

Monetary–Fiscal Interactions: How to Improve Policy Outcomes?*

Jan Libich,¹ James Savage² and Carl Walsh³

It has long been recognised that the interaction between monetary and fiscal policy may be an important determinant of the outcomes of both policies. To provide some insights into how this interaction and macroeconomic outcomes can be improved, a symposium was held at the 2010 Australian Conference of Economists. This piece summarises the discussion, with the full papers by Michal Franta, Jan Libich and Petr Stehlík; Don Brash; Carl Walsh; Jacopo Cimadomo; Stephen Kirchner; and Eric Leeper and Todd Walker appearing later in this issue.

Keywords: monetary–fiscal interactions, institutional design, commitment.

1. Introduction to the Session

There are few current policy issues as pertinent as the optimal setting of fiscal and monetary policies. A cursory view of the heated debate in the United States today, between proponents of fiscal tightening and loosening, is a case in point.

Choosing optimal fiscal and monetary policy is, however, made difficult by the fact that the tools used by governments and central banks in conducting the two policies affect many of the same (current and expected future) variables: for example, unemployment, inflation, investment sentiment or asset prices. Furthermore, not only is there a high degree of uncertainty about policy effects and interlinkages, but for many countries there is a question of whether governments and central banks agree at all on the macroeconomic outcomes to be achieved.

To contribute to the understanding of fiscal–monetary interactions, a symposium was held at the 2010 Australian Conference for Economists. It featured speeches and a round-table discussion by the following five economists (in order of appearance).⁴

Dr Jan Libich is a Senior Lecturer at School of Economics and Finance, La Trobe University, Melbourne. His recent research, supported by the Australian Research Council, examines the interactions between fiscal and monetary policies.

Dr Don Brash was Governor of the Reserve Bank of New Zealand (RBNZ) from 1988 to 2002 and the leader of the New Zealand National Party from 2003 to 2006. During his tenure at the

*Introduction to a Symposium held at the 39th Australian Conference of Economists, 27 September 2010, Sydney. The organisers Jan Libich, Andrew Hughes Hallett and Petr Stehlík would like to thank the Australian Research Council for financial support (DP 0879638), and the conference organisers, especially Prof. Lance Fisher, for kindly accommodating the session into the programme.

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⁴Professor Eric Leeper was unable to participate in the panel in person but his written contribution appears in this issue. We would also like to acknowledge the contribution to the debate of our invited guest Dr David Gruen, executive director at the Australian Treasury.

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RBNZ he presided over the world's first explicit inflation targeting regime – subsequently emulated by over two dozen countries.

Carl Walsh is Distinguished Professor in the Department of Economics at the University of California, Santa Cruz. He has published numerous influential papers as well as a leading graduate textbook on monetary policy.

Dr Jacopo Cimadomo is a researcher in the Fiscal Policies Division of the European Central Bank (ECB). His recent work has focused on estimating the effectiveness of fiscal policy in the European Monetary Union, and how it has changed over time.

Dr Stephen Kirchner is a Senior Lecturer at the School of Finance and Economics, University of Technology, Sydney. His research interest lies in the institutional design of macroeconomic policies.

Eric Leeper is Professor in the Department of Economics at Indiana University, and one of the most prolific experts on monetary–fiscal interactions. His seminal work on “active” and “passive” policies initiated a large stream of literature on the possible monetary effects of fiscal policy known as the “fiscal theory of the price level.”

The panellists discussed the monetary–fiscal interactions from several different view points – based on their own research and policy experience. We provide brief summaries of the key points made during the discussion in the following paragraphs – the full speeches appear later in this issue.

2. The Big Picture of Monetary–Fiscal Interactions – Michal Franta, Jan Libich and Petr Stehlik

It is clear that different countries have had markedly different fiscal and monetary outcomes. How are we to formally consider such different fiscal/monetary situations as Japan, the United States, Greece, Zimbabwe or Australia in a unified framework?

In his speech Jan framed the medium-term monetary–fiscal interactions as a strategic game between the central bank and the government, whose interests may or may not align. Jan identified several potential scenarios that may obtain, depending on the “type” of the government. If the government is fiscally prudent then we are likely to observe a monetary–fiscal “symbiosis” scenario, as coined by Dixit and Lambertini (2001), in which both policies produce optimal medium-run outcomes. However, if the government's finances are on an unsustainable path we are likely to observe a coordination problem and/or an outright conflict between the policies. In such cases fiscal excesses may spill over, and threaten the credibility and outcomes of monetary policy. Whether or not this happens depends on various structural and policy parameters.

Jan's primary finding is that legislated medium-term commitment of the central bank to low inflation may alter the incentives of the government, and thus have a containing effect on its spending, especially in small open economies. However, much of this effect is lost when small countries join a currency union. Jan reported some empirical evidence for these findings, contrasting the outcomes in inflation targeting countries pre- and post-adoption of the regime, and comparing them with outcomes in countries without an explicit inflation target.

3. Policy Interactions: How an Agreed Inflation Target Affects Fiscal Policy – Don Brash

To provide real-life examples of the political economy of the strategic interactions between governments and central banks, Don Brash recounted an early experience as Governor of the Reserve Bank of New Zealand. Shortly after he took up leadership of the central bank, Sir Roger Douglas, the finance minister, announced that the RBNZ would begin targeting inflation without reference to the objectives of the government (which was subsequently formalised in the RBNZ Act of 1989). Don admits that neither of them “fully appreciated the extent to which our agreement would inevitably affect fiscal policy.”

Don recounts how shortly after, in 1990, the government proposed an expansionary budget, and how he tightened monetary conditions as a consequence. He recalls an editorial in

New Zealand's largest daily newspaper observing that: "Electors are frequently bribed to their ultimate cost. This time the independence of responsible monetary control quickly exposes a fiscal fraud."⁵

This case, and the outcome of the subsequent election in which the opposition National Party won on a promise of fiscal consolidation, indicates that governments and central banks need to take into account the behaviour of the other authority in their decision-making. The 2004 and 2007 federal elections in Australia were fought on similar premises, adding weight to the argument.

4. Central Banking Independence Revisited – Carl Walsh

In his contribution, Carl first reviewed the basic argument for central bank independence as a means of dealing with the types of political pressures that many blame for excessive inflation during the 1970s and 1980s. He then focused on two questions.

First, he asked: "Is the concept of central bank independence meaningless without fiscal acquiescence?" He gave an affirmative answer for two reasons. He first reviewed the "unpleasant monetarist arithmetic" argument by Sargent and Wallace (1981). They showed that the failure of the fiscal authority to balance its intertemporal budget would mean that monetary policy could, at best, only temporarily reduce inflation. By reducing inflation now, and thereby reducing the government's revenue from the inflation tax, future inflation would have to be higher.

Carl then discussed the emphasis of the fiscal theory of the price level on the link between the real value of the government's debt and the public's expectations about future fiscal surpluses. This means that there are two equilibrium conditions that involve monetary and fiscal policy – the real demand for money must equal the real supply, and the real liabilities of the government must equal the present discounted value of future primary surpluses. Shifts in the demand for either money or the government's debt can have consequences for aggregate demand if these shifts are not appropriately accommodated.

As a second question, Carl asked: "Does central bank independence forgo potential gains from monetary and fiscal policy coordination?" In normal times, the need for such coordination is limited. In fact, monetary policy should be used to offset the macroeconomic effects of fiscal policy to ensure output and inflation stability. However, in a crisis, such coordination can become important. In the United States, the Federal Reserve has been engaging in policies with a strong fiscal element. While appropriate in a crisis, fiscal actions by a central bank can put its independence at risk. Cooperation – just as normal policy – needs to be transparent so that it is clear that actions by the central bank are consistent with its mandate and do not threaten its independence.

5. The Fiscal Stimulus and Challenges Ahead: Views on the Euro Area – Jacopo Cimadomo

Jacopo focused on fiscal developments in the euro area in the context of the global financial crisis, and presented some empirical results based on his econometric analysis on the effectiveness of fiscal stimulus measures.

He discussed the findings of his research in Kirchner *et al.* (2010) on the effectiveness of euro area fiscal policy. He presented estimates of fiscal multipliers – both short- and long-term – and how these changed over the past three decades. To do so, he used various empirical techniques including both fixed and time-varying parameter vector autoregressions estimated via Bayesian methods.

