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Independence and Accountability of Monetary and Fiscal Policy Committees

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Abstract

The democratic accountability of policymaking institutions which are autonomous within delegated mandates has not received as much attention as their independence. We analyze in a theoretical model the effects of accountability in the form of possible overriding of economic policy decisions by the government under different degrees of independence of expert committees conducting monetary and fiscal policy. The equilibrium outcomes of such alternative institution-design frameworks are compared according to key macroeconomic performance criteria. Our results stress the trade-off between anchoring inflation expectations on target and output stabilization that is not solved with accountability.

JEL Classification: E52, E58, E61, E63

Key Words: independence, accountability, monetary policy, fiscal policy, expert committees, institution design

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1 Motivation

The purpose of this paper is to address analytically a central question in institution design that has direct implications for policymaking: How are different degrees of independence of monetary and fiscal policies affected in influencing macroeconomic outcomes when complemented with accountability? Whereas the issue of the autonomy of monetary policy has been investigated at length, fiscal policy independence from the government has hardly been studied at all. This is not least because of the distributive effects of fiscal policy which call for ex ante democratic control. However, as Wyplosz (2005) argues, the determination of the fiscal deficit can also be delegated to an independent agency, since it does not differ much in its distributive effects from the determination of the interest rate by monetary policy. Formalizing these ideas, our contribution here is to set up and solve a macroeconomic game-theoretic model where fiscal policy – or, more precisely, its stabilization role – can be delegated to an expert committee in the same way as monetary policy. Policy delegation in a democracy implies accountability, the more so under publicly announced targets as is common nowadays. Insofar accountability has not been well defined and explored either in the related literature, our model constitutes as well an attempt to operationalize this concept in a straightforward way in order to analyze its macroeconomic effects.

In addition to the main theoretical motivation expounded further down (subsection 1.2), our interest in the topic is justified from the perspectives of both empirical observation and policy application (subsection 1.1).

1.1 Empirical Facts as Policy Outcomes?

Empirically, several stylized facts have persisted since the early 1990s. Figure 1 shows that inflation has been low and stable in the OECD countries and the Euro area. Unemployment rates have been decreasing too, except in Germany, but with some cyclical pattern. There is an ongoing discussion to what extent this 'great moderation' should be attributed to 'good policy' or to 'good luck' or to both. However, a deeper scrutiny of the data quickly excludes fiscal policy from having been 'good', in the sense of time consistent and, hence, credible, even if the convergence to explicit or implicit inflation targeting institutional frameworks has at the same time ensured greater dynamic consistency and credibility of monetary policy. Figure 2 provides evidence on a persistent 'deficit bias', even when the cyclically adjusted general government budget balance is taken into account.

[Figures 1 and 2 about here]

Clearly, the economic environment has been the same for monetary and fiscal policy during the time period in the figures, but the respective institutions and mechanisms implementing them have differed much. This institution-design aspect may explain why monetary policy has been much more successful than fiscal policy, as is currently widely believed. Since the early 1990s monetary policy in the OECD and Euro area countries has been operating under considerable autonomy, yet mostly within credible monetary regimes imposing some form of constrained discretion. Monetary policy committees, legally assigned clear mandates and operationally involving independent expertise to a substantial degree, have been at the core of responsible decision making. Fiscal policy, by contrast has been implemented by elected governments, often within the leeway of prescribed fiscal rules, for instance, the Stability and Growth Pact. There is also agreement among researchers that fiscal policy has in effect remained unconstrained by such fiscal rules, basically because they have been easily breached (as Figure 2 also illustrates).

1.2 Theoretical Analysis of Institution Design

Wyplosz (2005) has notably insisted that institution design, not mechanistic rules, is needed to overcome the 'time inconsistency that plagues fiscal policy'. The particular novelty of our approach is that we set to explore alternative social arrangements which delegate to independent but accountable non-elected expert committees *both* monetary and fiscal policy. Such institutional mechanisms are theoretically appealing because of their potential to enhance policy credibility and effectiveness compared to the situation where elected fiscal authorities and governments induce the well-known problems of dynamic inconsistency and political business cycles. More precisely, in a way symmetric to an appointed independent but accountable Monetary Policy Committee (MPC) implementing its mandate, we incorporate an analogous independent but accountable Fiscal Policy Committee (FPC), with a corresponding mandate in the fiscal policy area. Our model builds upon the existing literature that derives optimal policy instruments, both in the tradition of Kydland-Prescott (1977) – Barro-Gordon (1982 a, b) and following its modern New Keynesian extensions.

We motivate three goals to achieve at a social level, an output, an inflation and a public deficit-to-GDP target, and assume two instruments at disposal, the interest rate to conduct monetary policy and the general government (primary) budget deficit-to-GDP to conduct fiscal policy. Each implementing authority is assigned or chooses a target, and actions are potentially, but not necessarily, coordinated. We then consider alternative institutional frameworks for macroeconomic policymaking, which embody particular social choices of institution design (i.e., the preferences of a given society) spanning different degrees of independence without or with accountability of the expert committees to

the government. Accountability is modeled as an override clause which the government may implement, e.g., under extreme shocks in the spirit of Lohmann (1992) and Blinder (1997). Independence and accountability are, thus, both defined with respect to the government.[1] Society, via parliament, 'institutionalizes' its preferences by granting certain degrees of independence – without or with an override option for the government – to the monetary and/or fiscal authority, both 'conservative' in the sense of Rogoff (1985). The government, being the elected representative of the principal, implements the policy regime chosen by society, while the committees, as agents, are accountable within their mandate for the degree of freedom each is allowed in conducting the respective policies. Our conceptual and modeling approach also follows recent refinements and applications of the mentioned classical articles.[2]

The huge theoretical and empirical literature on optimal monetary policy and its delegation[3] has established that a more autonomous central bank tends to lead to a lower actual inflation on average. Eijffinger and Hoeberichts (2002) have emphasized that such a democratic approach to the conduct of monetary policy would require augmented responsibility of the central bank for its actions as well as accountability to the government and/or to the parliament. An essential dimension of, or even precondition for, accountability is transparency, because it is necessary for any form of a wider, non-secretive accountability to be effectively implemented. Thus, in a democracy independence requires accountability, which in turn is preconditioned by policy transparency. As far as optimal fiscal policy or its delegation is concerned, few clear and general results seem to be supported theoretically or empirically on a broad basis, no matter that a number of regulations stipulate certain restrictions on fiscal discretion. Like in monetary policy, the trade-off between value (or moral) judgment and technical (or expert) judgment (involving specialized knowledge) plays a crucial role in delegating fiscal policy to an independent institution. Moreover, if the consequences of fiscal policy are long-term and affect in a similar way the whole society, as it is with stabilization policy, it can be delegated by analogy to monetary policy (Blinder 1997, 121). Fiscal policy as stabilization policy is characterized by technical knowledge, not so much by moral judgment as, e.g., redistribution (Calmfors 2003, 334). Therefore, stabilization can be delegated, whereas all other areas such as redistribution and provision of public goods should not.

[1] Whose preferences, for simplicity and in the tradition of the political economy literature, we identify throughout with those of the median voter.

[2] Most directly Beetsma and Bovenberg (1997, 1998), Dixit and Lambertini (2003), von Hagen and Mundschenk (2003), Demertzis, Hughes Hallet and Viegi (2004), Wyplosz (2005), Castellani and Debrun (2005), Mihov and Sibert (2006), Mihailov (2006), Hughes Hallet and Libich (2006), and Ullrich (2007).

[3] Often in the form of instrument independence under goal dependence, e.g., Fischer (1994) and Debelle and Fischer (1994), or more specifically as inflation-forecast targeting, e.g., Svensson (1997) and Herrendorf (1998). This type of monetary regime has been eloquently qualified by Bernanke and Mishkin (1997) as 'constrained discretion', again in an inflation targeting context.

However, the separation of these tasks is not as easy as theoretical models might suggest because fiscal policy touches the core of the political decision process (Buti, Eijffinger, and Franco 2003, 15).

With respect to both monetary and fiscal policy considered jointly in their interdependence, major work develops the welfare-theoretic dynamic Ramsey (1927) approach,[4] relates to the fiscal theory of the price level,[5] or derives from the game-theoretic literature on strategic interaction, e.g., Nordhaus (1994). More recent research along the latter line has moved into the study of optimal incentive schemes, which could be thought of as contracts or institutions. Separation and delegation of powers from a principal to an agent and the related incentive-compatibility design and enforceability with view to some social optimum have been the key issues of focus. We here contribute further along a specific dimension of interest within this particular direction. More precisely, we opt for a game-theoretic macroeconomic approach since from the perspective of our task it has two main advantages: (i) it is the traditional one to our topic, dominating the theoretical studies we quoted and build upon, thus making our results comparable to earlier ones; and (ii) it allows us to achieve analytical clarity, important in a first cut at an issue, such as ours.[6]

Our major findings complement and extend the earlier literature. We compare the equilibrium outcomes of alternative policy frameworks, representing exogenous social preferences on institution design, and rank them according to key macroeconomic performance criteria such as inflation expectations, inflation, output and the budget deficit. Our results demonstrate that accountability does not eliminate the trade-off between inflation and output stabilization, yet it influences macroeconomic outcomes toward the preferences and targets of elected politicians. We conclude that if the priority is to manage inflation and deficit expectations and fluctuations, a society should opt for independent monetary and fiscal policy that is not threatened by the possibility of its decisions being overridden. If, on the other hand, a society would prefer to mitigate the variability of output and employment, policymaking by expert committees should be additionally restricted either by accountability mechanisms such as override clauses or similar in effects or by some form of constrained discretion such as goal dependence.

[4] E.g., Lucas and Stokey (1983), Chari and Kehoe (1999), Benigno and Woodford (2003, 2006), Schmitt-Grohé and Uribe (2004 a, b).

[5] With Ricardian equivalence, McCallum and Nelson (2006) have claimed that monetary-fiscal coordination does not matter at all.

[6] The alternative of solving a microfounded welfare-theoretic Ramsey-policy problem, along the lines of Benigno and Woodford (2003, 2006) is inappropriate to address overriding under constrained discretion following extreme shocks, at the centre of our model, because their linear-quadratic approximation method applies to small shocks only and under precommitment from a 'timeless perspective'. Microfounded but more computationally intensive Ramsey-policy approaches of the kind employed by Schmitt-Grohé and Uribe (2004 a, b) permit more realism (e.g., more distortions and shocks) at the cost of assuming too that a commitment technology is available and of losing analytical clarity.

The paper is organized as follows. The next section specifies our basic model, defining precisely the notions of independence and accountability, the mandates of the institutions responsible for macroeconomic management, and the economic environment. Section 3 discusses our main results, first without accountability and then with accountability, and presents rankings of the policy regimes by alternative performance criteria. Concluding remarks are offered in section 4. Finally, Appendix A documents the solutions of our model which arise from the optimization of the relevant authorities under the considered policy regimes, and Appendix B collects the proofs of all propositions and corollaries.

2 The Basic Model

2.1 The Target System and Sharing of Power

We set up a model of the relationships among a Government (denoted by a G-superscript), an MPC (M-superscript) and an FPC (F-superscript).[7] The objective functions of the expert committees reflect independence and accountability issues. Independence is granted with regard to the degree the monetary or fiscal authority can choose its own targets and follow its own preferences. Alternative institution-design regimes between the extremes of complete freedom of action and full dependence of both authorities are also theoretically formulated along these lines. Accountability is modeled as the possibility of overriding committee decisions that would imply costs for the Government specific to each regime, which deter frequent use of the override option.

Assuming additive separability of a quadratic loss function for each player, rational expectations and perfect information, as is common in this literature, our point of departure is the case of 'joint' optimization (under full 'coordination') with regard to the three objectives, stabilization of output, inflation, and the public-sector budget deficit ratio to GDP, conducted by the Government. Its social loss function is written as:[8]

$$L^G = \frac{\gamma_y^G}{2}\left(y - y^{*,G}\right)^2 + \frac{\gamma_\pi^G}{2}\left(\pi - \pi^{*,G}\right)^2 + \frac{\gamma_d^G}{2}\left(d - d^{*,G}\right)^2, \tag{1}$$

where y is the real output level, π denotes the inflation rate, and d is the primary government budget deficit (measured as a percentage of GDP); γ_j^G, for $j = y, \pi, d$, are the

[7] Each of these three policymaking units is considered as a whole, i.e., in its entirety. We, thus, do not address here aspects of structure and configuration of decision power: neither within the committees, as much of the literature on MPCs has done, nor within the Government. Moreover, to sharpen the contrast in incentives *vis-à-vis* elected politicians, our experts are assumed to enjoy long terms of office but to have no reappointment option.

[8] The usual discount factor parameter β in dynamic models is eliminated from further consideration in our static framework, as in most of the related studies.

preference 'weights'[9] and an asterisk denotes target levels of the respective variables.[10] Benigno and Woodford (2003) have microfounded a similar multiperiod loss function where the third term above is absent. In their optimization problem, however, the real primary budget surplus enters via the intertemporal budget constraint of the government. Wyplosz (2005) has recommended delegating to an FPC decisions on the (primary) *budget balance-to-GDP* only, not on its *structure*, with view to achieving fiscal sustainability. The rationale is that the government intertemporal budget constraint, with constant real interest rate, r, for simplicity, and D_t denoting debt-to-GDP in (2) below, can be written in two equivalent ways, as a transversality condition (TVC) and as present value (PV) of expected future primary budget balances:[11]

$$\text{TVC: } \lim_{j\to\infty} \frac{D_{t+j}}{(1+r)^j} = 0 \Leftrightarrow D_t \leq \sum_{j=0}^{\infty} \frac{d_{t+j}}{(1+r)^j} \equiv \sum_{j=0}^{\infty} \frac{g_{t+j} + tr_{t+j} - \tau_{t+j} y_{t+j}}{(1+r)^j} \text{: PV.} \qquad (2)$$

The variables in the PV representation in (2) defining the deficit – government spending, g_t, (lump-sump) government transfers, tr_t, and some (distortionary) tax rate,[12] τ_t, multiplying GDP, y_t, all in real terms – have commonly been modeled as instruments of fiscal policy. Usually such modeling has assumed *only* one of the mentioned fiscal instruments to be chosen endogenously by the government under discretion or commitment, with *all* the remaining ones taken as exogenously given, e.g., in the neoclassical literature on optimal fiscal policy as well as in its modern microfounded extensions, such as Benigno and Woodford (2003, 2006) or Benigno and De Paoli (2006).[13] In writing our social loss function in the form (1), we essentially follow Wyplosz's (2005) interpretation, i.e., one could think of our deficit target as imposed by the requirement for fiscal sustainability embodied in (2). Because we focus on delegating to an expert committee the *stabilization* role of fiscal policy rather than the total of it, abstracting from tax issues and from the components of government expenditure, we could interpret variation in the primary deficit-to-GDP in our set-up as reflecting variation in the bulk of government expenditure

[9] We use quotes because these 'weights' in our model context are not necessarily constrained to add up to unity.

