edge. Thus, recent pro-independence offensives may reflect anti-inflationary forces using their current political strength to establish or strengthen (i.e., institutionalize) their central banks' independence so that the bank might continue to serve anti-inflationary interests should the structure of polity and economy turn more inflationary in the future. This logic suggests, conversely, that when central bank independence would provide the most anti-inflationary impact is exactly when it is hardest to establish because that will be when less anti-inflationary forces dominate. Assuming political actors understand this dynamic and have some foresight, we would expect pro-independence forces to be on the offensive when they hold sway even though central bank independence is least necessary then and anti-independence forces to be on the offensive when they hold sway even though central bank independence would have greatest anti-inflationary impact then.

5. Conclusion

Theoretically, I have shown that the predictions of central-bank-independence-and-inflation

theory are more precise (and correctly so) than previous empirical analyses have credited. The argument is not merely that central bank independence reduces inflation *ceteris paribus*, as previous linear-additive models have amply demonstrated. Rather, the theory states and the evidence reveals (given properly specified models) that how much central bank independence reduces inflation depends on many domestic and international, institutional and structural characteristics of the broader political-economic environment because these considerations differently affect the desired inflation-rates, and thus the monetary policies, of partially independent central banks and politically responsive governments. Conversely, the inflationary impact of any factor to which governments and central banks respond differently depends on the degree of central bank independence.

Empirically, the failure of much previous literature to specify test equations embodying these theoretical expectations resulted in mis-specification which provided estimates of only the rough-average inflation-impacts of central bank independence and of other variables across various configurations of those other variables and central bank independence occurring in the sample country-times. Furthermore, by fostering imprecise coefficient estimates, such mis-specification may have obscured empirical relationships which actually exist (e.g., political and partisan business cycles). More broadly, the present exercise has demonstrated that the appropriate application of theoretically derived restrictions on empirical estimation can aid researchers seeking evidence regarding the complex, interactive hypotheses which are the hallmark of institutional political economy in particular and of political science in general.²⁰

The results also suggest that moves toward greater (lesser) central bank independence may be most likely when that institution would have least (most) anti-inflationary impact. This is because

²⁰ Western (1997) offers a complementary statistical approach which should further aid such endeavors (see note 9).

pro-independence forces will seek to institutionalize greater central bank independence when they are ascendant, not because it is necessary then—indeed that is when it is least necessary—but because it is possible then and may become necessary in the future when, having been established, it may prove harder to remove. Anti-independence forces should act analogously when they dominate, which will be when central bank independence would have had most anti-inflationary bite. For now, this is merely conjecture, but the notion may suggest avenues for further theoretical development in endogenizing central bank independence in particular and institutions in general.

Finally, the theory and evidence above illustrate a still broader point regarding institutional political economy. The incentives facing political-economic actors, and thus policies and outcomes, are determined by the interactions of the set of domestic and international, economic and political, and structural and institutional factors operating in that place and time. Indeed, researchers have long recognized this as true not only of political economy but of political and other social sciences more generally. Too often, however, the unavoidable limitations of social science and its data have led scholars either to abandon quantitative analysis of such complicated phenomenon altogether or to conduct quantitative analysis of more limited and therefore less general models which do not explore many of the interactions suspected to be present. This work demonstrates a fruitfully exploitable alternative compromise. We can use our theories to narrow the range and types of possible interactions over which to search, moving beyond linear-additive and linear-interactive models, and we may find it both statistically efficient and theoretically rewarding to do so.

Appendix: Data Definitions, Sources, and Descriptive Statistics

Data are annual, 1972-90, for 18 countries: US, Japan, Germany, France, Italy, UK, Canada, Austria, Belgium, Denmark, Finland, Ireland, the Netherlands, Norway, Sweden, Switzerland, Australia, and New Zealand. All data available at <http://www-personal.umich.edu/~franzese>.

π : GDP-Deflator Inflation-Rate (x%). OECD data taken from Layard, et al. (1991).