It was shown that the size of multipliers has been decreasing since the late 1980s (with the contemporaneous expenditure multiplier being around 0.5, and the long-term effect negative). When testing for the driving forces of this reduced effectiveness of fiscal policy, Jacopo showed that the responses of monetary policy may have played a role (together with other factors such as increased openness).

⁵*New Zealand Herald*, 3 August 1990.

Jacopo concluded by outlining the ECB's official proposals stated in ECB (2010) to the Van Rompuy Task Force, which was set up to reinforce economic governance in the euro area. The ECB's proposals include developing a stronger European fiscal framework that would feature an independent fiscal agency, assurance of better quality fiscal statistics and more enforceable penalties for countries that fail to comply.

6. Reforming Fiscal Responsibility Legislation – Stephen Kirchner

Stephen spoke on his idea for the re-design of fiscal rules – along the lines of the institutional changes towards independence, transparency and accountability that have occurred in monetary policy. The main motivation for fiscal rules is to limit the government's capacity to spend excessively even when it is highly tempted to do so.

His proposal, spelled out in Carling and Kirchner (2009), suggests replacing the Australian Charter of Budget Honesty with firm rules, to be put into law. It has three main pillars:

- 1 A balanced budget rule on average over the cycle. Within this rule, there could also be a more restrictive limit on the size of the budget deficit/surplus in any particular year.
- 2 A ceiling on the net government debt to gross domestic product (GDP) ratio.
- 3 A limited government rule, which would require that fiscal policy be conducted so as to maintain the size of the government at a predictable, non-increasing proportion of GDP.

The numerical parameters within these rules can be set based on the economic and political specifics of the particular country. In terms of implementation, Stephen argued for creation of a Fiscal Commission, an independent institution that would "enhance the independence, transparency and accountability of the federal budget process."

7. Fiscal Limits in Advanced Economies – Eric Leeper and Todd Walker

Eric Leeper and Todd Walker's article constitutes a valuable contribution across several dimensions. First, it summarises and discusses the observed and predicted fiscal imbalances in developed countries. The data speak clearly: the fiscal stance in most developed countries is unsustainable, and significant policy adjustments are required to improve the situation.

Second, the article provides a much needed survey of the literature on monetary–fiscal interactions in the presence of fiscal stress. In doing so, Eric and Todd highlight the structural differences between advanced and emerging economies, pointing out that these "may limit applying insights from the emerging markets literature to the problems that advanced economies face." Because of that, the authors emphasise the value of economic theory: there simply exist too few relevant data points for econometric analyses to offer conclusive answers.

Third, the authors develop a simple model that is a good reference point for their survey, and surprisingly powerful in demonstrating the key insights. For example, it shows how the probability of the passive monetary/active fiscal policy regime determines whether expected inflation converges to target or drifts from target, and how conservative monetary policy can have counter-intuitive effects on inflation expectations.

Fourth, the authors set up a research agenda regarding the effects of fiscal stress to better inform real-world policy decisions. They discuss in detail four main areas of interest: (i) identifying policy behaviour; (ii) quantifying fiscal limits; (iii) integrating heterogeneity and policy uncertainty; and (iv) anchoring fiscal expectations appropriately so that monetary policy can control inflation.

The importance of such research is evident – as the authors argue: "Policy decisions will be made, even in a research void. The time to fill that void is now."

8. Conclusions

History teaches us that poor fiscal and monetary policies can heighten the risk of crises and hinder prosperity; for an extensive account see, for example, Reinhart and Rogoff (2009). The round-table discussion highlighted the importance of understanding the *interactions* between the two policies, and their consequences for the outcomes of both policies.

Most importantly, the contributions emphasised the need for “institutionalising” good policies through transparent and accounted for legislated rules. This is to ensure that the policy-makers’ actions are predictable, and their incentives are correctly aligned with public interest. As argued by Douglass North,⁶ “Institutions form the incentive structure of a society, and the political and economic institutions, in consequence, are the underlying determinants of economic performance.”

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⁶From the Nobel Prize lecture, Stockholm, 9 December 1993.

The Big Picture of Monetary–Fiscal Interactions*

Michal Franta,¹ Jan Libich² and Petr Stehlík³

The paper offers a schematic game theoretic approach to thinking about medium-term strategic interactions between monetary and fiscal policy. We show that under some circumstances fiscal excesses may spill over to monetary policy, but a legislated commitment to a numerical inflation target can sometimes prevent this through providing the central bank with ammunition to counter-act excessive fiscal actions. As such, a more explicit monetary commitment may have a ‘disciplining effect’ on fiscal policy, and improve fiscal outcomes as well as monetary outcomes. We present some empirical evidence for this finding.

Keywords: fiscal-monetary policy interaction, commitment, inflation targeting.

1. Introduction

Many countries face an era of substantial fiscal stress. Will it spill over and cause monetary stress too? We offer a schematic way of thinking about such fiscal–monetary interactions, focusing on medium–long-term scenarios and outcomes.⁴

As the policy interactions are strategic in nature, we will use standard game-theoretic tools for that purpose. An advantage of such approach is to be able to examine the effect of policy *commitment*. We show that under some (but not all) circumstances, a stronger long-term monetary commitment may avoid undesirable spillovers from fiscal policy.

Interestingly, monetary commitment may also be able to indirectly discipline the government, that is, improve fiscal outcomes as well as monetary outcomes. This is through a credible threat from the central bank of a tug-of-war between the two policies. We conclude by showing that this prediction is supported by data: adoption of numerical inflation targets did seem to have such a disciplining effect.

2. Game-Theoretic Representation

Consider two medium-run options for each policy: *discipline*, D , delivering the socially optimal levels on average, and *indiscipline*, I , delivering some discretionary but socially inferior levels. In terms

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⁴Fiscal excesses are not a recent phenomenon. See, for example, IMF (2009) that estimates the contribution of the global financial crisis to the observed fiscal stress to be only 10.8 per cent of the contribution of ageing-related spending in G20 countries.

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of monetary policy, the natural interpretation of D is achieving a low inflation target on average over the business cycle, and I represents the target's over-shooting on average. In regards to fiscal policy, D and I can be interpreted as running, on average over the medium term, a balanced budget vs a structural deficit. Importantly, the fiscal balance measure includes intertemporal considerations (such as ageing populations) as well as the expected value of non-standard potential future outlays (such as those arising from guarantees for financial institutions).⁵

The payoff matrix in Equation (1) summarises the game using a 2×2 game-theoretic representation. The policy-makers are denoted by M and F respectively, and their payoffs $\{a, b, c, d, w, x, y, z\}$ are functions of the deep parameters of the underlying macroeconomic model.⁶

		F	
		D	I
M	D	a, w	b, x
	I	c, y	d, z

(1)

The outcomes of the game are determined by the exact payoffs. What are the scenarios that obtain in real world countries, and under what circumstances? Arguably, that depends on the type of policy-makers as well as various characteristics of the economy.

3. Possible Scenarios

Let us categorise the policy-makers into two types: “responsible” and “ambitious.” Responsible policy-makers can be defined as preferring the socially optimal (D, D) outcome, that is, $a > \max\{b, c, d\}$ and $w > \max\{x, y, z\}$. In contrast, ambitious policy-makers prefer one of the three remaining socially inferior outcomes, (I, I) , (D, I) or (I, D) . Figures 1 and 2 summarise the outcomes and describe various scenarios of interest (the list is obviously not exhaustive).

Let us focus on the case receiving most attention in the literature, media and financial markets, namely a responsible central bank facing an ambitious government. Intuitively, to secure votes, the government prefers to spend excessively or avoid necessary welfare/health/pension reforms, and would like the central bank to reduce the resulting debt through inflation. Whether the central bank will do so depends on its payoff d relative to b .

In the *tug-of-war* scenario, in which (D, I) is the unique Nash equilibrium, the central bank resists fiscal pressures, and fiscal excesses will not spill over to monetary policy in the medium-run.⁷ In the *Neglect* scenario, the opposite is the case: fiscal–monetary spillovers will surely occur as (I, I) is the unique Nash equilibrium. In the *Battle* scenario, such spillovers may or may not eventuate, and interestingly the outcome of fiscal policy itself is ambiguous. This is because there are two (potentially fully symmetric) pure Nash equilibria: (D, D) and (I, I) .