[10] Conventional macromodels studying monetary and fiscal policy interactions, such as Beetsma and Bovenberg (1997, 1998), von Hagen and Mundschenk (2003) or Castellani and Debrun (2005), have worked with the same three quadratic terms in the objective function of the policymaker, where government spending has usually been included instead of the deficit.

[11] Ignoring a seigniorage term as appropriate to credible policy, the only case to which we restict attention here.

[12] On firm sales in Benigno and Woodford (2003), on income and/or capital in other papers.

[13] Other recent microfounded models such as Beetsma and Jensen (2005), Galí and Monacelli (2005), Leith and Wren-Lewis (2006) or Adam and Billi (2007) have motivated in different ways – e.g., by adding *public spending* in consumer utility – a (quadratic) term related to fiscal policy in the social objective function, which we here take for granted since our focus is on a different issue, as in the title.

for a given level of taxes (and transfers), and thus influencing the sustainability of public debt-to-GDP.

Further formalizing ideas of Blinder (1997) and Wyplosz (2005), we then assume that the above social objective can be decomposed and its parts appropriately delegated to an MPC and an FPC, involving some 'division of policymaking labor' (Blinder 1997, 124) between these institutions with respect to the primary target of each, inflation and deficit stabilization, respectively, but also complementarity with respect to the secondary (and shared) target of output stabilization. More precisely, under such separation of powers our three players are assigned different prerogatives and minimize *institution-specific* loss functions. The elected Government minimizes (1) again, but the difference now is a constant cost term (see (6) and (8) further down) capturing the fact that the Government would only be able to ultimately determine economic policy if it overrides committee decisions. This overriding as a form of accountability comes at some cost because delegation of economic policy to an independent agency has been made in the first place. Overriding committee decisions would call for a public procedure that results in costs for the Government because it deviates from its initial delegation decision.[14]

For the MPC, we assume a standard quadratic loss function:

$$L^M = \frac{\gamma_\pi^M}{2}(\pi - \pi^{*,M})^2 + \frac{\gamma_y^M}{2}(y - y^{*,M})^2. \tag{3}$$

Finally for the FPC, we have in a symmetric fashion:

$$L^F = \frac{\gamma_d^F}{2}(d - d^{*,F})^2 + \frac{\gamma_y^F}{2}(y - y^{*,F})^2. \tag{4}$$

We assume that the primary goal for the MPC is to keep inflation on target. Output stabilization also plays some role but receives a lower weight in the loss function. The deficit is not a concern for monetary policy. Therefore we have $\gamma_\pi^M > \gamma_y^M$. In a similar way, the FPC is mostly concerned with having the deficit on target, $\gamma_d^F > \gamma_y^F$; it also cares about output, but not about inflation. A final analogy for the Government requires us to posit $\gamma_y^G > \gamma_\pi^G$ and $\gamma_y^G > \gamma_d^G$ (without being specific as to whether $\gamma_\pi^G \gtreqless \gamma_d^G$). In accordance with the related literature, we endow our expert committees with 'conservative' preferences in the sense of Rogoff (1985), i.e., each of them attaches a higher absolute (and, hence, relative) weight to its primary goal compared to the median voter and, thus, the Government:

$$\gamma_\pi^M > \gamma_\pi^G, \quad \frac{\gamma_\pi^M}{\gamma_y^M} > 1 > \frac{\gamma_\pi^G}{\gamma_y^G} \quad \text{and} \quad \gamma_d^F > \gamma_d^G, \quad \frac{\gamma_d^F}{\gamma_y^F} > 1 > \frac{\gamma_d^G}{\gamma_y^G}.$$

[14] We assume that accountability always requires, hence, always implies transparency. Therefore, and without loss of generality, we fix the degree of transparency to be full, or – which is an alternative interpretation – any degree necessary to implement efficient monitoring and, thus, enforce accountability.

But note that the justification of 'conservatism' in our model is somewhat different from Rogoff's (1985). First, it is rather the *specialized knowledge embodied* in the preferences of the MPC and the FPC that explains it, not the mere preferences. Second, being *non-elected policy institutions* consisting of experts, the committees are further assumed not to have an overambitious output target; they pursue instead a policy that brings output to its normal (or natural) level, $y^{*,M} = y^{*,F} = y^N$. We then denote $\pi^{*,M} = \pi^*$ and $d^{*,F} = d^*$ to simplify notation.[15] However, the Government has an output target that is higher than the normal level, reflecting what we would call a 're-election concern', $y^{*,G} > y^N$. This translates into the inflation and budget deficit targets too, $\pi^{*,G} > \pi^*$ and $d^{*,G} > d^*$.[16]

2.2 The Monetary Authority

To operationalize independence into a theoretical model,[17] we follow the New Keynesian monetary policy literature in assuming, differently from the earlier papers we cited, that the MPC optimizes an objective function with respect to the interest rate. Under partial independence, it is forced to take the preferences and the targets of the Government into account, because independence is granted from the Government. This is modeled by a weighting, $0 \leq \theta^M \leq 1$, applied to the objective functions of the MPC and the Government. Such a formulation allows to capture various degrees of instrument (in)dependence in addition to goal (in)dependence, and is written into the MPC's objective function as

$$Z^M = \theta^M L^G + (1 - \theta^M) L^M. \tag{5}$$

If $\theta^M = 0$, the MPC is granted complete (instrument and goal) independence, because it can determine the interest rate according to its own objective function, that is, without taking the preferences and targets of the Government into account. If $\theta^M = 1$, the MPC is instrument- as well as goal-dependent, i.e., operating with no discretion at all and, effectively, suppressed as an institution.

Unlike independence, accountability is a concept that is not yet clearly defined, especially in theoretical work. In our context it would require each of the committees to be responsible for the process and the results of its policy and to be able to explain

[15] 'Coordination' only arises in two senses in our model: (i) if the government is in charge of fiscal and monetary policy; (ii) insofar the targets of the two committees are assumed the same while their preference weights differ, which appears more realistic given the fact that monetary and fiscal authorities communicate and coordinate at an expert level frequently enough.

[16] Since more output can be attained at the cost of higher inflation and deficit-to-GDP, in general as well as implied by our model economy summarized in (9) below.

[17] Recall that, in a broader sense, several dimensions of independence could be considered, such as: (i) goal vs. instrument (operational), (ii) formal (legal, de jure) vs. informal (actual, de facto), (iii) institutional, (iv) functional, (v) financial, (vi) personal, etc.

its actions. Accountability is usually justified from a democratic point of view and not because of economic necessity.[18] Democratic accountability can take on many different forms.[19] In the spirit of Lohmann (1992) and in accordance with the views of Blinder (1997) concerning delegation, we model accountability as an override clause where the Government is able to change committee decisions according to its preferences. In case of overriding MPC's decision, the Government would step in and put through its preferred inflation rate by setting the nominal interest rate at the required level.[20] Therefore, we can write accountability as

$$\begin{aligned} W^M &= \alpha(L^G + C^M) + (1-\alpha)Z^M \\ &= \left[\theta^M + \left(1-\theta^M\right)\alpha\right] L^G + (1-\alpha)\left(1-\theta^M\right) L^M + \alpha C^M, \end{aligned} \tag{6}$$

where $\alpha = 1$ if the MPC is overridden and cannot implement its desired inflation rate. The Government's preferences and targets now receive a weight in the objective function that is higher than in the case of independent monetary committee with no override option for the Government summarized by equation (5). Yet if the MPC is overridden by the Government, the latter would incur a cost C^M. With $\alpha = 0$, the MPC can implement its preferred inflation rate and will not be held accountable by having its decisions overridden.

2.3 The Fiscal Authority

The objective function of the FPC resembles that of the MPC, and the degree of independence is again captured by a weighting, $0 \leq \theta^F \leq 1$, between the objective function of the Government and that of the FPC:

[18] However, if policy targets are communicated to society, as under much greater transparency nowadays, accountability will also strengthen the incentives of the implementing authorities to fulfil their mandate, thus contributing to overall efficiency in the macroeconomy.

[19] Castellani (2002) investigates accountability that is modeled as ex post political intervention, similarly to our approach. Hughes Hallet and Libich (2006, 13-14) define accountability in an encompassing way, as the final responsibility for the outcomes of monetary policy, and emphasize goal independence and goal transparency (interpretable as an explicit inflation target) as substitute commitment technologies. Accountability is then modeled as the punishability of the central banker following deviations of inflation from target, in line with a linear contract, as in Svensson (1997), and with the implementation of inflation targeting, e.g., in New Zealand or the UK. In practice, discussion and (implicit) approval of central bank policy in parliaments have been a wide-spread form of accountability too, more recently complemented by its explicit evaluation by officially appointed experts (e.g., in New Zealand in 2001 or Sweden in 2007).

[20] "Finally, in a democracy, the central bank's decisions should be reversible by the political authorities, but only under extreme circumstances. A Federal Reserve decision on monetary policy can in principle be overturned by an act of Congress. And Fed governors can be removed from office for good cause. These mechanisms have never been used, but America is wise to have them in place. Delegated authority must be retrievable." (Blinder 1997, 123)

$$Z^F = \theta^F L^G + (1 - \theta^F) L^F, \tag{7}$$

where $\theta^F = 0$ results in complete (instrument and goal) independence of the FPC, while $\theta^F = 1$ yields the opposite extreme with a completely dependent fiscal policy. As with the MPC, the FPC is held accountable by the Government. If the fiscal committee sets the deficit in a way that its actual value deviates to a large extent from the deficit preferred by the Government, the latter will step in and override the decision of the FPC. By analogy with the implementation of monetary policy, we then have

$$\begin{aligned} W^F &= \alpha(L^G + C^F) + (1 - \alpha) Z^F \\ &= \left[\theta^F + \left(1 - \theta^F\right) \alpha\right] L^G + (1 - \alpha) \left(1 - \theta^F\right) L^F + \alpha C^F, \end{aligned} \tag{8}$$

where $\alpha = 0$ if the expert committee is left to conduct fiscal policy, and $\alpha = 1$ if the Government overrides FPC's decision and determines a deficit level according to its own preferences.

2.4 The Economy and the Conduct of Macroeconomic Policy

The economy can be described by an aggregate demand (AD) and an aggregate supply (AS) function in a standard way.[21] AD, y^D in (9), depends on the real interest rate that is determined by the nominal interest rate, i, the instrument of monetary policy, and on the instrument of fiscal policy, the deficit d. The expected value of the AD i.i.d. disturbance process, ϵ, is zero and its variance is constant. AS, y^S in (9), deviates from the normal (or natural) output level, y^N, if inflation, π, and inflation expectations, π^e, do not match.[22] Again, the expected value of the constant-variance AS i.i.d. disturbance process, ε, is zero.[23] Imposing equilibrium of aggregate demand and supply determines the output level:

$$\begin{aligned} y^D &= ad - b(i - \pi^e) + \epsilon, \\ y^S &= y^N + c(\pi - \pi^e) + \varepsilon, \\ y &\equiv y^D = y^S, \end{aligned} \tag{9}$$

[21] Reminiscent of Sargent and Wallace (1975) and the huge literature they generated.

[22] The presence of the deficit term in AD but not AS is motivated by our focus on delegating the stabilization role of fiscal policy and is consistent with analogous modeling shortcuts in Beetsma and Bovenberg (1997, 1998), von Hagen and Mundschenk (2003), and Castellani and Debrun (2005), among others.

[23] A positive realization of ε is interpreted as an efficiency shock, e.g., better technology, and a negative realization as a cost-push shock, e.g., higher wages.

with $a > 0$, $b > 0$, $c > 0$.[24]

Similarly to Lohmann (1992) and Mihov and Sibert (2006), we model the Government's incentives to override endogenously, as described next.

[Figure 3 about here]

It is clear that the Government can determine the inflation rate, the output gap and the deficit according to its targets and preferences by minimizing its own loss function. Any deviation of the instruments from the corresponding optimal levels will result in a deviation from the desired minimal loss, regardless whether this deviation is positive or negative because of the quadratic form (see Figure 3). The levels of the variables that are determined by the committees will result in a higher loss in any case, since the monetary and fiscal policymakers optimize each according to its own loss function (as in Figure 3, again). Therefore, the Government would override the committee decisions in every event if there are no costs to do so. If there are costs of overriding, the gain of doing so and choosing the policy instruments according to the Government's own loss function compared to the loss realized in case of committee decisions has to be higher than the costs:

$$L^G\left(y^{com}, \pi^{com}, d^{com}\right) - L^G\left(y^G, \pi^G, d^G\right) > C^M + C^F > 0. \tag{10}$$

Note that each of the arguments in the two loss functions above is endogenous and depends further on the materialized supply shock ε, given the probability α implied ex ante for the occurrence of overriding ex post in any particular institution-design framework with accountability ($\alpha \neq 0$). We could have written that as $j = j\left(\varepsilon; \alpha\right)$ for $j = y, \pi, d$ under the two possibilities captured by the superscripts *com* (no overriding) and G (overriding) in (10), which we do not do to keep the notation less complicated. Since among the deeper determinants of the endogenous arguments of the above loss functions are also the various target values, in addition to ε and α, and since these constant targets are not subject to optimization ex post, as assumed, the only magnitude that changes in every state of nature and influences the relative loss in (10) is the supply shock ε. The larger its positive or negative realization, the larger the deviation of the macroeconomic variables determined via the respective instruments by the committees from the level the Government would have chosen. There would, thus, be a threshold of the supply shock $|\overline{\varepsilon}|$ where it equates the loss of the Government, $L^G\left(y^G, \pi^G, d^G\right)$, including the costs of overriding, $C^M + C^F$, with the loss of the Government conditioned on the decisions of the committees, $L^G\left(y^{com}, \pi^{com}, d^{com}\right)$. Any larger shock would lead to a net gain of the

[24] Which could be themselves defined in terms of underlying deeper parameters that have parallels to the New Keynesian or Neo-Wicksellian microfounded model for monetary policy analysis, with y^N then interpreted as the flexible-price level of output (see, e.g., Woodford, 2003).