CBI: Central Bank Independence (0-1). The average of five commonly used indices: LVAU and QVAU from Cukierman (1992), EC and POL from Grilli et al. (1991), and the original index from Bade and Parkin (1982). [N.b. Alesina's frequently-cited index derives from Bade and Parkin's (personal communications).] Cukierman's LVAU and so the average potentially varies by "decade": 1950-9, 1960-72, 1973-9, 1980-9; almost 97% of LVAU's average is cross-national though. The source indices are linearly rescaled 0-1; then available rescaled measures are averaged.

G: Government Partisanship (0-10). Commonly-available "expert" codings of left-right party positions provide a partisanship score for each party (see Appendix B to Laver and Schofield 1991). These are rescaled, 0=extreme-left to 10=extreme-right, and averaged. Farthest left in the sample are French Communists: 1.3755; farthest right are Japanese Liberal Democrats: 8.9. US Democrats are 4.8213 and Republicans 7.61. Governments' partisan positions are the average of "government member" party-positions, i.e. cabinet ministers in pure parliamentary systems. US governments are coded as 1/3 the President's score, 1/3 the Senate-average, and 1/3 the House-average. French Vth Republic and Finnish governments' positions are 1/2 the President's and 1/2 the Cabinet's. If multiple governments held power in one year, each is weighted by the fraction it reigned.

T: Trade Openness (0-2). Exports plus imports over GDP; from IMF IFS CD-ROM, June 1996.

F: Financial-Sector Employment (x%). Finance, insurance, real estate, and banking employment

as a percent of total employment; from OECD National Accounts Volume II, Detailed Tables.

π^a : Inflation Abroad (x%). Created from π . Each country-year's observation on π^a is the average inflation in the *other* 17 countries in that year.

U: Union Density (0-1). Union members as a share of labor force; Golden and Wallerstein (1995).

CWB: Coordination of Wage Bargaining (0-1). A subjective index from Hall and Franzese (1998). The index varies by country: US=UK=Canada=Ireland=0; France=Italy=Australia=New Zealand=.25; Belgium=Netherlands=.5; Japan=Germany=Denmark=Finland=Switzerland=.75; Austria=Norway=Sweden=1.

[Table A1 Here]

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Table 1: Alternative Models of Inflation in Developed Democracies, 1972-90

Independent Variables		Coefficient (Factor)	Linear Model (3)	Interactive Model (5)	Wtd. Avg. Model (4)
All Factors Excluding CBI: $X_{t-1}B_1 = \beta_g G_{t-1} + \beta_f F_{t-1} + \beta_t T_{t-1} + \beta_u U_{t-1} + \beta_{cwb} CWB + \beta_{\pi^a} \pi_{t-1}^a$	Government Partisanship	β_g (G_{t-1})	-.287 (.096)	-.517 (.311)	-.526 (.156)
	Financial Sector Employment Share	β_f (F_{t-1})	-46.4 (10.5)	-64.0 (33.1)	-82.6 (19.1)
	Trade Openness	β_t (T_{t-1})	-1.10 (.575)	-8.36 (3.06)	-2.45 (1.04)
	Union Density	β_u (U_{t-1})	+4.53 (1.21)	+10.6 (3.35)	+8.73 (2.16)
	Coordination of Wage/Price Bargaining	β_{cwb} (CWB)	-3.88 (.775)	-4.84 (1.97)	-7.15 (1.44)
	Inflation Abroad	β_{π^a} (π_{t-1}^a)	+.266 (.097)	+.650 (.212)	+.564 (.164)
	CBI (non-interacted)	$\beta_{cbi,1}$ (CBI_{t-1})	-2.33 (.907)	-2.53 (8.71)	-7.39 (2.46)
CBI times inflation effect of all other factors [Model (4)]	$\beta_{cbi,2}$ ($CBI_{t-1} \cdot X_{t-1} B_1$)	—	—	-.838 (.106)	
Simple Interactions [Model (5)]		$\beta_{c,g}$ ($CBI_{t-1} \cdot G_{t-1}$)	—	+4.32 (.671)	—
		$\beta_{c,f}$ ($CBI_{t-1} \cdot F_{t-1}$)	—	+15.8 (59.3)	—
		$\beta_{c,t}$ ($CBI_{t-1} \cdot T_{t-1}$)	—	+14.7 (6.12)	—
		$\beta_{c,u}$ ($CBI_{t-1} \cdot U_{t-1}$)	—	-10.4 (5.74)	—
		$\beta_{c,c}$ ($CBI_{t-1} \cdot CWB$)	—	+1.76 (3.54)	—
		β_{c,π^a} ($CBI_{t-1} \cdot \pi_{t-1}^a$)	—	-.698 (.331)	—
Observations (Degrees of Freedom)			342 (332)	342 (326)	342 (331)
Adjusted R² (Standard Error of Regression)			.675 (2.675)	.688 (2.624)	.689 (2.619)