In the *Battle* scenario, there exist both a coordination problem (to avoid the inferior mixed Nash) and a policy conflict (to secure its preferred pure Nash: (D, D) for the central bank and (I, I) for the government). We will focus on this scenario given that a large body of interaction models following Sargent and Wallace (1981) has these two features, for example, Adam and Billi (2008), Branch

⁵Iceland and Ireland are prime examples of how important it is to incorporate the latter component of fiscal policy. As Kotlikoff (2006) and many others have argued, making inferences solely based on the current budget position may lead to serious underestimates of potential fiscal problems.

⁶Libich *et al.* (2010a) lay out a simple macro model and show how analytically tractable macro models of policy interaction can be mapped into such a 2×2 game using the approach of Cho and Matsui (2005).

⁷Let us note that the (D, I) outcome cannot obtain in the (very) long-run when the government's intertemporal budget constraint has to hold. For this reason, our analysis should be interpreted as the medium-run, which is free of cyclical considerations, but in which the budget constraint is not “fully binding.” For an example of an economy temporarily reaching a situation with unsustainable macroeconomic policies, see Davig and Leeper (2011). See also Davig *et al.* (2010) who examine whether, once the economy is nearing the fiscal limit, the (D, I) outcome will be replaced by (I, I) , or (I, D) , or some combination of the two.

Central bank/government	Responsible	Ambitious
Responsible	Symbiosis Pure coordination	Tug-of-war Battle of the sexes Neglect
Ambitious	...	Game of chicken Prisoner's dilemma Battle of the sexes Neglect

Figure 1. Scenarios Under Various Types of Policy-makers

Scenario	Pure Nash	Mixed Nash	Coordination problem	Policy conflict	Socially optimal outcomes
Symbiosis	(D, D)	No	No	No	Yes
Pure coordination	$(D, D), (I, I)$	Yes	Yes	No	Likely
Battle of the sexes	$(D, D), (I, I)$	Yes	Yes	Yes	Uncertain
Game of chicken	$(D, I), (I, D)$	Yes	Yes	Yes	At most one policy
Tug-of-war	(D, I)	No	No	Yes	Only M policy
Prisoner's dilemma	(I, I)	No	Yes	No	No
Neglect	(I, I)	No	No	No	No

Figure 2. Description of Possible Scenarios

et al. (2008), Resende and Rebei (2008), Hughes Hallett and Libich (2007), Benhabib and Eusepi (2005), Dixit and Lambertini (2003, 2001), Blake and Weale (1998), Nordhaus (1994), Sims (1994), Woodford (1994), Leeper (1991), Wyplosz (1991), Petit (1989) and Alesina and Tabellini (1987).

3.1 Commitment

There are two ways of thinking about (long-term) policy commitment in our framework. First, commitment can be modelled as a punishment for deviating from the socially optimal action, and as such it would reduce the players' payoffs from playing I . This corresponds to the Walsh's (1995) channel, and may lead to a change of policy outcomes within a given scenario, or to a change of the scenario itself.

Second, commitment can be modelled as a change in the rules of the game without necessarily changing the payoffs of each strategy profile. Most commonly, this has been performed by implementing Stackelberg leadership of one player, as in the Sargent and Wallace's (1981) literature.⁸

The *Battle* scenario is the most interesting one from this "institutional" point of view as policy commitment (leadership) alters the set of equilibria. If the central bank is the Stackelberg leader, then its preferred (D, D) outcome obtains, the intuition of which is comparable to the dominant monetary policy in Sargent and Wallace (1981), active fiscal/passive monetary policy in Leeper (1991) or a Ricardian regime in Woodford (1995). In contrast, under the government's leadership, its preferred (I, I) uniquely obtains, which can be roughly related to the dominant fiscal regime in Sargent and Wallace (1981), accommodating monetary policy in Sims (1988), active monetary/passive fiscal policy in Leeper (1991) or a non-Ricardian regime in Woodford (1995).⁹

⁸Let us note that the timeless perspective type of commitment is not applicable here as it focuses on short-run stabilisation and biases, not medium/long-run levels.

⁹Our companion game-theoretic work refines and partly qualifies these standard conclusions by generalising the commitment concept from static to dynamic. It offers frameworks that allow the players to commit to their actions for different periods of time, and/or with different probability distributions, which leads to an asynchronous game (with deterministic timing: Libich and Stehlik, 2010, or stochastic timing: Basov *et al.*, 2010).

4. Testable Hypotheses and Empirical Assessment

The *Battle* scenario has two main testable predictions about the effect of legislating a stronger monetary commitment – commonly implemented as an explicit numerical target for average inflation.

Prediction 1: Stronger monetary commitment may lead to an improvement in monetary outcomes: lower and/or less variable inflation, and higher policy credibility.

Prediction 2: Stronger monetary commitment may be able to discipline fiscal policy. This is because the government realises that a strongly committed central bank will not accommodate excessive fiscal spending, and is willing to engage in a policy conflict by strongly counter-acting fiscal actions and tightening monetary conditions. This reduces the government's payoff from engaging in such excessive actions, and provides strong incentives for improving fiscal balances towards long-term sustainability.¹⁰

It is important to note that both predictions (i) refer to medium-term averages, not short-run stabilisation outcomes, and (ii) obtain under some – but not all – circumstances. For example, if we only consider commitment through Stackelberg leadership, that is, changes of outcomes within a given scenario, then the prediction may only apply in the *Battle* or *Pure coordination* scenario, and only if the socially optimal outcome (*D,D*) does not obtain initially.

Under other scenarios, monetary leadership will not alter monetary outcomes. Therefore, the predictions are *not* equivalent to the statement that adoption of explicit inflation targeting (EIT) necessarily improves monetary and fiscal outcomes. In empirical testing, the exact nature of the claim has to be taken into account, and guide the selection of countries and sample periods.

4.1 Prediction 1: Monetary Commitment May Discipline Monetary Policy

Unfortunately, the literature assessing the effects of EIT on the level and variability of inflation has not commonly accounted for these issues, and therefore has not reached a consensus.

Our analysis implies that: (i) papers only including industrial countries are likely to find weak or insignificant effects of EIT on inflation and its volatility (Ball and Sheridan, 2005; Willard, 2006), whereas (ii) papers with larger samples including emerging and developing countries are likely to find strong and significant effects (e.g. Corbo *et al.*, 2001; Neyapti, 2009; Fang and Miller, 2010).

Furthermore, in line with the prediction of our model, inflation has been found negatively correlated with two common proxies for monetary commitment: accountability (Briault *et al.*, 1997) and transparency (Fry *et al.*, 2000; Chortareas *et al.*, 2002). See also Debelle (1997) who finds EIT to increase the monetary policy's credibility. All these papers include either pre-1980 inflation data and/or developing countries. In contrast, papers that only focus on industrial countries and use post-1990 data often find no correlation between transparency and inflation, see, for example, Eijffinger and Geraats (2006).

4.2. Prediction 2: Monetary Commitment May Discipline Fiscal Policy

Our companion work in progress attempts to test the hypothesis that stronger monetary commitment may also indirectly improve the outcomes of fiscal policy. Focusing on industrial countries, we (i) compare policy behaviour and macroeconomic outcomes of five early adopters of an explicit inflation target (New Zealand, Canada, United Kingdom, Sweden and Australia) pre- and post-

¹⁰Libich *et al.* (2010b), however, show formally that such disciplining may be ineffective in a monetary union. Intuitively, a small country's fiscal mismanagement only has a negligible effect on the average inflation outcomes of the union, and hence the muted response of the common central bank will not provide a sufficiently strong punishment to that country – especially if it ignores the negative externalities it imposes on other members. The behaviour of Greece after joining the European Monetary Union seems an example of this.

adoption of the regime, and (ii) contrast these with outcomes in the main non-EIT (United States, Switzerland and Japan).¹¹

As a starting point, it is illustrative to examine the behaviour of central government debt to GDP ratio, reported in Figure 3 separately for the two groups of countries. In all five depicted EIT countries, there was a reduction in government debt starting about one to three years after the adoption of the regime (in the case of the United Kingdom, after the subsequent granting of central bank instrument independence – which is a prerequisite of the EIT regime). On the other hand, the non-EIT countries have either experienced little change in the ratio since the early 1990s (United States and Switzerland), or an increase (Japan). Although these findings are consistent with the disciplining effect discussed above, it should be stressed that they do not constitute evidence of causality.