Government when overriding. The probability that such a large supply shock occurs is given by α and known to the agents when forming their inflation expectations.[25] With probability $1-\alpha$ the supply shock is not large enough to cross the threshold for overriding. This can be written as

$$L^G\left(y^{com},\pi^{com},d^{com}\right)-L^G\left(y^G,\pi^G,d^G\right)\begin{cases}>C^M+C^F, & |\varepsilon|>|\overline{\varepsilon}| \quad \text{with prob } \alpha\\ \leq C^M+C^F, & |\varepsilon|\leq|\overline{\varepsilon}| \quad \text{with prob } 1-\alpha\end{cases}.$$

To put it differently, with accountability as modeled here, the Government would determine the inflation rate via the interest rate and the deficit with probability α. With probability $1-\alpha$, the committees decide about the appropriate level of their respective instruments and, ultimately, determine the inflation rate. Private agents will take this institutional mechanism (captured in our model by the value of the accountability parameter α) into account, understanding that the level of macroeconomic variables such as inflation and output can be determined ex post either by the MPC and the FPC or by the Government, and will form inflation expectations accordingly. Inflation expectations are, consequently, a weighted average of the inflation rate resulting in circumstances where the Government ultimately decides (weighted with probability α) and the inflation rate in cases where the committees are left to conduct their preferred monetary and fiscal policy (weighted with probability $1-\alpha$). The probability of overriding and the formation of inflation expectations are exogenously given and cannot be influenced by policymakers.[26]

The order of events is assumed to be as follows. The preferences of society/parliament are exogenously *embodied* in each particular institution design framework we study, assigning accountability to the government ($\alpha \neq 0$ in W^M and W^F) and degrees of independence from the government to the MPC (θ^M in Z^M) and the FPC (θ^F in Z^F). If there is goal independence, each expert committee chooses its targets.[27] Then, the private sector forms rational expectations about the inflation rate assuming a *linear*[28] feedback rule for each institution responding to own and other players' targets, other players' instruments and shocks. The supply and demand shocks are realized and observed by the policymakers. The MPC and the FPC set the interest rate and the budget deficit-to-GDP ratio, respectively, resulting from their optimization. The Government checks whether any overriding, as part of the accountability mechanism, has to take place. The equilibrium inflation, output and deficit ratio are finally determined.

[25] α needs to be bounded above sufficiently low, e.g., of the order of $0 \leq \alpha < 0.1$ or even less, if overriding is to occur rarely, so as to ensure credibility of monetary and fiscal policy and the underlying institution-design arrangement.

[26] Future extensions to less restrictive environments are, of course, contemplated on this aspect.

[27] We do not model the choice of an optimal target level.

[28] All policy feedback rules are restricted to be linear here. Nonlinear reaction functions could be a next extension.

3 Key Results

The results from solving our model we characterize in the present section concern inflation expectations and the actual levels of inflation, output and the budget deficit expressed in terms of target values and shocks. We consider different policy regimes, corresponding to different social preferences on institution design, according to the degree of independence without or with accountability of the committees (see Table 1 for a listing of the possibilities). To optimally set the instrument levels, i.e., the interest rate and the budget deficit ratio to GDP, the loss function of the respective policymaker is minimized with respect to the instrument at hand. The Government can use the interest rate and the deficit jointly, whereas the MPC determines the interest rate taking the deficit as given and the FPC minimizes its loss via the deficit taking the interest rate as given. It is assumed that any of the expert committees, when independent, and the Government optimize simultaneously ex post under perfect information.[29]

[Table 1 about here]

The precise solutions by policy regime and respective variable are provided in Appendix A. The results show, overall, that the different equilibrium values have a similar structure depending on (a 'weighted average' of) target values, gaps between the corresponding inflation and output targets of the different decision-makers, the normal output level and the exogenous shocks. The above key terms are 'weighted' by expressions that depend on the parameters of the economy (a, b, c) and the preference structure (γ's) of the policymakers. These 'weights' play an important role, as they characterize the different possibilities for combining the preferences of the Government, the MPC and the FPC according to the degree of independence ($0 \leq \theta^M \leq 1$ and $0 \leq \theta^F \leq 1$) without ($\alpha = 0$) or with accountability ($0 < \alpha < 1$) of the committees.

3.1 Delegation of Economic Policy

3.1.1 Without Accountability

Without accountability ($\alpha = 0$), the MPC and the FPC can minimize their respective loss functions, (5) and (7), given the strategy of the other committee. Therefore, they have to take into account the preferences of the Government to an extent that depends only on the degree of independence.

In the solution to the general case of the optimization of the MPC's and the FPC's loss functions with partial ($0 < \theta^M < 1$, $0 < \theta^F < 1$) degree of independence, **Regime A**,

[29] The more complicated cases of sequential optimization and/or imperfect information are left for future research.

inflation and inflation expectations differ only because of the supply shock (see Appendix A). The demand shock is completely offset by monetary policy. Because the committees and the Government support different target values of inflation, output and the deficit, and monetary and fiscal policy are not necessarily completely independent, Government preferences matter and the gaps between the targets influence the equilibrium levels of the different variables.

There are four interesting limiting cases that arise in a set-up without accountability (see Table 1). These are a completely (in)dependent monetary and fiscal policy as well as a completely independent monetary (fiscal) and completely dependent fiscal (monetary) policy.

If monetary and fiscal policy are completely dependent, $\theta^M = 1$ and $\theta^F = 1$, it is as if the Government determines economic policy according to its own liking (see Appendix A). Insofar existing, the committees only implement the instrument values that the Government decides. This **Regime A1** is therefore, in essence, Government optimization. The results show that, whereas the deficit is on target, inflation expectations and, depending on the shock realization, the inflation rate in most cases end up above target because of the inflationary bias that originates in targeting output above its natural level, i.e., in the Government's re-election concern. Again, actual inflation and inflation expectations differ because of the supply shock that is not completely offset by policymakers. This yields an output level that deviates from its natural level: upwards if a positive supply (efficiency) shock has materialized, and downwards in the case of a negative supply (cost-push) shock.

The second limiting case is that of completely independent monetary and fiscal policies, $\theta^M = 0$ and $\theta^F = 0$. In this **Regime A2**, both committees are independent from the Government to determine the respective instrument level and are 'not accountable', in the sense of our model that their decisions cannot be changed. In this case (see Appendix A), the deficit reacts to the supply shock and differs from target value. Inflation expectations are on target and differ from inflation because of a not fully dampened supply shock. This leads also to an output level that deviates from the normal one in the direction of the supply shock.

In **Regime A3**, monetary policy is assumed to be completely independent from the Government, whereas the FPC is completely dependent, $\theta^M = 0$ and $\theta^F = 1$. Because fiscal policy is conducted with regard to Government preferences and targets (see Appendix A), the deficit explicitly depends on the gaps between the output and inflation targets, where the basic level of the deficit is given by the Government target. Inflation expectations are anchored at target value and differ from the inflation rate because of the supply shock. This leads to an output level different from the normal level, depending again on the sign and size of the supply shock.

If monetary policy is completely dependent on the Government but fiscal policy is completely independent, $\theta^M = 1$ and $\theta^F = 0$, we have **Regime A4**. Again (see Appendix A), there is the influence of the difference between targets and the not completely offset supply shock, leading to deviations of output from target via the gap between inflation and inflation expectations.

3.1.2 With Accountability

With accountability modeled explicitly ($0 < \alpha < 1$), there are two possible deficit ratios, interest rates, inflation rates and output levels depending on whether overriding takes place or not. If no overriding occurs, the monetary and fiscal policy committees (hence, superscript *com* in the relevant subsections of Appendix A) are left to determine simultaneously the inflation rate and the output level. If overriding occurs, the Government (superscript G) steps in and ultimately determines instead the level of the macroeconomic variables. There is only one level of inflation expectations, however, giving each of the two possibilities for ex post inflation a probability of α, respectively $1 - \alpha$. In contrast to the preceding subsection, Government preferences matter in every regime because the committees can now be overridden even in cases of complete independence, a possibility that is taken account of in the formation of inflation expectations.

The general solution in equilibrium for **Regime B** yields the deficit, inflation expectations, inflation and output if the Government steps in and decides about the instruments or if the MPC and the FPC are not overridden and conduct policy according to their preferences. In both cases (see Appendix A), inflation expectations are the same because agents do not know ex ante the size of the supply shock that causes the Government to override MPC's and FPC's decisions ex post. Therefore, agents take both possibilities into account when forming inflation expectations. However, the policymakers optimize ex post, simultaneously and under perfect information, knowing the size of the supply shock, so inflation, output and the deficit are decided among the authorities in charge.

Regime B2[30] is characterized by completely independent but accountable committees, $\theta^M = 0$, $\theta^F = 0$, $0 < \alpha < 1$. The structure of the results is the same as if with partially independent committees (see Appendix A). However, the influence of the Government is muted because it affects the results only according to the inflation expectations of private agents, and not from the very beginning via the objective functions of the committees as it would be the case with incomplete independence. In this regime, the difference between the respective variables when the Government or the committees ultimately decide should be larger than under incomplete independence.

[30] To consider here certain Regime B1, by analogy with Regime A1, would be irrelevant, as the Government cannot be accountable to itself.

If there is an independent but accountable MPC only and fiscal policy is completely dependent on the Government, $\theta^M = 0$, $0 < \alpha < 1$ and $\theta^F = 1$, we are in **Regime B3**. The deficit ratio, the inflation rate, inflation expectations and output are the same as in Regime B2 (see Appendix A). What matters is the independence of monetary policy whereas the (in)dependence of fiscal policy does not play a role for the determination of inflation, inflation expectations and output. Only the deficit ratio will be determined by the preferences of the FPC if the committees are left to decide.

An independent but accountable FPC only, $\theta^F = 0$, $0 < \alpha < 1$ and $\theta^M = 1$, **Regime B4**, yields the same results as Regime A4 if the FPC is left to decide. If the Government overrides instead, it will implement $d^G = d^{*,G}$, but inflation, inflation expectations and output will be the same as if the committees would determine the instrument levels (see Appendix A). The particular institutional arrangement being A4 or B4 is, thus, not crucial for the level of the macroeconomic variables except for the deficit.

3.2 Ranking of the Institution-Design Regimes

We now sum up our key results by ranking the considered institution-design frameworks according to the corresponding equilibrium outcomes of our model. We discuss alternative rankings based on a single criterion, and focus on different criteria in turn, to highlight each of the three target variables. To them, we add a fourth criterion, inflation expectations, with which we start here the rankings. The reason is that anchoring private-sector expectations, although not a target in the explicit loss functions policymakers optimize upon, is perhaps the most important task of monetary and fiscal policy. In the present section our theoretical findings are stated compactly in propositions and corollaries with only brief interpretation offered, while detailed proofs and relevant further intuition are provided in Appendix B.

3.2.1 By Expected Inflation Outcomes

With regard to the ranking of regimes according to inflation expectations, we come to the following conclusions.

Proposition 1 ***(Anchoring Inflation Expectations)*** *Among the institution-design regimes considered, those with a fully independent non-elected MPC whose decisions are explicitly guaranteed not to be overridden by elected politicians (Regimes A2 and A3) implement optimal macroeconomic policies with the lowest anchor for inflation expectations.*

Corollary 1.1 ***(Anchoring Inflation Expectations and FPC)*** *Provided that monetary policy is delegated to a fully independent MPC, delegation or not of fiscal policy to a similarly independent FPC does not matter for inflation expectations.*

Corollary 1.2 ***(Anchoring Inflation Expectations and Accountability)*** *All policy regimes* without *accountability modeled as an override clause (Regimes A) dominate the corresponding regimes* with *accountability (Regimes B) along the dimension of anchoring inflation expectations.*

The corresponding ranking of the above regimes along the inflation expectations dimension is summarized in the middle column of Table 2.

[Table 2 about here]

3.2.2 By Actual Inflation Outcomes

Realized inflation differs from the rationally forecasted one only by a term containing the ex post supply shock, ε – as the demand shock, ϵ, is completely compensated by policy (via the optimal interest-rate setting: see Appendix A) in every materialized state of nature – multiplied by some combination of parameters. We next summarize our results in terms of deviations $\pi - \pi^e$ across regimes and rank the latter according to the smallest (in absolute value) deviation of actual from expected inflation.

Proposition 2 ***(Inflation Stabilization)*** *An institution-design regime that implements optimal macroeconomic policies with the lowest deviation of actual from expected inflation is, again, one with a fully independent MPC.*

Corollary 2.1 ***(Inflation Stabilization and FPC)*** *Provided that monetary policy is delegated to a fully independent MPC, delegation or not of fiscal policy to a similarly independent FPC does not matter for stabilizing ex post deviations of actual from expected inflation, in an analogous way to the ex ante formation of inflation expectations.*

Corollary 2.2 ***(Inflation Stabilization and Accountability)*** *All policy regimes* without *accountability modeled as an override clause (Regimes A) also dominate the corresponding regimes* with *accountability (Regimes B) in terms of resulting in lower deviation of actual from expected inflation.*

The ranking according to our second criterion, in fact, a parallel image of the ranking along the criterion of anchoring inflation expectations, is shown in the final column of Table 2. On account of both these criteria, therefore, (i) anchoring inflation expectations (ex ante) and (ii) containing the effects of AS shocks on actual inflation (ex post), we have reached an unambiguous conclusion in terms of (a) the best regime as well as (b) the ordering of the alternative policy frameworks we considered here.

3.2.3 By Actual Output Outcomes

Besides inflation and inflation expectations, the output level is another key macroeconomic variable in our model: it is not an instrument itself, but is the only magnitude that plays a role in all of the three objective functions. The output levels that arise in the different policy regimes without accountability are all based on the normal output level and show different deviations from this benchmark. In the regimes without accountability these deviations arise solely because of the supply shock, as the impact of the demand shock is completely offset by the policymakers. The effect of the supply shock on output depends on the preferences of the policymakers. In case of a positive (negative) supply shock, output is higher (lower) than normal. The size of this effect can be ordered as follows:

Proposition 3 ***(Output Level and Stabilization without Accountability)*** Without *accountability, the output level in Regime A1 is equal to the level in Regime A4, and the output level in Regime A2 is equal to the level in Regime A3. With* $\gamma_\pi^M/\gamma_y^M > 1 > \gamma_\pi^G/\gamma_y^G$ *and* $\gamma_\pi^M > \gamma_\pi^G$*, as assumed, the output level A1 and A4 is closer to normal output than the output level A2 and A3. In the general case A, the output level is intermediate between the polar regimes.*

This ranking is the opposite to the one according to actual inflation: for output, the deviation from normal level is highest if monetary policy is independent. If the Government dominates policymaking, output stabilization is according to its preferences. Because the MPC gives a higher priority to bringing inflation back to target rather than output compared to the Government, it is not surprising that a supply shock has a larger impact on the output level if the MPC is independent and can stabilize according to its own preferences only.

Proposition 4 ***(Output Level and Stabilization with Accountability)*** If *the Government ultimately determines the instruments in the regimes* with *accountability, the output level in Regime B2 equals that of B3. The output level in B4 is lower and closer to the normal level compared to the output levels in all other regimes. The output level in B2 and B3 is higher than in B.* If *the committees are left to decide instead, the net effect is ambiguous and ranking is not possible.*

When the MPC can be made accountable in the sense implied by our model, the output level is not only influenced by normal output and the supply shock but also by the difference between the Government's inflation target and the MPC's target as well as by the gap between the output target of the Government and normal output being the target of the MPC and the FPC. This result comes from the uncertainty of the private sector

which institution would be the policymaker in charge when forming inflation expectations. Unlike in the formation of inflation expectations, the probability of overriding does not play a role in shock stabilization since this task is done after the authority in charge of economic policy is determined ex post. Moreover, only the independence of the MPC matters for the output level: the case of a completely independent MPC leads to the same output level regardless whether the FPC is completely independent or completely dependent (Regimes B2 and B3).