NOTES: Coefficients on constants and two lags of inflation suppressed to conserve space. Models (3) and (5) estimated by ordinary least-squares and (4) by constrained least-squares. Newey-West autocorrelation-and-heteroskedasticity-consistent standard-errors in parentheses.

Table A1: Descriptive Statistics (Sample = 18 OECD Countries, 1972-90)

	π	CBI_{t-1}	G_{t-1}	T_{t-1}	F_{t-1}	π^a_{t-1}	U_{t-1}	CWB
Mean	7.63	.501	5.49	.514	.068	8.04	.450	.486
Median	6.85	0.468	5.51	.470	0.068	8.56	.450	.500
Maximum	27.2	.931	8.90	1.40	.113	13.7	.846	1.00
Minimum	-1.40	.150	2.78	.084	.021	3.73	.102	.000
Std. Dev.	4.69	.196	1.56	.260	.021	2.69	.172	.359

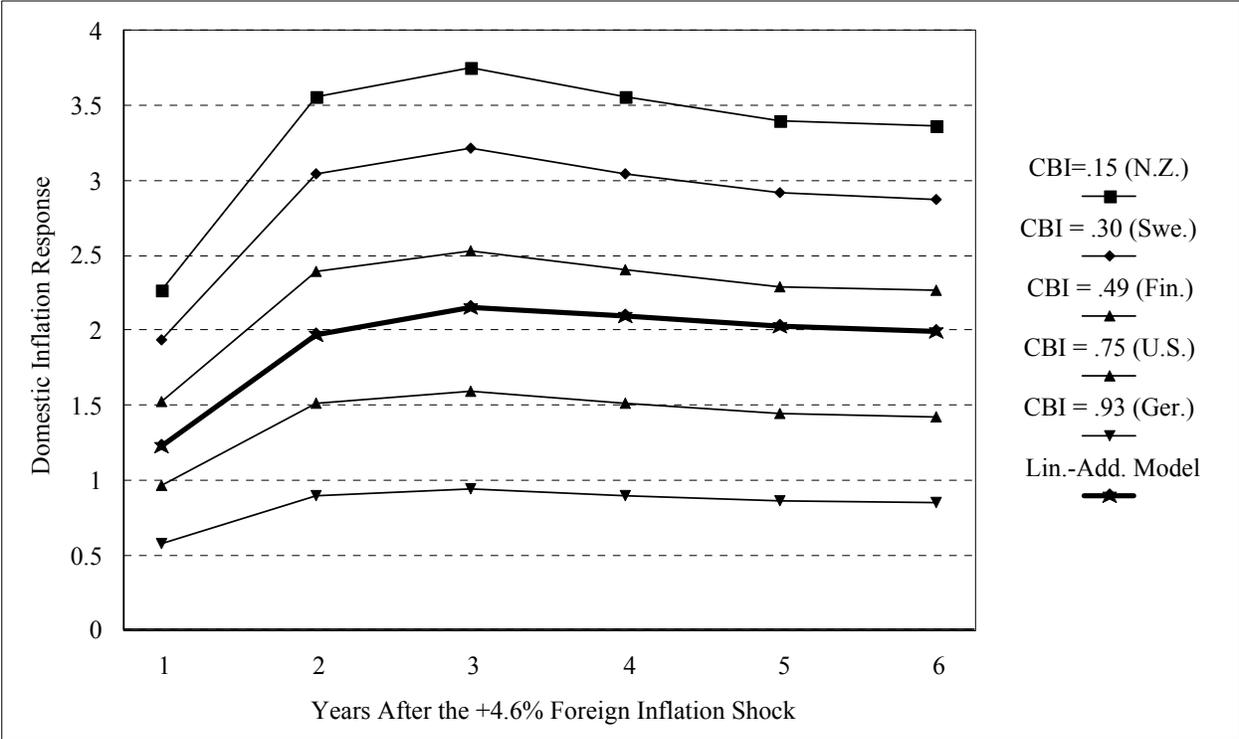


Figure 1: Domestic-inflation response to Bretton Woods' collapse and OPEC I (a +4.6% exogenous-foreign-inflation shock by assumption), as a function of the degree of central bank independence characterizing the domestic political economy.

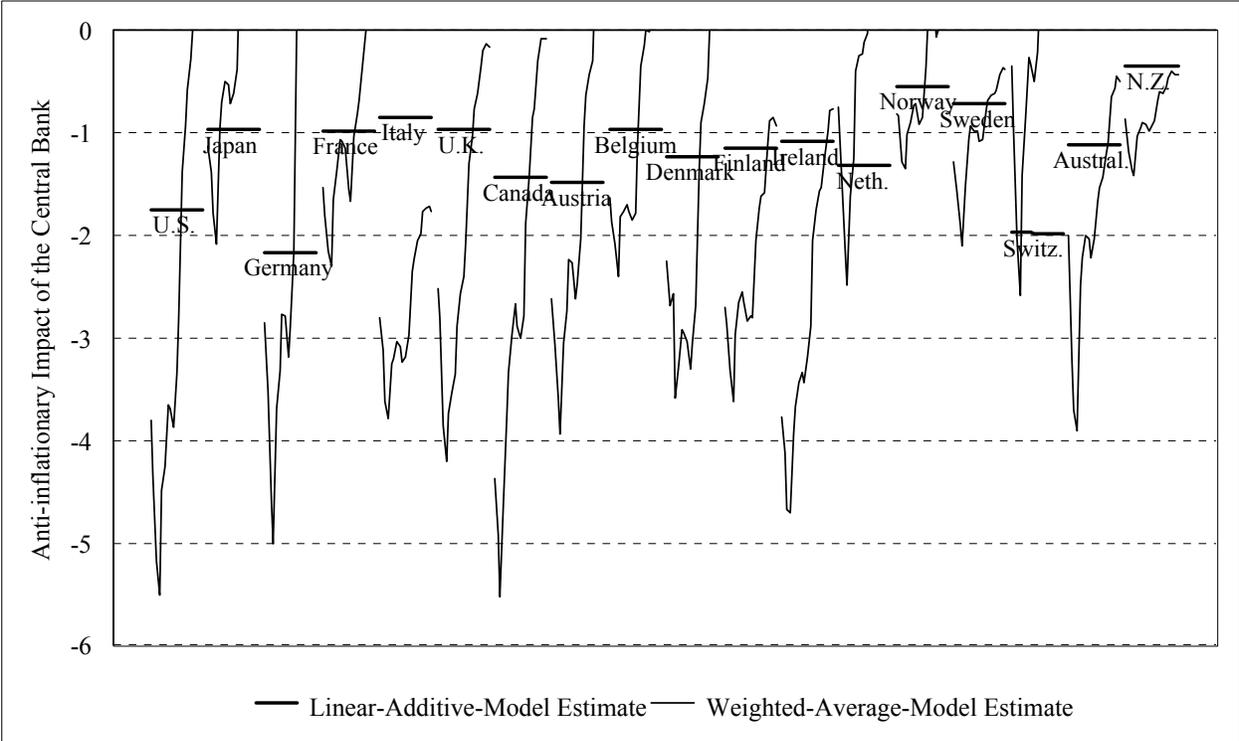


Figure 2: Linear-additive and weighted-average estimates of central banks' anti-inflationary impacts given their degree of independence and given the other politico-economic characteristics of that country-year. Estimates for each country 1972-90 are plotted from left to right.