To capture finer details of the monetary–fiscal interactions and the role of monetary policy commitment, we set up a structural vector autoregression (SVAR) model and estimate it using Bayesian techniques.¹² Drawing on the literature that deals with the identification of fiscal policy shocks within SVAR models, the model includes the main variables through which monetary and fiscal authority interact: government expenditures, output, private consumption, monetary policy rate and central government debt.

The following table reports the posterior means of the standard deviation of structural shocks (identified using Cholesky decomposition).¹³ The table suggests that the volatility of monetary policy shocks, as well as the volatility of government debt shocks have decreased substantially in EIT countries after adoption of the regime, and to a larger extent than in non-EIT countries.

Means for the groups/periods	Government spending	Policy interest rate	Government debt
EIT: 1980-adoption	0.008	1.509	0.025
EIT: adoption-2008	0.006	0.357	0.017
Non-EIT: 1980–1992	0.008	0.820	0.014
Non-EIT: 1993–2008	0.007	0.353 ¹⁴	0.013

Let us now focus on the impulse responses of the monetary policy rate to unexpected government spending and debt shock respectively. Our results show that introduction of EIT commonly led to a change in the direction of the central bank’s responses: in each of the five EIT countries post-adoption there is less accommodating behaviour by the central bank to the government spending shock and/or the debt shock. The central banks either does not react at all or tries to offset fiscal shocks. In case of non-EIT countries, the changes are mainly in the opposite direction towards a more accommodative policy. In the later period, in all three non-EIT countries, the monetary authority accommodates either the government spending shock or the debt shock.¹⁵

¹¹The sample selection is driven by data availability and need for a heterogenous sample. It follows the sample choice of inflation targeters by Dotsey (2006) – see his paper for further justification. Nevertheless, due to such small sample, the findings should only be taken as indicative rather than conclusive.

¹²We will below report some results for the baseline specification with fixed parameters, but the time-varying parameters VAR (vector autoregression) produces similar results. The reader should, however, keep in mind the potential shortcomings expressed in Leeper *et al.* (2009).

¹³Data are expressed in log of real per capita terms (except the interest rate which is in levels).

¹⁴Japan is excluded from this mean as it had near-zero rates for most of the period (if included, the non-EIT mean is 0.278).

¹⁵It should, however, be noted that there are instances in which the direction of change is the opposite in the two groups. For example, there is some evidence of increased monetary accommodation in the post-adoption period in the United Kingdom, and decreased accommodation of government debt shocks in the United States.

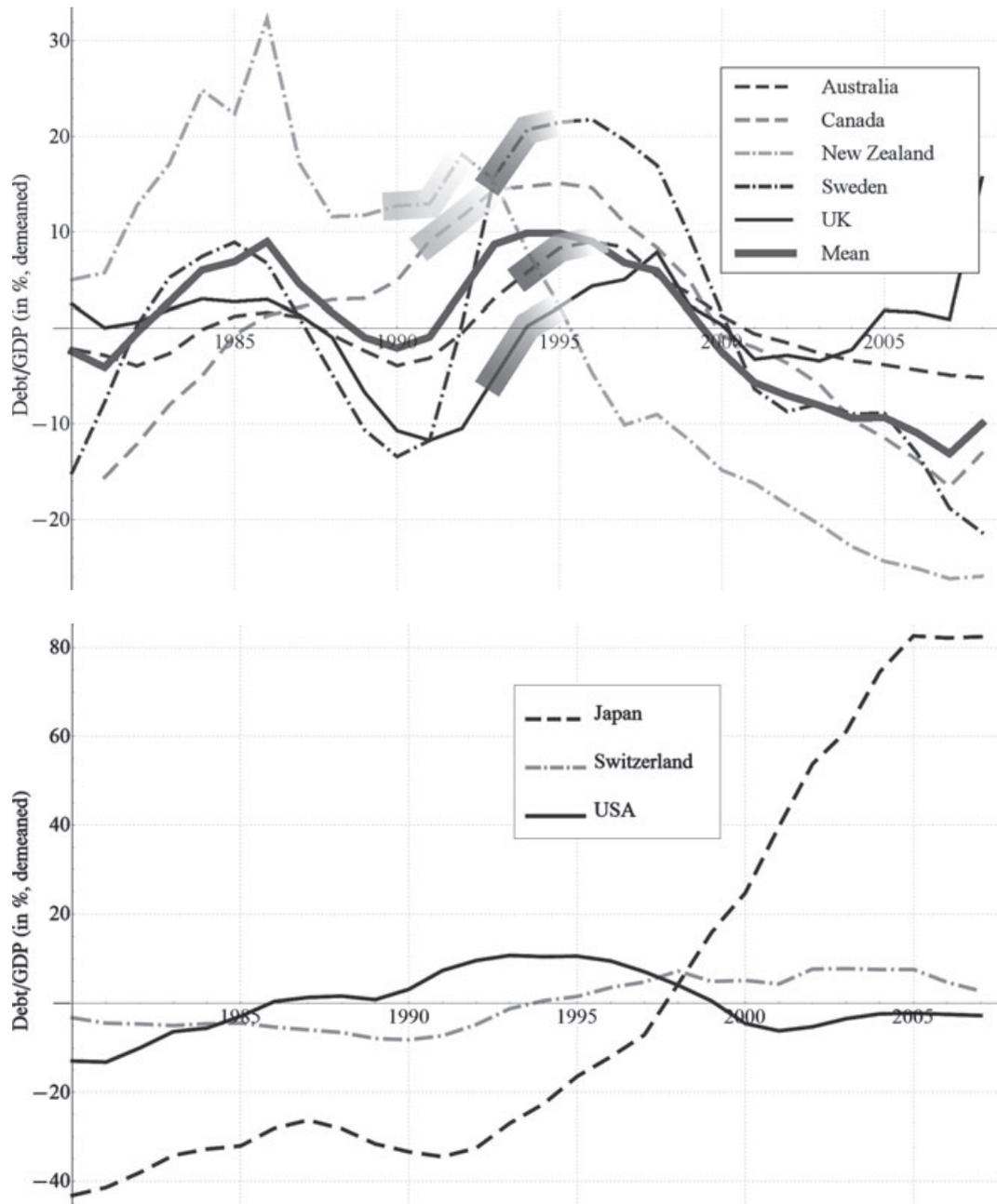


Figure 3. Evolution of the Government Debt to GDP Ratio (in Per Cent, Demeaned) in EIT Countries (Top) and Non-EIT Countries (Bottom)

Note: The start of the shaded area indicates the regime's adoption.