If the MPC is completely dependent, shock stabilization is determined by the Government only and, therefore, only Government preferences determine the output level (Regime B4). Output deviates from normal level because of the supply shock. However, if monetary policy is not completely dependent on Government preferences, the Government takes into account the MPC preferences via inflation expectations. In this case, output increases because of the overambitious target levels of the Government, $y^{*,G} > y^N$ and $\pi^{*,G} > \pi^*$. The impact of the normal output level on output besides the difference to the Government target is positive regardless of the regime with accountability. The highest output level is reached if the Government overrides the completely independent MPC (Regimes B2 and B3). Here, agents expect especially low inflation and, therefore, the Government can raise output exceptionally high with lower reaction of the inflation rate than with only partial independence.

Corollary 4.1 ***(Output Level and Accountability)*** *Comparing the policy regimes* with *and* without *accountability, Regime A1 and A4 produce the same output level as Regime B4. For all other regimes, the relationship between the output levels is ambiguous.*

If monetary policy is completely dependent, only Government preferences determine output stabilization and output deviates from the normal level only because of supply shocks. In addition, no target gaps occur, so that without shocks output always equals its normal level. In this case, there is no difference between the regimes without and with accountability (Regimes A1=A4 and B4). This also confirms the presumption that it is not reasonable to hold a completely dependent authority accountable.

A summary of our results on the ranking of the considered policy regimes according to actual output is provided in Table 3.

[Table 3 about here]

3.2.4 By Actual Deficit Outcomes

Unlike the interest rate, the budget deficit ratio to GDP has a twofold role to play in our model. First, it is an instrument to stimulate aggregate demand. Second, it is a target

in the loss functions of the Government and the FPC. The starting point in analyzing the deficit is a deficit target value independent of whether accountability is intended or not. In cases where fiscal policy is dependent, the target equals that of the Government. With independent fiscal policy, the target of the FPC prevails. With intermediate values of FPC independence, a weighted average of the targets can be observed depending on the degree of fiscal policy autonomy.

Proposition 5 ***(Deficit-to-GDP Ratio Stabilization)*** *In all regimes where the Government can decide on monetary and fiscal policy jointly, the budget deficit will equal the Government target.*

The Government will establish the deficit on target if the monetary and fiscal authorities are completely dependent and implement policy according to the preferences of the Government as well as if it overrides committee decisions in the regimes with accountability.[31] If both instruments are optimized jointly, then the deficit is not needed to influence inflation and output: the interest rate is sufficient as policy instrument. To get this result, a dependent fiscal policy is not enough; monetary policy has to be dependent too.

In regimes with accountability, target differences play a role if the committees are not overridden and are partially independent (Regimes B) or where monetary policy is completely independent (Regimes B2 and B3). With independent monetary policy, the deficit reacts in a stronger way to the target differences if fiscal policy is dependent on Government preferences. The deficit is then used as an instrument to achieve the overambitious output target of the Government.

We summarize our findings on the comparison of regimes along the dimension of the public deficit in Table 4.

[Table 4 about here]

3.3 Expectations Anchoring and Shock Stabilization

We now make an attempt to sum up in a compact final message our various results reported in the present section. Insofar this is possible at all – although at the cost of some minor incompleteness and partial ambiguity – a convenient way seems to be by the use of a comparative table that offers at a glance the essence of our conclusions. Such is intended to be Table 5, which lists the considered institution-design regimes in its first column. The ranking of these regimes is then summarized across perhaps the two most important properties of any macroeconomic stabilization policy: (i) to what extent it

[31] This becomes clear from the minimization of the Government's loss finction (1).

ensures anchoring of (inflation) expectations ex ante (the second column of Table 5, in particular, but also the next two columns); and (ii) to what extent it reacts ex post to stabilize the effects of macroeconomic shocks, i.e., to ensure lower variability of the target variables a society has institutionalized in a given regime (the last three columns of Table 5).

[Table 5 about here]

Looking first across the regimes without accountability in the sense of our model, i.e., regimes A, it is clear from Table 5 that A2 dominates the other four: it guarantees the lowest expected inflation and the lowest expected budget deficit simultaneously with expected level of output that equals normal output. Thus, from the perspective of ex ante anchoring of inflation and deficit expectations, i.e., eliminating the inflation and deficit biases, fully independent expert committees would be the preferable institution-design regime. However, when ex post shock stabilization is instead taken into account, regime A1 dominates the rest, ensuring the highest stabilization (i.e., the lowest variability) of output combined with full stabilization (i.e., an achieved target) for the deficit ratio to GDP; yet this comes at the cost of the lowest inflation stabilization (i.e., the highest inflation variability). So the well-known trade-off from the voluminous literature on optimal macroeconomic stabilization policies remains unresolved in our model featuring autonomous decision making by monetary and fiscal expert committees.

Adding an override option for the Government as (a modeling shortcut for) some form of accountability of the committees produces the respective regimes B, but does not help solve the trade-off between inflation variability and output variability. The B regimes perform even worse in terms of anchoring inflation expectations, at the same time allowing expectations for output above normal and for a deficit ratio above the target the fiscal experts would have otherwise pursued. In other words, introducing accountability in the form of an override option for the Government only shifts expectations away from the targets and preferences of the MPC and the FPC and into the direction of those of the Government, but does not mitigate the notorious trade-off. Moreover, in terms of ex post stabilization of shocks, accountability does not lead to anything better either relative to the regimes without it.

4 Concluding Remarks

This paper addressed the important institution-design issue of independence and accountability of delegated monetary and fiscal policy. In a theoretical model allowing for different degrees of autonomy *vis-à-vis* the government of expert committees to which society may opt to delegate both monetary and fiscal policy, we analyzed the effects of

democratic accountability in the form of possible overriding of committee decisions. As the literature on monetary policy has usually established, we found that delegation to autonomous institutions of appointed experts improves the outcomes in terms of average inflation and deficit performance over policies conducted by self-interested politicians. In other words, independent monetary and fiscal authorities operating within clear mandates solve the problem of inflation and deficit biases by anchoring inflation and deficit expectations at their conservative targets. Moreover, such institutional arrangements also achieve the strongest stabilization of inflation, and often of the deficit ratio, ex post. Yet greater independence results in increased output variability and, generally, a lower level of output. Insofar output levels and stabilization ex post would matter instead as a key criterion, our ranking of the policy regimes studied is reversed. Because the government, aiming at re-election, is more concerned about meeting the output target, the highest output stabilization, and in most cases also actual output level, arises if its preferences alone count in decision-making: either when monetary policy is completely dependent, or when the government overrides the MPC. Imposing to the committees accountability for their actions in the form of possible overriding does not eliminate the trade-off between inflation and output stabilization (and, usually, levels). Accountability only influences, or shifts, macroeconomic outcomes toward the preferences and targets of elected politicians.

Overall, applying any combination of the above considerations as a multiple criterion to rank the examined institution-design frameworks may give priority to either anchoring inflation and deficit expectations ex ante, and hence also stabilizing ex post inflation, or to output stabilization, possibly constrained by attaining the target for the public-sector deficit-to-GDP ratio too. This is, certainly, a political trade-off, and any solution to it would be chosen in each relevant real-world context with view to the preferences of society and its democratic representatives, as well as the economic environment and the institutional framework for policymaking. What we can conclude from our theoretical exercise is that if the priority is to manage inflation and deficit expectations as well as actual inflation, a society should opt for independent monetary and fiscal policy which is free from the threat of its decisions being overridden. If, on the other hand, a society would prefer to mitigate the fluctuations of output and employment, policymaking by expert committees should be constrained either by limits to independence, e.g., permitting instrument- but not goal-independence, as in popular inflation targeting regimes of monetary policy, or by accountability mechanisms such as override clauses or more sophisticated contractual arrangements with broadly similar effects. A combination of both these restrictive institutional devices, one acting upon the degree of independence and the other upon the form of accountability, is also envisageable – as well as any intermediate policy regimes between the polar cases – depending on the priorities and corresponding trade-offs a democratic society is prepared to accept and implement.

A Model Solution

Throughout, we use the compact notation defined as follows:

$$\Delta \equiv \theta^F \gamma_d^G + \left(1-\theta^F\right)\gamma_d^F > 0, \quad \Upsilon \equiv \theta^F \gamma_y^G + \left(1-\theta^F\right)\gamma_y^F > 0,$$
$$\Pi \equiv \theta^M \gamma_\pi^G + \left(1-\theta^M\right)\gamma_\pi^M > 0, \quad \Omega \equiv \theta^M \gamma_y^G + \left(1-\theta^M\right)\gamma_y^M > 0,$$

$$\kappa \equiv \gamma_\pi^G + c^2\gamma_y^G > 0, \quad \varphi \equiv \gamma_\pi^M + c^2\gamma_y^M > 0, \quad \omega \equiv \gamma_y^G\gamma_\pi^M - \gamma_\pi^G\gamma_y^M > 0,$$
$$\delta \equiv \gamma_d^G + a^2\gamma_y^G > 0, \quad \tau \equiv \gamma_d^F + a^2\gamma_y^F > 0,$$
$$\mu \equiv \gamma_\pi^G + c^2\gamma_\pi^M > 0, \quad \phi \equiv \gamma_d^G + a^2\gamma_y^F > 0,$$

$$\Lambda \equiv \kappa\Pi - \alpha\left(1-\theta^M\right)c^2\omega > 0 \text{ if } 0 < \alpha < \tfrac{\kappa\Pi}{\left(1-\theta^M\right)c^2\omega}.$$

We derive[32] the following expressions for the optimized policy *instruments*, the interest rate and the deficit-to-GDP ratio, and the resulting equilibrium macroeconomic *outcomes*, in terms of the actual inflation rate, inflation expectations and the actual output level.

A.1 Delegation of Economic Policy without Accountability

A.1.1 General-Case Solution with Partial Independence: Regime A

$$\begin{aligned} i &= \frac{\theta^M\gamma_\pi^G\pi^{*,G} + \left(1-\theta^M\right)\gamma_\pi^M\pi^*}{\Pi} + \frac{\left(1-\theta^M\right)\theta^F a^2\gamma_\pi^M\gamma_\pi^G}{bc\Delta\Pi}\left(\pi^{*,G}-\pi^*\right) - \frac{1}{b}y^N \\ &+ \frac{a\left[\gamma_d^G\theta^F d^{*,G} + \left(1-\theta^F\right)\gamma_d^F d^{*,F}\right]}{b\Delta} + \frac{\theta^M bc\Delta + \left(1-\theta^M\right)\theta^F a^2\gamma_\pi^M}{b\Delta\Pi}\gamma_y^G\left(y^{*,G}-y^N\right) \\ &+ \frac{1}{b}\epsilon - \frac{\Pi\Delta + a^2\left[\left(1-\theta^M\right)\gamma_\pi^M\Upsilon + \theta^M\left(1-\theta^F\right)\gamma_\pi^G\gamma_y^F - \left(1-\theta^M\right)\theta^F\gamma_\pi^G\gamma_y^M\right]}{b\Delta\left(\Pi + c^2\Omega\right)}\varepsilon, \end{aligned} \tag{A-1}$$

$$\begin{aligned} d &= \frac{\theta^F\gamma_d^G d^{*,G} + \left(1-\theta^F\right)\gamma_d^F d^*}{\Delta} + \frac{a\left(1-\theta^M\right)\theta^F}{\Delta\Pi}\left[\frac{\gamma_\pi^G\gamma_\pi^M}{c}\left(\pi^{*,G}-\pi^*\right) + \left(\gamma_\pi^M\gamma_y^G y^{*,G} - \gamma_\pi^G\gamma_y^M y^N\right)\right] \\ &- \frac{a\left[\left(1-\theta^M\right)\theta^F\omega + \left(1-\theta^F\right)\gamma_y^F\Pi\right]}{\left(\Pi + c^2\Omega\right)\Delta}\varepsilon, \end{aligned} \tag{A-2}$$

$$\pi = \frac{\theta^M\gamma_\pi^G}{\Pi}\pi^{*,G} + \frac{\left(1-\theta^M\right)\gamma_\pi^M}{\Pi}\pi^* + \frac{c\theta^M\gamma_y^G}{\Pi}\left(y^{*,G}-y^N\right) - \frac{c\Omega}{\Pi + c^2\Omega}\varepsilon, \tag{A-3}$$

$$\pi^e = \frac{\theta^M\gamma_\pi^G}{\Pi}\pi^{*,G} + \frac{\left(1-\theta^M\right)\gamma_\pi^M}{\Pi}\pi^* + \frac{c\theta^M\gamma_y^G}{\Pi}\left(y^{*,G}-y^N\right), \tag{A-4}$$

$$y = y^N + \frac{\Pi}{\Pi + c^2\Omega}\varepsilon. \tag{A-5}$$

[32] With the help of *Maple*.

A.1.2 Special-Case Solutions: Regimes A1, A2, A3, A4

Regime A1: Government Optimization without Accountability

$$
\begin{aligned}
i &= \pi^{*,G} - \frac{1}{b}y^N + \frac{\gamma_y^G c}{\gamma_\pi^G}\left(y^{*,G} - y^N\right) + \frac{a}{b}d^{*,G} + \frac{1}{b}\epsilon - \frac{\gamma_\pi^G}{b\kappa}\varepsilon, && \text{(A-6)}\\
d &= d^{*,G}, && \text{(A-7)}\\
\pi &= \pi^{*,G} + \frac{c\gamma_y^G}{\gamma_\pi^G}\left(y^{*,G} - y^N\right) - \frac{c\gamma_y^G}{\kappa}\varepsilon, && \text{(A-8)}\\
\pi^e &= \pi^{*,G} + \frac{c\gamma_y^G}{\gamma_\pi^G}\left(y^{*,G} - y^N\right), && \text{(A-9)}\\
y &= y^N + \frac{\gamma_\pi^G}{\kappa}\varepsilon. && \text{(A-10)}
\end{aligned}
$$

Regime A2: Completely Independent Committees

$$
\begin{aligned}
i &= \pi^* - \frac{1}{b}y^N + \frac{a}{b}d^* + \frac{1}{b}\epsilon - \frac{\gamma_\pi^M\tau}{b\varphi\gamma_d^F}\varepsilon, && \text{(A-11)}\\
d &= d^* - \frac{\gamma_\pi^M\gamma_y^F a}{\varphi\gamma_d^F}\varepsilon, && \text{(A-12)}\\
\pi &= \pi^* - \frac{c\gamma_y^M}{\varphi}\varepsilon, && \text{(A-13)}\\
\pi^e &= \pi^*, && \text{(A-14)}\\
y &= y^N + \frac{\gamma_\pi^M}{\varphi}\varepsilon. && \text{(A-15)}
\end{aligned}
$$

Regime A3: Completely Independent MPC with Completely Dependent FPC

$$
\begin{aligned}
i &= \pi^* - \tfrac{1}{b}y^N + \tfrac{a^2\gamma_\pi^G}{bc\gamma_d^G}\left(\pi^{*,G} - \pi^*\right) + \tfrac{a^2\gamma_y^G}{b\gamma_d^G}\left(y^{*,G} - y^N\right) + \tfrac{a}{b}d^{*,G}\\
&\quad + \tfrac{1}{b}\epsilon - \tfrac{\gamma_\pi^M\delta - a^2\gamma_y^M\gamma_\pi^G}{b\varphi\gamma_d^G}\varepsilon, && \text{(A-16)}\\
d &= d^{*,G} + \frac{a}{\gamma_d^G}\left[\frac{\gamma_\pi^G}{c}\left(\pi^{*,G} - \pi^*\right) + \gamma_y^G\left(y^{*,G} - y^N\right)\right] - \frac{a\omega}{\varphi\gamma_d^G}\varepsilon. && \text{(A-17)}
\end{aligned}
$$

π, π^e and y are the same as in Regime A2.