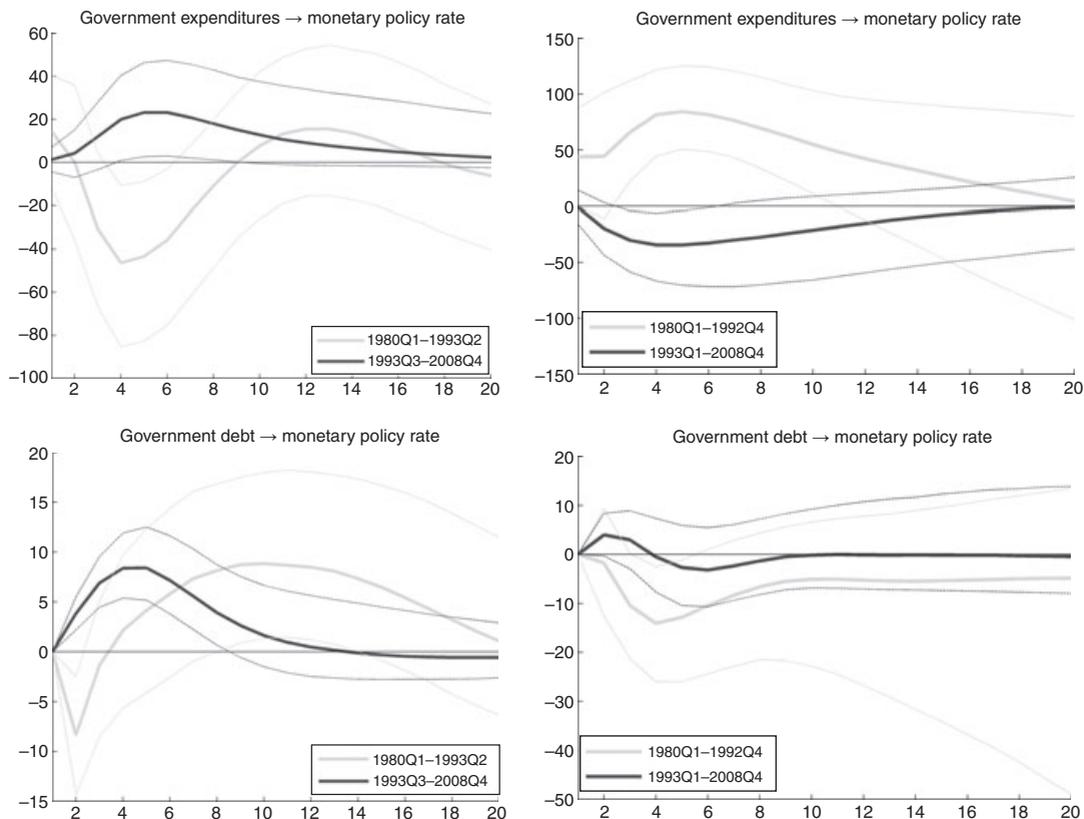


Figure 4. The Effect of a Government Spending Shock (Top) and Government Debt Shock (Bottom) on the Policy Interest Rate Over Twenty Quarters: Australia (Left) and Switzerland (Right)

As an example, Figure 4 presents median and middle 68 per cent of the distribution of impulse responses for Australia (EIT) and Switzerland (non-EIT). Note that because the shock is normalised to enable the comparison between the two periods, the numbers on the vertical axis are not directly interpretable as changes in the monetary policy rate.

The figure shows that, in Australia, accommodative approach of the central bank changed post-adoption of EIT to one in which shocks to both government spending and debt are strongly offset. The developments in Switzerland have been the opposite for government spending shocks.

5. Other Institutional Remedies and Short-Run Considerations

The above discussion stressed that although monetary commitment (leadership) may discipline fiscal under some circumstances, in some scenarios the monetary threat of policy conflict is insufficient to discourage the government from excessive spending and avoiding necessary fiscal reforms. In such cases, direct fiscal commitment is required to ensure medium-term fiscal discipline. Although many proposals have been made, only a handful of countries have legislated explicit fiscal rules to that effect – for a discussion, see Libich *et al.* (2010b).

It should, however, be emphasised that even if medium-run discipline is achieved for both policies, and long-term expectations of monetary and fiscal outcomes are thus anchored, expectations

of short-term stabilisation still matter in an important way. This has long been recognised, and the trend in monetary policy-making of publishing forecasts and communicating policy intentions and explanations more effectively has been driven by this need. As Leeper (2010) convincingly argues, fiscal policy should follow in these footsteps.

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Monetary and Fiscal Policy: How an Agreed Inflation Target Affects Fiscal Policy

Donald Brash¹

When the 1989 legislation was passed giving the Reserve Bank of New Zealand a high degree of operational independence, with an overriding responsibility for achieving and maintaining stability in the general level of prices, the extent to which this would inevitably drive change in fiscal policy was not widely understood. It wasn't long before the Government realised the inevitable inter-relationship.

Keywords: monetary policy, fiscal policy, Reserve Bank of New Zealand.

Mr Chairman, I am honoured to be taking part on this panel in the company of such distinguished economists. I particularly want to pay tribute to Dr Jan Libich, who has done such important work in this whole area of the interaction between monetary and fiscal policy. He and I first had contact when I was Governor of the Reserve Bank of New Zealand and he was doing research on inflation targeting. We met when I was the Leader of the Opposition in the New Zealand Parliament. And we now share a link to La Trobe University, where I am an Adjunct Professor.

When the Reserve Bank of New Zealand Act was passed in 1989, I doubt if anybody fully understood how it would impact on fiscal policy. The focus was on monetary policy, and getting inflation under control.

New Zealand had had relatively high inflation throughout the 1970s and early 1980s. A new (Labour) Government had won election in 1984 amidst a serious balance of payments crisis and with strong inflationary pressures barely kept in check by tight controls on prices, wages, dividends, rents and interest rates. The new Minister of Finance, Roger Douglas, was determined to deal with the underlying imbalances in the economy and, in so doing, reduce inflation to very low levels.

The central bank, like central banks in most countries at the time, was totally beholden to the political process. The Bank gave the Minister of Finance *advice* on monetary policy, but the *decisions* were made by the Minister. And the result had been not only relatively high inflation but also a pronounced cyclicity of policy – with a cycle that bore a strange resemblance to the three-yearly election cycle. The government ran large fiscal deficits, and there was no discernible connection between fiscal policy and monetary policy. If an election were imminent, both fiscal policy and monetary policy seemed primarily geared to securing the re-election of the governing party.

The 1989 Reserve Bank Act changed that. The Act required monetary policy to “achieve and maintain stability in the general level of prices.” There was no reference to output, employment, the balance of payments or, of course, fiscal policy.

But the Act did require that what was *meant* by “stability in the general level of prices” should be agreed between the Minister of Finance on behalf of the Government and the Governor of the Bank, and, importantly, that that agreement should be made public.

In February 1990, I signed an agreement with the Minister of Finance to deliver twelve-monthly inflation as measured by the CPI of between 0 and 2 per cent by the end of 1992. I had been given

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JEL classifications: E02, E58

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complete independence by the 1989 Act to run monetary policy without reference to the government, and I was to be held to account for achieving the agreed inflation objective. I am not sure that even then either the Minister or I fully appreciated the extent to which our agreement would inevitably affect fiscal policy.

In the middle of 1990, just six months away from a general election, the Minister of Finance brought down his annual budget. Not surprisingly, politics being what it is, the budget was expansionary, and seen as such by financial markets. There was concern about this loosening of fiscal policy, and this was reflected in both a rise in long-term interest rates and a fall in the exchange rate.

In the Bank, we judged that the combination of easier fiscal policy and lower exchange rate would be stimulatory – and stimulatory to the point where our ability to deliver the *agreed* inflation target by the end of 1992 was in jeopardy. So we responded by tightening monetary policy (just a few months prior to the general election it should be noted – nothing quite like it had happened in New Zealand history before).

Immediately, an editorial in New Zealand's largest daily paper, the *New Zealand Herald*, noted that the Budget had "rekindled inflationary expectations. The (Reserve Bank) was bound to lift interest rates Electors are frequently bribed to their ultimate cost. This time the independence of responsible monetary control quickly exposes a fiscal fraud."²

The main Opposition party campaigned in the election on a commitment to get interest rates reduced, but there was no suggestion that they would do this by removing the instrument independence of the Reserve Bank. On the contrary, the 1989 Reserve Bank Act had been passed into law less than a year earlier with the full support of the Opposition (or at least, no Member of Parliament voted against it, perhaps because Sir Robert Muldoon, who had been responsible for much of the high inflation of the late 1970s and early 1980s, was in hospital at the time!).

No, the Opposition claimed that they would get interest rates down not by leaning on the central bank but by "giving monetary policy some mates," through tighter fiscal policy and deregulation of the labour market.

Following the late 1990 election, which resulted in the Opposition winning the Treasury benches, the new Government did exactly that, embarking on a substantial programme of fiscal consolidation and a considerable liberalisation of the labour market. By 1994, the budget was in surplus for the first time in decades (the result both of one very determined Minister of Finance and of the Fiscal Responsibility Act that she promoted), inflation was within the agreed target range, the economy was growing strongly and ten-year New Zealand government New Zealand dollar bonds were, briefly at least, yielding less than US Treasuries!

A few years later, with several years of fiscal surplus behind it, the Government undertook to reduce income taxes subject to three conditions being met: one was that the target level for gross sovereign debt would not be threatened, one was that the budget would remain in surplus after the tax reductions and one was that the Reserve Bank would not regard the proposed tax cuts as requiring a significant tightening of monetary policy. The Minister of Finance formally wrote to me at the time to seek confirmation that the tax reductions would not require a significant tightening and, given the outlook for inflation at the time, I was able to give him that.