Regime A4: Completely Independent FPC with Completely Dependent MPC

$$
\begin{aligned}
i &= \pi^{*,G} - \frac{1}{b}y^N + \frac{c\gamma_y^G}{\gamma_\pi^G}\left(y^{*,G} - y^N\right) + \frac{a}{b}d^* + \frac{1}{b}\epsilon - \frac{\gamma_\pi^G\tau}{b\kappa\gamma_d^F}\varepsilon, && \text{(A-18)}\\
d &= d^* - \frac{\gamma_\pi^G\gamma_y^F a}{\kappa\gamma_d^F}\varepsilon. && \text{(A-19)}
\end{aligned}
$$

π, π^e and y are the same as in Regime A1.

A.2 Delegation of Economic Policy with Accountability

A.2.1 General-Case Solution with Partial Independence: Regime B

If the Government overrides the decisions of the FPC and the MPC

$$
\begin{aligned}
i^G &= \frac{\alpha\left(1-\theta^M\right)\gamma_\pi^M\gamma_\pi^G(b+c)}{b\left(\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M\right)}\left(\pi^*-\pi^{*,G}\right) \\
&\quad \frac{\alpha\left(1-\theta^M\right)c^2\gamma_\pi^M\gamma_y^G\pi^*+\gamma_\pi^G\left[\left(1-\theta^M\right)\gamma_\pi^M+\theta^M\kappa+(1-\alpha)\left(1-\theta^M\right)c^2\gamma_y^M\right]\pi^{*,G}}{\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M} \\
&\quad +\frac{\gamma_y^G c\left\{\theta^M b\kappa+(1-\alpha)\left(1-\theta^M\right)bc^2\gamma_y^M+\left(1-\theta^M\right)\gamma_\pi^M[(1-\alpha)b-\alpha c]\right\}}{b\left[\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M\right]}\left(y^{*,G}-y^N\right) \\
&\quad -\frac{1}{b}y^N-\frac{\gamma_\pi^G}{b\kappa}\varepsilon+\frac{1}{b}\epsilon+\frac{a}{b}d^{*,G}, \qquad \text{(A-20)}
\end{aligned}
$$

$$
d^G = d^{*,G}, \qquad \text{(A-21)}
$$

$$
\begin{aligned}
\pi^e &= \pi^{*,G}+\frac{(1-\alpha)\left(1-\theta^M\right)c\gamma_y^M\kappa}{\Lambda}y^N+\frac{(1-\alpha)\left(1-\theta^M\right)\gamma_\pi^M\kappa}{\Lambda}\left(\pi^*-\pi^{*,G}\right) \\
&\quad +\frac{c\gamma_y^G\left[\theta^M\kappa+\alpha\left(1-\theta^M\right)\varphi\right]}{\Lambda}\left(y^{*,G}-y^N\right), \qquad \text{(A-22)}
\end{aligned}
$$

$$
\begin{aligned}
\pi^G &= \pi^{*,G}+\frac{(1-\alpha)\left(1-\theta^M\right)(b+c)\gamma_y^M\kappa}{\Lambda}y^N+\frac{(1-\alpha)\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M}{\Lambda}\left(\pi^*-\pi^{*,G}\right) \qquad \text{(A-23)} \\
&\quad +\frac{c\gamma_y^G\left[\Pi+c^2\theta^M\gamma_y^G+\alpha c^2\left(1-\theta^M\right)\gamma_y^M\right]}{\Lambda}\left(y^{*,G}-y^N\right)-\frac{c\gamma_y^G}{\kappa}\varepsilon,
\end{aligned}
$$

$$
\begin{aligned}
y^G &= y^N+\frac{(1-\alpha)\left(1-\theta^M\right)c\gamma_\pi^M}{\Lambda}\left[\gamma_\pi^G\left(\pi^{*,G}-\pi^*\right)+c\gamma_y^G\left(y^{*,G}-y^N\right)\right] \\
&\quad +\frac{(1-\alpha)\left(1-\theta^M\right)bc\gamma_y^M\kappa}{\Lambda}y^N+\frac{\gamma_\pi^G}{\kappa}\varepsilon. \qquad \text{(A-24)}
\end{aligned}
$$

If the decisions of the MPC and the FPC are not overridden by the Government

$$
\begin{aligned}
i^{com} &= \frac{\left(1-\theta^M\right)\gamma_\pi^M\gamma_\pi^G\left\{(1-\alpha)c^2\left[\left(1-\theta^F\right)\phi+\theta^F\gamma_d^G\right]+\theta^F a^2\kappa\right\}}{bc\Delta\left(\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M\right)}\left(\pi^{*,G}-\pi^*\right)\\
&+\frac{\left[\alpha(1-\theta^M)+\theta^M\right]\gamma_\pi^M\kappa\pi^*+(1-\alpha)(1-\theta^M)\gamma_\pi^G\varphi\pi^{*,G}}{\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M}\\
&+\frac{\gamma_y^G\left[(1-\alpha)\left(1-\theta^M\right)\gamma_\pi^M(bc+c^2)\Delta+(1-\theta^M)a^2\gamma_\pi^M\left(\theta^F\gamma_\pi^G-\alpha(1-\theta^F)\gamma_y^F\right)\right]}{b\Delta\left[\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M\right]}\left(y^{*,G}-y^N\right)\\
&+\frac{\gamma_y^G\left[\left(1-\theta^M\right)a^2c^2\gamma_\pi^M\Upsilon+(1-\alpha)\left(1-\theta^M\right)bc^3\gamma_y^M\Delta+\theta^M bc\Delta\kappa\right]}{b\Delta\left[\Lambda+\alpha\left(1-\theta^M\right)c^2\gamma_y^G\gamma_\pi^M\right]}\left(y^{*,G}-y^N\right)\\
&-\frac{1}{b}y^N+\frac{a\left[\gamma_d^G\gamma_d^F d^{*,G}+\left(1-\theta^F\right)\gamma_d^F d^*\right]}{b\Delta}+\frac{1}{b}\epsilon\\
&-\frac{\theta^M\theta^F\gamma_\pi^G\gamma_d^G+\theta^M\left(1-\theta^F\right)\gamma_\pi^G\tau+\left(1-\theta^M\right)\theta^F\gamma_\pi^M\delta}{b\Delta\left[\theta^M\kappa+\left(1-\theta^M\right)\varphi\right]}\varepsilon\\
&-\frac{\left(1-\theta^M\right)\left(1-\theta^F\right)\gamma_\pi^M\tau-\left(1-\theta^M\right)\theta^F a^2\gamma_y^M\gamma_\pi^G}{b\Delta\left[\theta^M\kappa+\left(1-\theta^M\right)\varphi\right]}\varepsilon, \qquad \text{(A-25)}
\end{aligned}
$$

$$
\begin{aligned}
d^{com} &= \frac{a\left(1-\theta^M\right)\gamma_\pi^M\left[\theta^F\kappa+\alpha\left(1-\theta^F\right)c^2\gamma_y^F\right]}{\Delta\Lambda}\left[\frac{\gamma_\pi^G}{c}\left(\pi^{*,G}-\pi^*\right)+\gamma_y^G\left(y^{*,G}-y^N\right)\right]\\
&+\frac{\theta^F\gamma_d^G d^{*,G}+\left(1-\theta^F\right)\gamma_d^F d^*}{\Delta}-\frac{a\left[\left(1-\theta^M\right)\theta^F\omega+\left(1-\theta^F\right)\gamma_y^F\Pi\right]}{\Delta\left[\Pi+c^2\Omega\right]}\varepsilon, \qquad \text{(A-26)}
\end{aligned}
$$

π^e the same as if the Government overrides ,

$$
\begin{aligned}
\pi^{com} &= \pi^{*,G}+\frac{(1-\alpha)\left(1-\theta^M\right)(b+c)\gamma_y^M\kappa}{\Lambda}y^N+\frac{\left(1-\theta^M\right)\gamma_\pi^M\left(\kappa-\alpha c^2\gamma_y^G\right)}{\Lambda}\left(\pi^*-\pi^{*,G}\right)\\
&+\frac{c\gamma_y^G\left[\theta^M\kappa+\alpha\left(1-\theta^M\right)c^2\gamma_y^M\right]}{\Lambda}\left(y^{*,G}-y^N\right)-\frac{c\Omega}{\Pi+c^2\Omega}\varepsilon, \qquad \text{(A-27)}
\end{aligned}
$$

$$
\begin{aligned}
y^{com} &= y^N+\frac{\alpha\left(1-\theta^M\right)c\gamma_\pi^M}{\Lambda}\left[\gamma_\pi^G\left(\pi^*-\pi^{*,G}\right)+c\gamma_y^G\left(y^N-y^{*,G}\right)\right]+\frac{(1-\alpha)\left(1-\theta^M\right)bc\gamma_y^M\kappa}{\Lambda}y^N\\
&+\frac{\Pi}{\Pi+c^2\Omega}\varepsilon. \qquad \text{(A-28)}
\end{aligned}
$$

A.2.2 Special-Case Solutions: Regimes B2, B3, B4

Regime B2: Independent but Accountable Committees *If the Government overrides the decisions of the FPC and the MPC*

$$
\begin{aligned}
i^G &= \frac{\alpha c\gamma_\pi^G\gamma_\pi^M}{b\left[(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+\alpha c^2\gamma_y^G\gamma_\pi^M\right]}\left(\pi^*-\pi^{*,G}\right)+\frac{\alpha\gamma_\pi^M\kappa\pi^*+(1-\alpha)\gamma_\pi^G\varphi\pi^{*,G}}{(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+\alpha c^2\gamma_y^G\gamma_\pi^M}\\
&\quad+\frac{c\gamma_y^G\left((1-\alpha)bc^2\gamma_y^M+(1-\alpha)b\gamma_\pi^M-\alpha c\gamma_\pi^M\right)}{b\left[(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+\alpha c^2\gamma_y^G\gamma_\pi^M\right]}\left(y^{*,G}-y^N\right)\\
&\quad-\frac{1}{b}y^N+\frac{1}{b}\epsilon+\frac{a}{b}d^{*,G}-\frac{\gamma_\pi^G}{b\left(c^2\gamma_y^G+\gamma_\pi^G\right)}\varepsilon, \qquad \text{(A-29)}
\end{aligned}
$$

$$
d^G = d^{*,G}, \qquad \text{(A-30)}
$$

$$
\pi^e = \frac{(1-\alpha)\kappa\gamma_\pi^M\pi^*+\alpha\varphi\gamma_\pi^G\pi^{*,G}}{\gamma_\pi^M\kappa-\alpha c^2\omega}+\frac{c\left[(1-\alpha)\kappa\gamma_y^My^N+\alpha\varphi\gamma_y^G\left(y^{*,G}-y^N\right)\right]}{\gamma_\pi^M\kappa-\alpha c^2\omega}, \qquad \text{(A-31)}
$$

$$
\begin{aligned}
\pi^G &= \pi^{*,G}+\frac{(1-\alpha)c^2\gamma_y^G\gamma_\pi^M}{\gamma_\pi^M\kappa-\alpha c^2\omega}\left(\pi^*-\pi^{*,G}\right)-\frac{c\gamma_y^G}{\kappa}\varepsilon\\
&\quad+\frac{c\gamma_y^G\left(\gamma_\pi^M+\alpha c^2\gamma_y^M\right)}{\gamma_\pi^M\kappa-\alpha c^2\omega}\left(y^{*,G}-y^N\right)+\frac{(1-\alpha)(b+c)\gamma_y^M\kappa}{\gamma_\pi^M\kappa-\alpha c^2\omega}y^N, \qquad \text{(A-32)}
\end{aligned}
$$

$$
y^G = y^N+\frac{(1-\alpha)c\gamma_\pi^M}{\gamma_\pi^M\kappa-\alpha c^2\omega}\left[\gamma_\pi^G\left(\pi^{*,G}-\pi^*\right)+c\gamma_y^G\left(y^{*,G}-y^N\right)\right]+\frac{(1-\alpha)bc\gamma_y^M\kappa}{\gamma_\pi^M\kappa-\alpha c^2\omega}y^N+\frac{\gamma_\pi^G}{\kappa}\varepsilon. \qquad \text{(A-33)}
$$

If the decisions of the MPC and the FPC are not overridden by the Government

$$
\begin{aligned}
i^{com} &= \frac{(1-\alpha)c\gamma_\pi^G\gamma_\pi^M\tau}{\left[(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+\alpha c^2\gamma_y^G\gamma_\pi^M\right]b\gamma_d^F}\left(\pi^{*,G}-\pi^*\right)\\
&\quad+\frac{(1-\alpha)\,\gamma_\pi^G\varphi\pi^{*,G}+\alpha\gamma_\pi^M\mu\pi^*}{(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+\alpha c^2\gamma_y^G\gamma_\pi^M}\\
&\quad+\frac{c\,(1-\alpha)\,\gamma_y^G\left(c\gamma_\pi^M\gamma_d^F+bc^2\gamma_y^M\gamma_d^F+b\gamma_\pi^M\gamma_d^F+a^2c\gamma_\pi^M\gamma_y^F\right)}{\left[(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+\alpha c^2\gamma_y^G\gamma_\pi^M\right]b\gamma_d^F}\left(y^{*,G}-y^N\right)\\
&\quad-\frac{1}{b}y^N+\frac{a}{b}d^*+\frac{1}{b}\epsilon-\frac{\gamma_\pi^M\tau}{b\varphi\gamma_d^F}\varepsilon, \qquad \text{(A-34)}
\end{aligned}
$$

$$
d^{com} = d^*+\frac{\alpha ac\gamma_\pi^M\gamma_y^F}{\gamma_d^F\left(\gamma_\pi^M\kappa-\alpha c^2\omega\right)}\left[\gamma_\pi^G\left(\pi^{*,G}-\pi^*\right)+\gamma_y^Gc\left(y^{*,G}-y^N\right)\right]-\frac{\gamma_\pi^M\gamma_y^Fa}{\varphi\gamma_d^F}\varepsilon, \qquad \text{(A-35)}
$$

π^e the same as if the Government overrides ,

$$
\begin{aligned}
\pi^{com} &= \pi^{*,G}+\frac{\gamma_\pi^M\left(\kappa-\alpha c^2\gamma_y^G\right)}{\gamma_\pi^M\kappa-\alpha c^2\omega}\left(\pi^*-\pi^{*,G}\right)+\frac{\alpha c^3\gamma_y^G\gamma_y^M}{\gamma_\pi^M\kappa-\alpha c^2\omega}\left(y^{*,G}-y^N\right)\\
&\quad+\frac{(1-\alpha)(b+c)\gamma_y^M\kappa}{\gamma_\pi^M\kappa-\alpha c^2\omega}y^N-\frac{c\gamma_y^M}{\varphi}\varepsilon, \qquad \text{(A-36)}
\end{aligned}
$$

$$
y^{com} = y^N+\frac{(1-\alpha)bc\gamma_y^M\kappa}{\gamma_\pi^M\kappa-\alpha c^2\omega}y^N+\frac{\alpha c\gamma_\pi^M}{\gamma_\pi^M\kappa-\alpha c^2\omega}\left[\gamma_\pi^G\left(\pi^*-\pi^{*,G}\right)+c\gamma_y^G\left(y^N-y^{*,G}\right)\right]+\frac{\gamma_\pi^M}{\varphi}\varepsilon. \qquad \text{(A-37)}
$$

Regime B3: Independent but Accountable MPC with Completely Dependent FPC *If the Government overrides the decision of the MPC*, all five variables of interest are the same as in Regime B2. *If the decision of the MPC is not overridden by the Government*

$$\begin{aligned} i^{com} &= \frac{a^2\gamma_\pi^G\gamma_\pi^M\kappa+(1-\alpha)c^2\gamma_\pi^M\gamma_\pi^G\gamma_d^G}{bc\gamma_d^G\left[(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+c^2\gamma_y^G\alpha\gamma_\pi^M\right]}\left(\pi^{*,G}-\pi^*\right) \\ &+\frac{(1-\alpha)\gamma_\pi^G\varphi\pi^{*,G}+\alpha\gamma_\pi^M\kappa\pi^*}{(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+c^2\gamma_y^G\alpha\gamma_\pi^M} \\ &+\frac{\gamma_y^G\left[a^2\gamma_\pi^M\kappa+(1-\alpha)\,bc\gamma_d^G\varphi+(1-\alpha)\,c^2\gamma_\pi^M\gamma_d^G\right]}{b\gamma_d^G\left[(1-\alpha)\,c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+c^2\gamma_y^G\alpha\gamma_\pi^M\right]}\left(y^{*,G}-y^N\right) \\ &-\frac{1}{b}y^N-\frac{a}{b}d^{*,G}+\frac{1}{b}\epsilon-\frac{\gamma_\pi^M\delta-a^2\gamma_y^M\gamma_\pi^G}{b\gamma_d^G\varphi}\varepsilon, \end{aligned} \tag{A-38}$$

$$d^{com} = d^{*,G}+\frac{a\gamma_\pi^M\kappa}{(\gamma_\pi^M\kappa-\alpha c^2\omega)\,\gamma_d^G}\left[\frac{\gamma_\pi^G}{c}\left(\pi^{*,G}-\pi^*\right)+\gamma_y^G\left(y^{*,G}-y^N\right)\right]-\frac{a\omega}{\varphi\gamma_d^G}\varepsilon, \tag{A-39}$$

and π, π^e and y are the same as in Regime B2.

Regime B4: Independent but Accountable FPC with Completely Dependent MPC *If the Government overrides the decision of the FPC*, it will implement $d^G = d^{*,G}$ and i^G equal to that in Regime A1, but π, π^e and y are the same as if the FPC would determine its instrument level.

B Proofs of the Propositions

B.1 Proof of Proposition 1 and Corollaries 1.1 and 1.2

A. Without Accountability We start by comparing the identified four special-case regimes without accountability (A1, A2, A3 and A4) in terms of the lowest expected inflation. We show below that Regimes A2 and A3 perform best along this particular dimension of ranking, by anchoring down inflation expectations at the target of the fully independent MPC:

$$\pi^e_{A2,A3} = \pi^* < \pi^{*,G}.$$

This is true no matter whether the FPC is also fully independent (as in Regime A2) or not (as in Regime A3).

Expected inflation under Regimes A1 and A4 is:

$$\pi^e_{A1,A4} = \pi^{*,G} + c\frac{\gamma^G_y}{\gamma^G_\pi}\left(y^{*,G} - y^N\right).$$

Insofar we allow for a re-election concern of the Government, $y^{*,G} - y^N > 0$, in line with the tradition of the literature on time inconsistency, A1 and, identically, A4, produces a substantial inflationary bias, which is a standard result. The expected inflation is higher, i.e., the inflationary bias is stronger, the higher is the Government's weight on output relative to that on inflation, $\gamma^G_y/\gamma^G_\pi > 1$, and the stronger is the reaction of aggregate supply to surprise inflation, captured by $c > 0$. In fact, an elastic AS response to forecast errors in expectations, i.e., a steeper (short-run) Phillips curve slope, $c > 1$, magnifies the effect of any given measure, $y^{*,G} - y^N > 0$, of the re-election concern on inflation expectations, while an inelastic AS response, i.e., a flatter (short-run) Phillips curve slope, dampens it.[33] Only if the Government is not pursuing an overambitious output target, $y^{*,G} - y^N = 0$, inflation would be $\pi^* = \pi^{*,G} = \pi^e$, as in Regimes A2 and A3.

Consider next the case when $\theta^M = 1/2$. It results in an intermediate magnitude of expected inflation:

$$\pi^e = \frac{\gamma^G_\pi}{\gamma^M_\pi + \gamma^G_\pi}\pi^* + \frac{\gamma^M_\pi}{\gamma^M_\pi + \gamma^G_\pi}\pi^{*,G} + c\frac{\gamma^G_y}{\gamma^M_\pi + \gamma^G_\pi}\left(y^{*,G} - y^N\right).$$

Insofar the re-election concern exists, we still have an inflationary bias relative to the cases of fully independent MPC (A2 and A3). Yet now the expected inflation outcome is

[33] There is no theoretical or empirical reason to restrict our parameter c to a particular positive-valued range (Woodford 2003, p. 245). Earlier aggregative models have AS or Phillips curve relations where the analogous parameter to c here is not restricted more than just being a positive number too (Sargent and Wallace 1975, p. 242).

lower than the one under fully dependent monetary policy (A1 and A4), because of two reasons. First, the multiplier to the output target gap is now smaller relative to the latter two regimes, since $c\gamma_y^G/\left(\gamma_\pi^M+\gamma_\pi^G\right) < c\gamma_y^G/\gamma_\pi^G$, that is, because the preference weight of the monetary policymaker, γ_π^M, now plays a role in reducing the response of private-sector expectations to the re-election concern. Second, only a fraction, $0 < \gamma_\pi^M/\left(\gamma_\pi^M+\gamma_\pi^G\right) < 1$, of the overambitious Government's target for inflation, $\pi^{*,G}$, now forms the expected level of inflation, together with a smaller (assuming $0 < \gamma_\pi^G < \gamma_\pi^M < 1$, as we do) fraction, $0 < \gamma_\pi^G/\left(\gamma_\pi^M+\gamma_\pi^G\right) < 1$, of the MPC's lower inflation target, π^*, consistent with attaining normal output level on average.

Finally, taking up the *general* case, Regime A,

$$\pi_A^e = \frac{\left(1-\theta^M\right)}{\Pi}\gamma_\pi^M\pi^* + \frac{\theta^M}{\Pi}\left[\gamma_\pi^G\pi^{*,G} + c\gamma_y^G\left(y^{*,G}-y^N\right)\right],$$

it naturally splits into two regions. To see this, set $\theta^M = 1/2$ above, so that $\Pi = 1/[2\left(\gamma_\pi^G+\gamma_\pi^M\right)]$ and, thus, becomes the average preference weight on inflation for the Government and the monetary committee. Then (i) if $0 < \theta^M < 1/2$ so that the MPC opinion matters more than that of the Government in deciding on targets and preferences with respect to inflation (and output), $\pi^{*,G}$ and $y^{*,G}-y^N$ will be weighted less and π^* more so that the re-election concern will be less important in expectation formation. Therefore, general case A (i) will be ranked between A2=A3 and the case of $\theta^M = 1/2$. By contrast, and following analogous reasoning, general case A (ii), where $1/2 < \theta^M < 1$, will come in this ranking between the case of $\theta^M = 1/2$ and A1=A4. The ranking we just derived is reflected in the top half (Regimes A) of the middle column of Table 2.

B. With Accountability Since expected inflation in Regime B4 is exactly the same as in Regimes A1 and A4, we turn to the two cases where the MPC is independent but now accountable, Regimes B2 and B3, in the sense of facing a possibility that its optimal decisions are overridden by the Government. Logically, this adds a constraint in the optimization of the MPC and influences it away from its priority on inflation expectations and more into stabilization considerations concerning actual output. This results in expectations formation that is less favorable than our best regimes on this account, A2 and A3:

$$\begin{aligned}\pi_{B2,B3}^e = {} & \frac{\alpha\gamma_\pi^G\left(\gamma_\pi^M+c^2\gamma_y^M\right)}{\alpha c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+(1-\alpha)c^2\gamma_y^G\gamma_\pi^M}\pi^{*,G} + \frac{(1-\alpha)\gamma_\pi^M\left(\gamma_\pi^G+c^2\gamma_y^G\right)}{\alpha c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+(1-\alpha)c^2\gamma_y^G\gamma_\pi^M}\pi^* \\ & + \frac{c\left(\gamma_\pi^G\gamma_y^M(1-\alpha)+2\gamma_y^M(1-\alpha)c^2\gamma_y^G+\gamma_y^G(1-\alpha)\gamma_\pi^M-c^2\gamma_y^G\gamma_y^M-\gamma_y^G\gamma_\pi^M\right)}{\alpha c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+(1-\alpha)c^2\gamma_y^G\gamma_\pi^M}y^N \\ & + \frac{\alpha c\gamma_y^G\left(\gamma_\pi^M+c^2\gamma_y^M\right)}{\alpha c^2\gamma_\pi^G\gamma_y^M+\gamma_\pi^G\gamma_\pi^M+(1-\alpha)c^2\gamma_y^G\gamma_\pi^M}y^{*,G}.\end{aligned}$$

The four coefficients above have a common denominator. Take first 'fair odds' of being overridden, i.e., $\alpha = 1/2$. Expected inflation in Regimes B2=B3 then translates into

$$\pi^e_{B2,B3,\alpha=\frac{1}{2}} = \frac{\left(\frac{1}{2}c^2\gamma^G_\pi\gamma^M_y+\frac{1}{2}\gamma^G_\pi\gamma^M_\pi\right)}{\left(\frac{1}{2}c^2\gamma^G_\pi\gamma^M_y+\frac{1}{2}\gamma^G_\pi\gamma^M_\pi\right)+\frac{1}{2}\gamma^G_\pi\gamma^M_\pi+\frac{1}{2}c^2\gamma^G_y\gamma^M_\pi}\pi^{*,G}+\frac{\left(\frac{1}{2}\gamma^G_\pi\gamma^M_\pi+\frac{1}{2}c^2\gamma^G_y\gamma^M_\pi\right)}{\frac{1}{2}c^2\gamma^G_\pi\gamma^M_y+\frac{1}{2}\gamma^G_\pi\gamma^M_\pi+\left(\frac{1}{2}\gamma^G_\pi\gamma^M_\pi+\frac{1}{2}c^2\gamma^G_y\gamma^M_\pi\right)}\pi^*$$
$$+\frac{\frac{1}{2}c\left(\gamma^G_\pi\gamma^M_y-\gamma^G_y\gamma^M_\pi\right)}{\frac{1}{2}c^2\left(\gamma^G_\pi\gamma^M_y+\gamma^G_y\gamma^M_\pi\right)+\gamma^G_\pi\gamma^M_\pi}y^N+\frac{\frac{1}{2}c^3\gamma^M_y\gamma^G_y+\left(\frac{1}{2}c\gamma^G_y\gamma^M_\pi\right)}{\frac{1}{2}c^2\gamma^G_\pi\gamma^G_y+\gamma^G_\pi\gamma^M_\pi+c\left(\frac{1}{2}c\gamma^G_y\gamma^M_\pi\right)}y^{*,G}, \text{ where:}$$
$$0<\text{Coeff. of } \pi^{*,G}_{B2,B3,\alpha=\frac{1}{2}}<1; \quad 0<\text{Coeff. of } \pi^{*}_{B2,B3,\alpha=\frac{1}{2}}<1;$$
$$\text{Coeff. of } y^N_{B2,B3,\alpha=\frac{1}{2}}<0 \text{ since } \gamma^G_\pi\gamma^M_y<\gamma^G_y\gamma^M_\pi; \quad \text{Coeff. of } y^{*,G}_{B2,B3,\alpha=\frac{1}{2}}>0.$$

Comparing the coefficients above with the simple expression for the corresponding regimes without accountability, $\pi^e_{A2,A3} = \pi^*$, we can conclude that Regime A2=A3 dominates Regime B2=B3 for $\alpha = 1/2$ in terms of anchoring inflation expectations to a lower level. First, the coefficients on π^* and $\pi^{*,G}$ above are both between 0 and 1, implying some sort of weighting of the inflation targets of the MPC and the Government, with $\pi^* < \pi^{*,G}$, but with the coefficient on $\pi^{*,G}$ definitely smaller than that on π^*, since $\gamma^G_\pi\gamma^M_y < \gamma^G_y\gamma^M_\pi$:

$$\text{Coeff. of } \pi^{*,G}_{B2,B3,\alpha=\frac{1}{2}} < \text{Coeff. of } \pi^{*}_{B2,B3,\alpha=\frac{1}{2}}.$$

Second, insofar $y^{*,G} > y^N$ and because the positive coefficient on the Government's output target dominates in absolute value the negative coefficient on the MPC's target of normal output, since $\gamma^G_y\gamma^M_\pi + c^2\gamma^M_y\gamma^G_y > \gamma^G_y\gamma^M_\pi - \gamma^G_\pi\gamma^M_y > 0$,

$$\left|\text{Coeff. of } y^{*,G}_{B2,B3,\alpha=\frac{1}{2}}\right| > \left|\text{Coeff. of } y^{N}_{B2,B3,\alpha=\frac{1}{2}}\right|,$$

because another positive constant is added on top of the weighted inflation targets just discussed determining $\pi^e_{B2,B3,\alpha=1/2}$.

For the more general case of $0 < \alpha < 1/2$ (small(er) probability of overriding), the weight on the MPC's inflation target would be higher than in the special case of $\alpha = 1/2$ relative to that of the Government's inflation target; and the weight on the Government's overambitious output target relative to normal output would be lower. Hence, on both counts, inflation expectations would be even lower than under $\alpha = 1/2$. Conversely, for the more general case of $1/2 < \alpha < 1$ (high(er) probability of overriding), the weight on the MPC's inflation target would be lower than in the special case of $\alpha = 1/2$ relative to that of the Government's inflation target; and the weight on the Government's overambitious output target relative to normal output would be higher. Hence, on both counts, inflation expectations would be higher than under $\alpha = 1/2$.