Roll forward ten years to the middle part of the most recent decade. I was no longer Governor. I was in Parliament, but unfortunately (for me) the Leader of the Opposition and not the Prime Minister! The government was running a fiscal surplus but the economy was running at full capacity – arguably at somewhat above full capacity – and government spending was increasing strongly. The Governor tightened monetary policy repeatedly to the point where, by mid-2007, New Zealand had one of the highest policy interest rates in the developed world (8.25 per cent).

Was this designed to discipline fiscal policy? Not directly, but it was a good illustration that the stance of fiscal policy inevitably has consequences for the stance of monetary policy, and indeed the Governor made it clear in a number of public statements that one of the reasons why he had had to tighten policy was the substantial stimulus arising from the strong growth in

²*New Zealand Herald*, 3 August 1990.

government spending, growth that inevitably had implications for pressure on resource utilisation and inflation.

There is inevitable interaction between monetary and fiscal policy. The nature of that interaction will depend on a number of factors, but crucially on what kind of pre-commitment the monetary authority makes to keeping inflation under control. Any kind of explicit inflation target will have a bearing on fiscal policy because both monetary and fiscal policy inevitably have some effect on resource use and therefore on inflation.

Where the inflation target is agreed between government and central bank, as in the New Zealand case – and of course also now in the Australian, Canadian and UK cases – that link between monetary and fiscal policy becomes much tighter.

Some central bankers are very dubious about allowing governments any role in determining, or even influencing, the goal of monetary policy. I disagree. I think giving governments an explicit role in agreeing the *goal* of monetary policy is highly desirable. This is partly because once the government has agreed the inflation target with the central bank – *and made that target public* – the central bank is almost entirely protected from political attack provided that the inflation rate is, and is likely to remain, within the agreed target.

But the other major advantage in having the government and central bank formally agree on the inflation target is that it really does mean that the government is forced to take the inflation target into account as it determines its fiscal policy – because it knows that any major change in the stance of fiscal policy must inevitably trigger a response from the monetary authority.

And because most governments are constantly suffering from the temptation to run a more stimulatory fiscal policy, knowing that that may provoke a tighter-than-otherwise monetary policy is a most useful constraint.

I have not the slightest doubt that having legislation which requires government and central bank to formally agree, and disclose to the public, the inflation rate which the central bank must target has a most useful role in creating strong incentives for good fiscal policy.

I am not arguing of course that without an agreed inflation target fiscal policy is inevitably irresponsible – there are plenty of examples of governments adopting a prudent fiscal policy without any pressure from an inflation target. Indeed, even in New Zealand much of the reduction in the primary fiscal deficit in the late 1980s occurred prior to the passage of the 1989 Reserve Bank legislation (although after the Minister of Finance had made it very clear to the Reserve Bank that getting inflation down to very low levels was to be the focus of monetary policy).

Moreover, even with an agreed inflation target, there is no guarantee that fiscal policy will be optimal. Over the middle part of the last decade, as already noted, government spending in New Zealand increased strongly – and the Government simply accepted the tightening of monetary policy which was a consequence of that.

Nor is there any guarantee that the central bank will always react correctly to developments in fiscal policy. In the mid-1990s, after the Bank advised the Minister of Finance that his proposed tax cuts should not require a significant tightening of monetary policy, it turned out that inflationary pressures were stronger than we judged likely when approval for the tax cuts was given, with the consequence that monetary policy did in fact need to be tightened somewhat.

What I am saying, however, is that having an inflation target agreed between government and central bank is, on balance, a positive influence on fiscal policy, and I strongly favour such a framework for monetary policy.

And I say that despite the concerns of those who argue that an inflation target of any kind, and especially one which is the product of a formal agreement between government and central bank, creates a strait jacket for monetary policy which is a net negative. I doubt if anybody who has actually been the Governor of an inflation targeting central bank would agree. An inflation target is only a strait jacket if it is badly designed. All those with which I am familiar allow for monetary policy to respond flexibly and predictably to exogenous shocks, be those shocks violent movements in international oil prices, natural calamities or some other price shock having little or nothing to do with fiscal or monetary policy.

Central Bank Independence Revisited

Carl E. Walsh¹

The recent financial crisis has drawn attention to the interactions between monetary and fiscal policies and their potential implications for central bank independence. I focus on aspects of these interactions. First, is central bank independence meaningless with fiscal acquiescence? And does central bank independence threatens potential gains from monetary and fiscal policy coordination?

Keywords: central bank independence, monetary policy.

1. Introduction

Twenty years ago, the Reserve Bank of New Zealand Act of 1989 launched an era of central bank reforms that generally had two dimensions. First, the objectives of monetary policy were clarified, usually through the adoption of inflation targeting. Second, the relationship between the central bank and the fiscal authority was altered to give more operational independence to the central bank. Both aspects of reform were clear in the case of the Reserve Bank of New Zealand; during the 1990s, the Reserve Bank of Australia also clarified its policy objectives by adopting inflation targeting, and the bank has, in joint statements with the government, most recently in December 2007, made clear its independence to conduct policy in ways consistent with achieving its objectives.

This combination of clear objectives and operational independence was designed to address the failings of monetary policy during the previous two decades when inflation rates in many countries had been allowed to rise to undesirable levels. The intellectual and empirical victory of Milton Friedman's argument that the long-run Phillips curve was vertical and that sustained inflation was ultimately a monetary phenomenon provided the underpinnings for establishing policy frameworks in which achieving low average inflation was the primary task of a central bank.

But while central banks could control inflation, they had failed to do so in the 1970s. A common explanation for high inflation, at least in the academic literature, drew on the insights of Kydland and Prescott (1977) concerning the time inconsistency of optimal commitment policies.² This diagnosis leads naturally to an examination of the incentives faced by policy-makers and a search

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²An influential approach to dealing with the inflation bias was provided by Rogoff (1985) who showed that a central banker who valued inflation stability more than society as a whole could lead to improved outcomes. While he assumed the central bank was given complete independence, Lohmann (1992) showed how outcomes could be further improved if the government overrode the central bank in the face of extreme shocks. For surveys of the inflation bias problem, see Persson and Tabellini (1990), Cukierman (1992) or Walsh (2010, chapter 7). For the question of whether the Reserve Bank Act was an optimal contract, see Walsh (1995a,b), while central bank independence is discussed in Walsh (2008).

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for institutional structures that might support or mimic the outcomes that would be achieved under commitment. Getting incentives right could take the form of making clear what the objectives of the central bank were supposed to be, and then ensuring that central banks had the tools to achieve those objectives.

If one source of perverse incentives came from political pressures, often related to the desire for short-run expansions timed to coincide with elections, a need to finance budget deficits or simply a wish by central bankers to be reappointed, then insulation from the political process, protection against pressures to monetise deficits and long terms in office for central bank officials were all designed to overcome the problems that had been associated with discretionary policy-making. And empirical work provided support for a negative relationship between average inflation and the degree of independence enjoyed by a country's central bank (Bade and Parkin, 1984; Cukierman, 1992; Alesina and Summers, 1993).

Central bank independence was often criticised as inconsistent with democratic accountability. This was not an issue in countries such as Australia, New Zealand, Canada and the United Kingdom (all early adopters of inflation targeting) in which the inflation target was either set by the elected government or jointly negotiated by the central bank and the elected government. It was, and possibly still is, an issue with central banks such as the European Central Bank (ECB), as the ECB can translate its formal mandate (price-level stability) into operational terms (inflation below but near 2 per cent) and has only a weak system of accountability.

2. Independence and the Fiscal Dimension

Almost all discussions of central bank independence took for granted the assumption that a suitably independent central bank could achieve its inflation targets. However, monetary policy independence requires fiscal cooperation – one cannot take it for granted that an independent central bank will be able to control inflation unless certain fiscal preconditions are satisfied. Because many central banks over the past two years have engaged in policies that have clear fiscal dimensions, there is a need to re-examine the fiscal conditions supporting central bank independence and to ask whether the arguments in support of such independence still apply.

I will focus on two distinct questions relevant for considering central bank independence and fiscal policy. First, is the concept of central bank independence meaningless without fiscal acquiescence? And second, does central bank independence forgo potential gains from monetary and fiscal policy coordination?

3. Is the Entire Concept of Central Bank Independence Meaningless Without Fiscal Acquiescence?

The answer to the first question is surely yes. Without fiscal acceptance of the goals of low and stable inflation, the central bank will ultimately fail, regardless of its supposed degree of operational independence.

Sargent and Wallace (1981) long ago reminded us that a fiscal policy that fails to set the present discounted value of primary fiscal surpluses at a level consistent with intertemporal budget balance forces the central bank to generate the seigniorage necessary to balance the budget. The central bank can reduce inflation, and potentially keep it low for an extended period, but low inflation today will simply require higher inflation in the future. At best, a central bank's ability to maintain low inflation is temporary – ultimately, fiscal insolvency will force the central bank to finance a primary deficit.

Or, as Ben Bernanke (2005) has expressed it, “No monetary-policy regime, including inflation targeting, will succeed in reducing inflation permanently in the face of unsustainable fiscal policies... .”

More recently, proponents of the fiscal theory of the price level argue that the price level must ensure the real value of the government's liabilities are equal to the public's expectations of the present real value of future surpluses including seigniorage.³ Essentially, there are two separate

³For recent discussions, see Cochrane (2010) and Leeper (2010).

equilibrium conditions that must be satisfied at the macro level. First, the real demand for money must equal the real supply of money. Second, a valuation equation for government debt requires that the real value of government liabilities equal the expected present real value of the consolidated government's surpluses.

While the first condition has disappeared from explicit view in most policy models, it still remains in the background and must be satisfied in equilibrium. It is the one we often use when we discuss monetary policy and inflation determination. In standard analysis, the fiscal authority always ensures the second condition is satisfied. If the government increases spending now, it must plan to either reduce future spending or raise current or future taxes.

However, shifts in the demand for money or for debt, if not accommodated, will affect aggregate demand and inflation. For example, if the government increases spending and is not expected to either raise taxes or reduce future spending, the value of the government's outstanding liabilities must fall. This decline forces an adjustment of prices and aggregate spending until the real value of outstanding nominal debt is reduced. This is similar to the adjustment associated with a fall in the demand for money – if the money supply is not reduced, prices eventually rise to reduce the real supply to align with the lower real demand.

So the political economy question is: Who ensures that fluctuations in the demand for either debt or money do not spill over to affect the real economy?

The consequences of failing to respond to such shifts can be severe. In the United States, the monetary errors of the Great Depression arose from a failure to accommodate the rise in real money demand associated with bank failures and financial collapse. The Great Recession has seen a flight to safe government debt, and this needs to be accommodated by an increased supply of debt. This may require fiscal authorities to behave in ways that are far from normal. As Chris Sims (2000, p. 969) has put it, in a crisis, "... fiscal policy must be seen *not* to be committed to conventional prescriptions for good fiscal policy" (italics in original).

4. Are Potential Gains from Policy Coordination Forgone with Central Bank Independence?

The literature on central bank independence focused on the benefits of independence – central bank independence almost had the flavour of a free lunch. However, potential costs can arise if an independent central bank is reluctant to coordinate policies with the fiscal authority. In normal times, the central bank should actively adjust policy to neutralise the effects of fiscal shifts on aggregate demand and inflation. In a crisis, cooperation may be necessary to ensure fiscal expansion in a crisis is successful (Cochrane, 2010). Monetary independence need not preclude cooperation, but an independent yet insecure institution might feel reluctant to cooperate for fear that its independence would be called into question.

If a modern financial crisis reflects a flight to government debt, then preventing deflation requires an increase in the supply of government debt – an increase in current and expected future deficits at the current price level. If the Treasury fails to accommodate this increase in demand, the central bank may be limited in its ability to stabilise the economy. For example, if short-term debt and money are perfect substitutes at a zero nominal interest rate, an open market operation in short-term debt would fail to accommodate the increased demand for government liabilities. Quantitative easing is then ineffective.

And credit easing – the purchase of private sector assets or direct lending by the central bank to the private sector – does succeed in expanding government liabilities and can meet the private sector demand for government debt. However, this is another way of saying that it is really a fiscal policy operation.

In the United States, the Fed has been conducting fiscal operations on a large scale, in part because of the very independence enjoyed by the Federal Reserve. This independence allowed it to undertake policies that would have been extremely hard to get through Congress, especially in any timely fashion. The flexibility to act quickly that independence allows can be critical in dealing with liquidity crises when financial markets threaten to freeze up and in addressing systematic risk.

However, clarity about the fiscal support that might be needed for central bank operations in a crisis is important, though providing this once a crisis is underway can be difficult. Yet the flexibility that independence gives can also threaten the central bank's independence if the respective roles of the central bank and the Treasury are not clearly spelled out prior to the crisis. For example, in the United States where these issues were not clearly recognised prior to the crisis, Congress has rightly questioned the fiscal nature of the Fed's actions.

5. Improving the Interactions Between Monetary and Fiscal Policy

In normal times, the central bank must have the independence to conduct monetary policy. This requires fiscal cooperation in ensuring a sustainable fiscal budget. Monetary policy should involve open market operations primarily in short-term government securities to reduce the risk of central bank losses when interest rates rise and to separate monetary policy from debt management policies (Goodfriend, 2011). The fiscal authority should control debt management to affect the size and maturity structure of government debt.

In crises, there is a need for coordination – credit easing policies are fiscal policies, but it can be appropriate for the central bank to undertake such fiscal operations if the monetary authority can respond more quickly. However, this flexibility means the central bank risks political exposure – needing to take actions before they are endorsed by elected officials can be a serious long-term threat to the central bank's independence in a system such as that of the United States. It may be less of a concern (and also there may be less of a need for it) in a Parliamentary system when a majority government may be able to respond more quickly. In this case, there is less need for such actions to be carried out by the central bank in such a system.

Nothing is so likely to threaten the independence necessary to ensure good monetary policy than the perception that the central bank is directly allocating credit to the private sector and engaging independently in large-scale policies which have significant distributional and fiscal effects.

Finally, cooperation – just as normal policy – needs to be transparent so that it is clear that actions by the central bank are consistent with its mandate and do not threaten its independence.

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The Fiscal Stimulus and Challenges Ahead: Views on the Euro Area*

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Focusing on the euro area, this article discusses recent fiscal developments and the use of discretionary fiscal policies to stimulate economic activity. It is argued that, when adopting discretionary stimulus measures, policy-makers should take into account two factors: (i) *ex ante* fiscal plans and the perception of the state of the economy in “real-time” may be substantially different from what is observed *ex post*, based on revised data; (ii) discretionary fiscal policies seem to have become less effective over time to stimulate output in the euro area, also because of a more forceful reaction of monetary policy to fiscal expansions. In the specific context of the 2008–2010 global crisis, while the implementation of fiscal stimulus measures probably averted an even more severe contraction of economic activity, this came at the cost of mounting fiscal imbalances. At the European level, the necessary fiscal adjustment will need to be complemented by a reform of the European Union’s system of fiscal rules.

Keywords: economic crisis, fiscal stimulus, fiscal stance, real-time data, fiscal policy effectiveness, sustainability of public finances, European Union’s system of fiscal rules.

1. A Global Fiscal Deterioration

The global financial and economic crisis of 2008–2010 has been accompanied by a rapid and profound *deterioration of public finances* in most industrialised countries. According to the International Monetary Fund’s (2010) *World Economic Outlook – October 2010*, the average general government net borrowing (i.e. deficit) across the major advanced economies increased from 2.1 per cent of gross domestic product (GDP) in 2007 to 4.7 per cent of GDP in 2008, and it exceeded the 10 per cent of GDP threshold in 2009. The deficit ratio is expected to decline only slowly in 2010 (to 9.3 per cent of GDP) and in 2011 (reaching 8.0 per cent of GDP). The fiscal deterioration has been strong in the United States. In this country, the deficit ratio is estimated to be above 10 per cent of GDP in 2009 and 2010, and around this threshold in 2011. The mirror image of these developments is that the US gross government debt is expected to approach 100 per cent of GDP already in 2011 (see International Monetary Fund, 2010). The budgetary worsening has also been severe

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in the *euro area*, although less so than in the United States: the euro area (aggregate) general government deficit increased from around 2 per cent of GDP in 2008 to 6.3 per cent of GDP in 2009 and, according to the IMF, is expected to decline to around 5 per cent of GDP by 2011. As a consequence, gross government debt reached around 80 per cent of GDP in 2009 and it is projected to be close to 90 per cent of GDP in 2011.