Thus, being a 'weighted average' of Government's and MPC's targets, not just for $\alpha = 1/2$ but also for any general probability of overriding $0 < \alpha < 1$ as we showed above, expected inflation is higher with accountability in B2 and B3 than it is in the parallel cases with a fully independent MPC in A2 and A3. That is, Regime A2=A3 dominates Regime B2=B3 in terms of anchoring private-sector expectations. For the same reason and following analogous logic, Regime A dominates Regime B in terms of expectation formation. This completes our proof of Proposition 1 and corollaries 1.1 and 1.2.■

B.2 Proof of Proposition 2 and Corollaries 2.1 and 2.2

A. Without Accountability Our extremes are, again, completely independent expert committees (Regime A2) versus a Government that optimizes alone (Regime A1). In Regime A2 (and A3), the deviation of actual from expected inflation, $\pi - \pi^e$, is:

$$(\pi - \pi^e)_{A2,A3} = -\frac{\left(c\gamma_y^M\right)}{\gamma_\pi^M + c\left(c\gamma_y^M\right)}\varepsilon, \text{ so that } 0 < |\text{Coeff. of } \varepsilon_{A2,A3}| < 1.$$

In the case when $c \geq 1$ the inequality above is obvious. In the case when $0 < c < 1$ one has to consider:

$$0 < \frac{\left(c\gamma_y^M\right)}{\gamma_\pi^M + c\left(c\gamma_y^M\right)} < 1.$$

The left-hand side inequality is obvious too. The right-hand side inequality requires

$$\frac{c\gamma_y^M}{\gamma_\pi^M + c^2\gamma_y^M} < 1 \Leftrightarrow (1-c)\, c\gamma_y^M < \gamma_\pi^M,$$

$$\underbrace{(1-c)\, c}_{0<(1-c)c<1 \text{ for } \forall c \text{ such that } 0<c<1} < \underbrace{\frac{\gamma_\pi^M}{\gamma_y^M}}_{>1 \text{ by assumption}},$$

which is always satisfied given our assumption $\frac{\gamma_\pi^M}{\gamma_y^M} > 1$ in the beginning.

Hence, the effect of the materialized AS disturbance, ε, on actual inflation and on the forecast error is dampened, the more so the higher is the MPC's preference weight on inflation, γ_π^M, and the more sensitive is aggregate supply to surprise inflation, i.e., the larger c.

At the other extreme, Regime A1 (and A4), the deviation $\pi - \pi^e$ is instead:

$$(\pi - \pi^e)_{A1,A4} = -\frac{\left(c\gamma_y^G\right)}{\gamma_\pi^G + c\left(c\gamma_y^G\right)}\varepsilon, \text{ so that, again, } 0 < |\text{Coeff. of } \varepsilon_{A1,A4}| < 1.$$

Similarly, in the case when $c \geq 1$ the inequality above is obvious. In the case when $0 < c < 1$ one has to consider:

$$0 < \frac{\left(c\gamma_y^G\right)}{\gamma_\pi^G + c\left(c\gamma_y^G\right)} < 1.$$

The left-hand side inequality is obvious too. The right-hand side inequality requires

$$\frac{c\gamma_y^G}{\gamma_\pi^G + c^2\gamma_y^G} < 1 \Leftrightarrow (1-c)\, c\gamma_y^G < \gamma_\pi^G,$$

$$\underbrace{(1-c)\, c}_{0<(1-c)c<1 \text{ for } \forall c \text{ such that } 0<c<1} < \underbrace{\frac{\gamma_\pi^G}{\gamma_y^G} < 1}_{\text{by assumption}},$$

so that we may have a dampening effect provided the above inequality holds, or now also a magnifying effect, if alternatively the above inequality does not hold. The case of the magnifying effect is not relevant to our comparison across regimes here of ex post stabilization of inflation, but the dampening effect is. In the latter case, insofar $\gamma_\pi^G < \gamma_\pi^M$ and $\gamma_y^G > \gamma_y^M$, the dampening effect is stronger on both counts in Regime A2 relative to Regime A1. Note that, again, Regime A2 is equivalent to Regime A3, and Regime A1 to A4 if the criterion for ranking is, like in the present subsection, the deviation of actual from expected inflation.

B. With Accountability Now the ranking is less evident, but we can show the following relations. We first compare Regimes B2^G and B2^{com}. We form the difference $\pi_{B2}^G - \pi_{B2}^{com} = \left(\pi_{B2}^G - \pi_{B2}^e\right) - (\pi_{B2}^{com} - \pi_{B2}^e)$. There are three pairs of terms in the respective expressions for π_{B2}^G and π_{B2}^{com} that are different:

$$\frac{c\gamma_y^G}{\kappa} \text{ in } \pi_{B2}^G < \frac{c\Omega}{\Pi + c^2\Omega} \text{ in } \pi_{B2}^{com};$$

$$(1-\alpha)\, c^2\gamma_y^G \text{ in the 2nd term of } \pi_{B2}^G < \kappa - \alpha c^2\gamma_y^G \text{ in the 2nd term of } \pi_{B2}^{com};$$

$$\Pi + c^2\theta^M\gamma_y^G \text{ in the 4th term of } \pi_{B2}^G > \theta^M\kappa \text{ in the 4th term of } \pi_{B2}^{com}.$$

The first pair of terms multiply the supply shock, ε; the second pair multiply the inflation target gap, $\pi^* - \pi^{*,G} < 0$; and the third pair of terms multiply the output target gap, $y^{*,G} - y^N > 0$. In addition to a larger multiple to the supply shock, a smaller multiple to a negative term, and a greater multiple to a positive term in the respective

(G versus *com*) actual inflation expressions (with the remaining terms in them being the same: compare Regime B2 with override versus committee decision in Appendix A),

$$\pi_{B2}^{G} > \pi_{B2}^{com} \Leftrightarrow \left(\pi_{B2}^{G} - \pi^{e}\right) > \left(\pi_{B2}^{com} - \pi^{e}\right),$$

i.e., B2^{com} results in smaller deviations of actual from expected inflation relative to B2^{G}.

We next argue that A2, in turn, results in even smaller deviations of actual from expected inflation relative to B2^{com}, because: (i) π_{B2}^{com} is some weighted average of π^{*} and $\pi^{*,G}$; (ii) the supply shock multiplier in π_{B2}^{com} is bigger than that in π_{A2}; and (iii) there are, furthermore, two positive terms added in π_{B2}^{com} which are absent in π_{A2}.

So, A2<B2^{com}<B2^{G} or A2<B2, i.e., Regime A2 leads to a smaller deviation of actual inflation from target relative to the corresponding Regime B2.

Similarly to the logic we exposed above, one can then also show that the remaining Regimes B, with accountability, are dominated by the respective Regimes A, without accountability, along the dimension of producing the lowest deviation of actual from expected inflation. Hence, the best regime in terms of containing inflation following a *cost-push* (i.e., *negative* supply) shock is to design the MPC fully independent. This completes our proof of Proposition 2 and corollaries 2.1 and 2.2.■

B.3 Proof of Proposition 3

(Without Accountability) It is straightforward to establish the result in this proposition by concentrating on the coefficient of the supply shock term in the output equations, because this shock is the only source that drives output away from normal in all regimes:

$$\begin{aligned} 1 &> \text{Coeff. of } \varepsilon_{A2,A3} > \text{Coeff. of } \varepsilon_{A} > \text{Coeff. of } \varepsilon_{A1,A4} > 0, \\ 1 &> \frac{\gamma_{\pi}^{M}}{\gamma_{\pi}^{M} + c^{2}\gamma_{y}^{M}} > \frac{\Pi}{\Pi + c^{2}\Omega} > \frac{\gamma_{\pi}^{G}}{\gamma_{\pi}^{G} + c^{2}\gamma_{y}^{G}} > 0. \end{aligned}$$

As $\gamma_{\pi}^{M} > \Pi > \gamma_{\pi}^{G}$, the ranking is now reversed relative to the case of actual inflation. In the general case of Regime A, shock stabilization is a 'weighted average' of the preferences of the Government and the MPC, where the weight is according to the degree of independence of the MPC. In this case, an intermediate level of shock stabilization arises. This completes our proof of Proposition 3.■

B.4 Proof of Proposition 4 and Corollary 4.1

Proof of Proposition 4 (With Accountability) Again, normal output is the starting point for actual output. However, there is an additional effect of the normal output level on actual output that increases its impact above unity. The size of this effect depends on the probability of overriding and on the preferences of the Government and the MPC with regard to inflation and the output gap.

If the committees are left to determine the instrument level under accountability, the results have the same structure as in the regimes where the Government steps in. However, the effects of the gap between the inflation targets of the Government and the committees and the gap between the output target of the Government and normal output have the opposite sign. The committees determine the instrument level in a way that these gaps now have a negative influence on the output level. The respective impact coefficients are of the same magnitude as when the Government overrides the committees but weighted with the probability that the Government does not step in, $1-\alpha$, instead of α. The impact coefficient of the normal output level besides that of the difference to the Government target is of the same size and magnitude as in the case where the Government finally decides. Moreover, the impact coefficient of the supply shock is higher if the committees are not overridden because they have a lower preference for output stabilization. If the committees decide, output would be lower as a rule compared to Government decisions. However, there is a range for positive supply shocks where $y^{com} > y^G$ and for

$$\varepsilon > \frac{\gamma_\pi^M \kappa \left(\Pi + c^2\Omega\right)}{\Lambda c \omega} \left[\gamma_\pi^G \left(\pi^{*,G} - \pi^*\right) + c\gamma_y^G \left(y^{*,G} - y^N\right)\right] \tag{A-40}$$

in the general case.

Illustration of Proposition 4 Figure 4 shows the basic mechanism that leads to this result and that also applies to all other comparisons of output outcomes when the committees are involved.

[Figure 4 about here]

The starting point is the normal output level multiplied with a term that is higher than one. Because the weighting of normal output is the same regardless whether the Government or the committees decide, we observe the same deviation from that level. A further deviation occurs, first, due to the impact of the supply shock that is partly accommodated by the policymaker in charge. Because the Government has higher preferences for output on target, the deviation from normal output is lower with Government overriding; this leads to a higher Government output level in case of a negative, and a lower level in case of a positive, supply shock compared to the respective committee

levels. Second, the target differences are still another source of deviation from normal output, but in an unambiguous way: output with the Government in charge is always higher than if committees are left to decide policies. However, there is a range where the Government level of output is lower than the committee level because of the stronger output stabilization by the former relative to the latter.[34] This completes our proof of Proposition 4.■

Proof of Corollary 4.1 For output stabilization across responsibilities and accountability regimes, the following results can be established:

$$0 < \text{Coeff. of } \varepsilon_{A1,A4,B4} = \text{Coeff. of } \varepsilon^{G}_{B2,B3} < \text{Coeff. of } \varepsilon_{A2,A3} = \text{Coeff. of } \varepsilon^{com}_{B2,B3} < 1,$$
$$0 < \frac{\gamma^{G}_{\pi}}{\gamma^{G}_{\pi} + c^2\gamma^{G}_{y}} < \frac{\gamma^{M}_{\pi}}{\gamma^{M}_{\pi} + c^2\gamma^{M}_{y}} < 1.$$

As $\gamma^{G}_{\pi} < \gamma^{M}_{\pi}$, the highest degree of output stabilization is achieved if the Government is in charge of monetary policy. This can be the case without accountability when the committees are completely dependent (Regimes A1=A4(=B4)), and with accountability when the Government overrides (Regimes B2, B3). In each case, shock stabilization occurs with regard to Government preferences only. For shock stabilization, accountability does not matter because the policymakers decide about stabilization if they have the power to do so and private agents do not expect shocks on average. Therefore, only own preferences play any role.

Because target differences only occur in regimes with accountability, output is higher (lower) compared to regimes without accountability if the Government (the committees) is (are) in charge and if monetary policy is not completely dependent. Because target differences between the Government and the committees are negative in cases where the committees decide, the net effect is not clear since such differences point in the opposite direction compared to the positive effect of the normal output level. If the Government is in charge, the net effect is unambiguously positive, when putting aside the supply shock. This completes our proof of Corollary 4.1.■

[34] The unambiguous ranking of actual inflation outcomes across regimes arises because deviations from expected inflation are considered that result only due to the supply shock. If absolute levels of inflation rates are compared instead, a similar ambiguity as in the case of output levels arises and target differences play a role in addition to the supply shock as discussed next. A comparison of the inflation rate determined by the Government with the one determined by the committees in Regime B with accountability shows that there is a realization of the supply shock where the inflation rates are equal. The shock is of the same size as the one that equates the output levels, y^{G} and y^{com} in Regime B (see equation (A-40)).

B.5 Proof of Proposition 5

A. Without Accountability If no accountability of the committees is intended, the deficit reacts not only to the target level but decreases (increases) with positive (negative) supply shocks. Ranking the regimes without accountability according to the reaction to supply shocks, Regime A1 does not show any influence of supply shocks. In Regime A2, the influence of the supply shock is larger than in Regime A4. A ranking of the other regimes according to the shock is not possible. The reaction of the deficit to supply shocks in regimes with accountability is the same as in the respective A regimes if the committees are left to decide. If the Government overrides, there is no influence of the shock. The relation between the influence of the supply shock on the deficit level in Regimes A2 and A3 looks as follows:

$$\frac{\gamma_\pi^M}{\gamma_y^M}\left(\frac{\gamma_d^F}{\gamma_y^F}-\frac{\gamma_d^G}{\gamma_y^G}\right) \quad \gtreqless \quad \frac{\gamma_\pi^G\gamma_d^F}{\gamma_y^G\gamma_y^F};$$

and the corresponding relation in Regimes A3 and A4 is given by:

$$\frac{\frac{\gamma_\pi^G}{\gamma_d^G}}{\frac{\gamma_\pi^M}{\gamma_y^M}}\frac{\gamma_\pi^M}{\gamma_\pi^M+c^2\gamma_y^M} \quad \gtreqless \quad \frac{\gamma_y^G}{\gamma_d^G}\frac{\gamma_\pi^M}{\gamma_\pi^M+c^2\gamma_y^M}-\frac{\gamma_y^F}{\gamma_d^F}\frac{\gamma_\pi^G}{\gamma_\pi^G+c^2\gamma_y^G}.$$

In addition to supply shocks, the deficit reacts to the difference between the inflation and output targets of the committees and the Government if monetary policy is completely independent but fiscal policy is not (Regime A3) and if both committees are partially independent (Regimes A). In these cases, the Government tries to offset some influence of the independent determination of the interest rate. If monetary policy is completely dependent but fiscal policy independent, such effects do not occur.

B. With Accountability If the Government decides alone, the deficit-to-GDP ratio is always on target and not needed for stabilization purposes or aiming at target levels for inflation and output. A ranking of the deficit when the committees are not overridden by the Government looks as follows. In Regime B1 with completely dependent committees, the deficit is on target. If the FPC is made independent, it also reacts to shocks but introduces a lower target level. If the MPC is made completely independent, there is also a reaction to the target differences that is more aggressive (stronger) with a dependent FPC. But the reaction to shocks cannot be compared between the two regimes with completely independent MPC. This completes our proof of Proposition 5.■

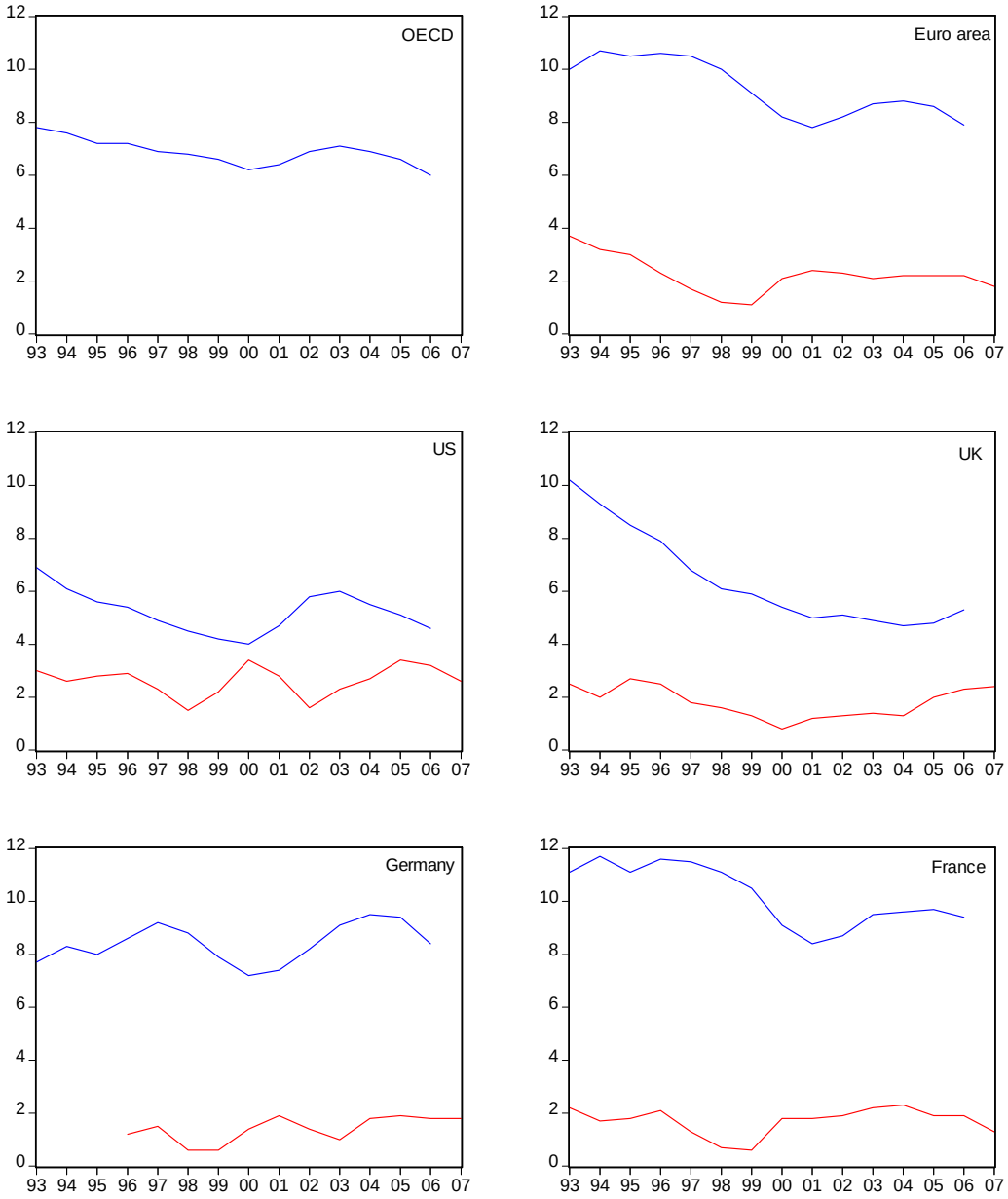

Figure 1: Standardized unemployment rate (blue curves) and CPI inflation (red curves), %, annual data, OECD, *Economic Outlook*, May 2007

Figure 2: Cyclically adjusted general government budget balance, % of potential GDP, annual data, OECD, *Economic Outlook*, May 2007

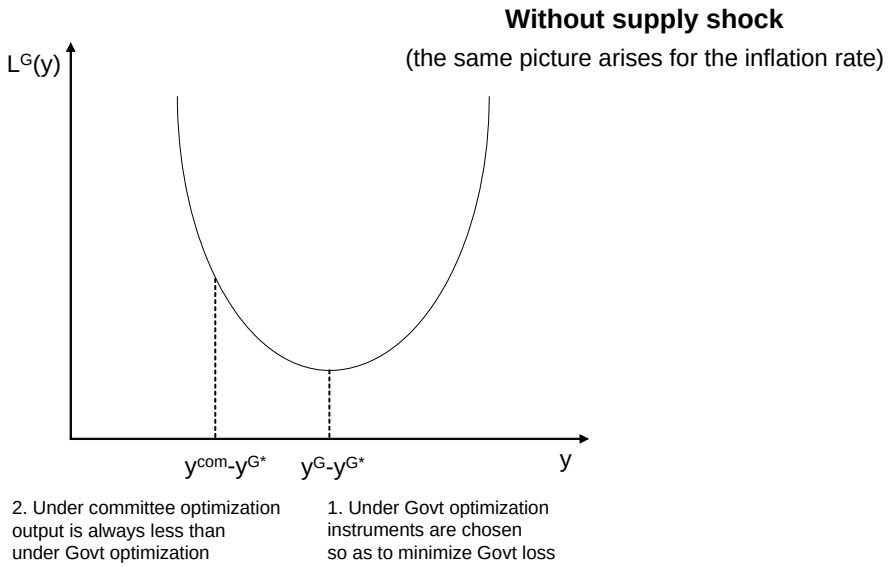

Figure 3: Ex ante relative loss in terms of output with accountability

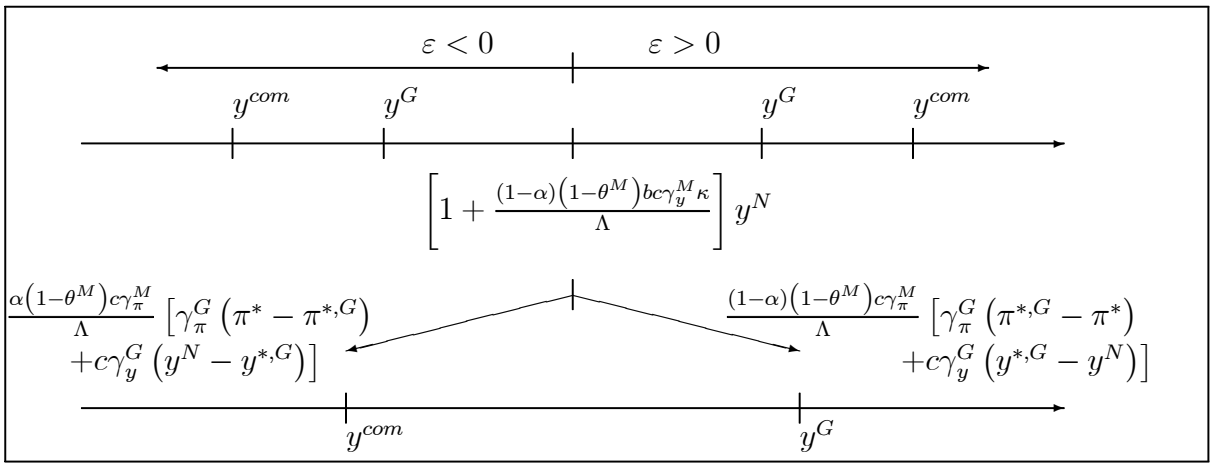

Figure 4: Effects of policy decisions on the output level when the Government decides and when the committees decide in the general case with accountability

Regime	Parameter setting	Without accountability, $\alpha = 0$	With accountability, $0 < \alpha < 1$
General Case: Partial Independence	$0 < \theta^M < 1$, $0 < \theta^F < 1$	Regime A	Regime B
Special Cases:			
Government Optimization	$\theta^M = 1$, $\theta^F = 1$	Regime A1	irrelevant case
Independent Committees	$\theta^M = 0$, $\theta^F = 0$	Regime A2	Regime B2
Independent MPC, Dependent FPC	$\theta^M = 0$, $\theta^F = 1$	Regime A3	Regime B3
Independent FPC, Dependent MPC	$\theta^M = 1$, $\theta^F = 0$	Regime A4	Regime B4

Table 1: Overview of the studied policy regimes depending on the degree of independence and accountability of the committees

Regime	π^e (rank)	$\pi - \pi^e$ (rank)
A	2, if $0 < \theta^M < \frac{1}{2}$; or 3 if $\frac{1}{2} < \theta^M < 1$	2, if $0 < \theta^M < \frac{1}{2}$; or 3 if $\frac{1}{2} < \theta^M < 1$
A1	4	4
A2	1	1
A3	1	1
A4	4	4
B	dominated by A	dominated by B2=B3
B2	dominated by A2	dominated by A2=A3
$B2^G$	–	$=B3^G$ dominated by $B2^{com}$=$B3^{com}$
$B2^{com}$	–	$=B3^{com}$ dominated by A2=A3
B3	dominated by A3	=B2, dominated by A3=A2
B4	4	dominated by B2=B3

Table 2: Ranking of the policy regimes by inflation outcomes (1 - closest to target value, 4 - largest deviation from target value)

Regime	AS shock stabilization (rank)	Target differences $\pi^{*,G} - \pi^* > 0$, $y^{*,G} - y^* > 0$ sign	size (absolute value)	Normal output level y^N (normalized to 1)
A	2 (intermediate)		-	$= 1$
A1	1 (highest)		-	$= 1$
A2	3 (lowest)		-	$= 1$
A3	=A2		-	$= 1$
A4	=A1		-	$= 1$
B^G	=A1	> 0	B^G <$B2^G$	$B2^G$ >$B^G > 1$
B^{com}	=A	< 0	B^{com} <$B2^{com}$	=$B^{com} > 1$
$B2^G$	=A1	> 0		$B2^G > 1$
$B2^{com}$	=A2	< 0		=$B2^{com} > 1$
			$B2^G \geq (\leq) B2^{com}$ if $\alpha \leq (\geq) \frac{1}{2}$	
$B3^G$	=A1	> 0	=$B2^G$	=$B2^G$
$B3^{com}$	=A2	< 0	=$B2^{com}$	=$B2^{com}$
$B4^G$	=A1	-	-	=A1= 1
$B4^{com}$	=A1	-	-	=A1= 1

Table 3: Ranking of the policy regimes by output outcomes

Regime	AS shock stabilization (rank)	Target differences $\pi^{*,G} - \pi^* > 0$, $y^{*,G} - y^* > 0$	Target level
A	?	A<A3	A2<A<A1
A1	1 (full)	-	A1>A2
A2	2 (lower)	-	A1>A2
A3	?	A<A3	=A1
A4	3 (higher)	-	=A2
B^G	=A1	-	=A1
B^{com}	=A	>0	=A
$B2^G$	=A1	-	=A1
$B2^{com}$	=A2	B2<B3	=A2
$B3^G$	=A1	-	=A1
$B3^{com}$	=A3	B2<B3	=A3
$B4^G$	=A1	-	=A1
$B4^{com}$	=A4	-	=A4

Table 4: Ranking of the policy regimes by deficit outcomes

Regime	Expectations anchoring (ex ante)			AS shock stabilization (ex post)		
	π^e	y^e	d^e	$\pi - \pi^e$	$y - y^e$	$d - d^e$
A	intermediate	y^N	intermediate	intermediate	intermediate	intermediate
A1	$\pi^{*,G}$ highest	y^N	$d^{*,G}$ highest	$-\frac{c\gamma_y^G}{\kappa}\varepsilon$ lowest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	0ε full
A2	π^* lowest	y^N	d^* lowest	$-\frac{c\gamma_y^M}{\varphi}\varepsilon$ highest	$\frac{\gamma_\pi^M}{\varphi}\varepsilon$ lowest	$-\frac{a\gamma_\pi^M\gamma_y^F}{\varphi\gamma_d^F}\varepsilon$ lower
A3	π^* lowest	y^N	$> d^{*,G}$ highest	$-\frac{c\gamma_y^M}{\varphi}\varepsilon$ highest	$\frac{\gamma_\pi^M}{\varphi}\varepsilon$ lowest	$-\frac{a\omega}{\varphi\gamma_d^G}\varepsilon$?
A4	$\pi^{*,G}$ highest	y^N	d^* lowest	$-\frac{c\gamma_y^G}{\kappa}\varepsilon$ lowest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	$-\frac{a\gamma_\pi^G\gamma_y^F}{\kappa\gamma_d^F}\varepsilon$ higher
B^G	dominated by A	$> y^N$	$> d^*$	$-\frac{c\gamma_y^G}{\kappa}\varepsilon$ lowest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	0ε full
B^{com}	dominated by A	$> y^N$	$> d^*$	intermediate	intermediate	intermediate
$B2^G$	dominated by A2	$> y^N$	$> d^*$	$-\frac{c\gamma_y^G}{\kappa}\varepsilon$ lowest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	0ε full
$B2^{com}$	dominated by A2	$> y^N$	$> d^*$	$-\frac{c\gamma_y^M}{\varphi}\varepsilon$ highest	$\frac{\gamma_\pi^M}{\varphi}\varepsilon$ lowest	$-\frac{a\gamma_\pi^M\gamma_y^F}{\varphi\gamma_d^F}\varepsilon$ lower
$B3^G$	dominated by A3	$> y^N$	$> d^*$	$-\frac{c\gamma_y^G}{\kappa}\varepsilon$ lowest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	0ε full
$B3^{com}$	dominated by A3	$> y^N$	$> d^*$	$-\frac{c\gamma_y^M}{\varphi}\varepsilon$ highest	$\frac{\gamma_\pi^M}{\varphi}\varepsilon$ lowest	$-\frac{a\omega}{\varphi\gamma_d^G}\varepsilon$?
$B4^G$	$\pi^{*,G}$ highest	$> y^N$	$> d^*$	$-\frac{c\gamma_y^G}{\kappa}\varepsilon$ lowest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	0ε full
$B4^{com}$	$\pi^{*,G}$ highest	$> y^N$	$> d^*$	$-\frac{c\gamma_y^M}{\varphi}\varepsilon$ highest	$\frac{\gamma_\pi^G}{\kappa}\varepsilon$ highest	$-\frac{a\gamma_\pi^G\gamma_y^F}{\kappa\gamma_d^F}\varepsilon$ higher

Table 5: Summary ranking of the policy regimes

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