2. Factors Behind the Fiscal Deterioration

In both the euro area and the United States, the deterioration of the *government budget balance* has been mainly driven by *three factors*: (i) the effects of the so-called “automatic stabilisers” in a contracting economy, which imply lower government revenue from direct and indirect taxes, and higher transfers to households and firms; (ii) the impact of fiscal stimulus measures adopted by governments to counteract the fall in output; and (iii) other factors showing up in an expansionary fiscal stance, namely other discretionary measures, ongoing spending trends and unexpected revenue shortfalls beyond the impact from the cycle. The contribution of these three factors is illustrated in Figure 1.

As shown, the automatic reaction of the government budget balance to the business cycle contributed significantly to explaining the fiscal deterioration during the recent recession. As regards the other factors, while “structural” (non-stimulus-related) determinants played the most important role, a non-negligible part of the increase in the government deficit was accounted for by temporary fiscal stimulus measures implemented during the crisis. The euro area fiscal stimulus, which was coordinated within the so-called “European Economic Recovery Plan (EERP)”, amounted to around 1.1 per cent of GDP in both 2009 and 2010 (not counting measures taken at the EU level and the costs of extra structural reforms), and is expected to be largely phased out in 2011 (see European Commission, 2010).²

While the aforementioned three factors had a major negative impact on the budget balance, the costs linked to government interventions aimed at stabilising the financial sector and rescue troubled financial institutions to a large extent showed up in higher *gross government debt* only. Figure 2 shows the impact of such government interventions on the euro area government debt ratio: they amounted to around 2 per cent of GDP in 2008, 2.5 per cent of GDP in 2009 and are projected to amount to around 3 per cent of GDP for both 2010 and 2011.³

3. On the Use of Discretionary Fiscal Policy as a Stabilising Tool

The recent economic and financial crisis has revived interest in the use of *discretionary* fiscal policy as a stabilising tool. As discussed before, euro area countries have implemented sizeable stimulus packages in the context of the crisis, which contributed to the deterioration of fiscal balances in the period 2009–2011. Stimulus measures were also implemented in previous episodes and other advanced economies, over the last decades. Policy-makers should take into account two factors when adopting discretionary fiscal measures to stabilise economic fluctuations. The first one concerns how to determine the appropriate *stance* of fiscal policies over the business cycle. The second one relates to the *uncertainty* surrounding the effectiveness of discretionary fiscal policies to stimulate economic activity.

As concerns the former issue, while the fiscal stimulus packages approved during the crisis had a quite clear “counter-cyclical” nature, in that they have been implemented in a context of severely negative output gaps, this has not always been the case over recent history. In a previous paper of mine (Cimadomo, 2008) I show that, in OECD countries over the period 1994–2006, governments generally tended to implement *counter-cyclical* policies in “real-time”: they attempted to phase-in

²For more detailed information related to the size of the fiscal stimulus measures in euro area countries, see Van Riet (2010), chapter 3 on “Euro Area Fiscal Policies: Response to the Economic,” by Afonso, Checherita, Trabandt and Warmedinger.

³The costs of government interventions in support of the financial sector in euro area countries are discussed in Van Riet (2010), chapter 2 on “Euro Area Fiscal Policies: Response to the Financial Crisis,” by Attinasi.

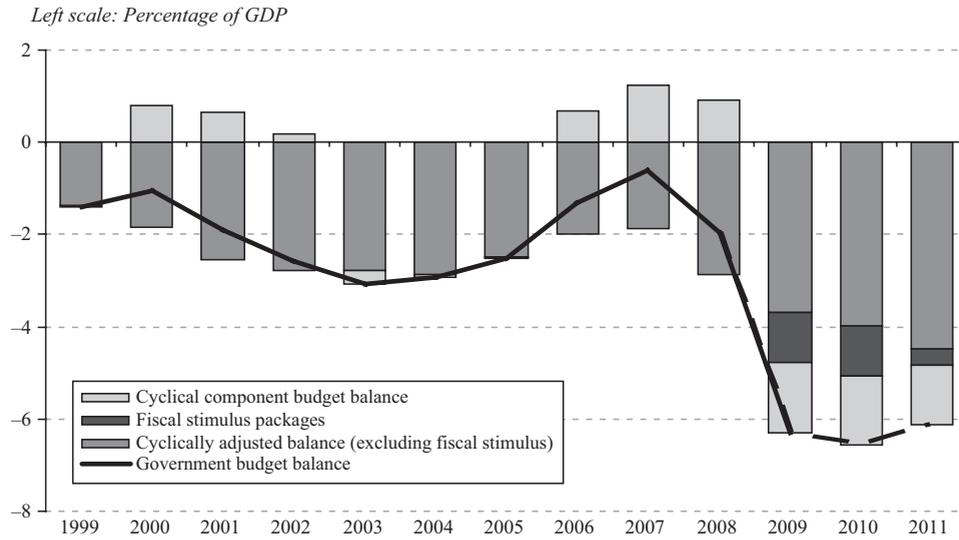


Figure 1. Factors Behind the Deterioration of the Euro Area Government Budget Balance
 Note: For 2011, it has been assumed that a third of the fiscal stimulus packages is still in place.
 Source: European Commission (2010).

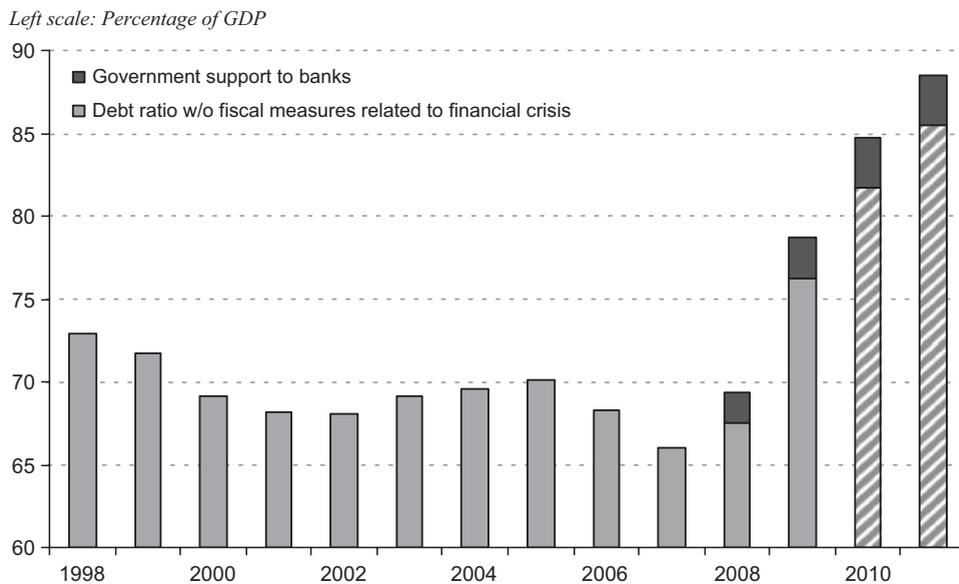


Figure 2. Euro Area Government Debt and Support to Banks
 Notes: For years 2010 and 2011, the chart reports estimates. The fiscal impact of the financial crisis on debt over the period 2008–2010 is captured by the government support to banks and other financial institutions in the form of capital injections (i.e. loans and acquisition of shares), as well as asset purchases and other financial transactions, including repayments. For 2011, the impact is kept constant at the 2010 level.
 Source: European Commission (2010), European System of Central Banks, ECB calculations.

tax cuts and spending increases during the then-perceived economic slowdowns and restrictive policies during boom times. However, with hindsight (i.e. from an “*ex post*” perspective) such policies often turned out to be pro-cyclical, that is, they exacerbated economic fluctuations. Differences between *ex ante* policy “intentions” and *ex post* outcomes typically originate from the difficulty in estimating potential growth and the output gap in real time, but also because of the implementation lags that characterise the budgetary process. In some circumstances, and in particular when there are no clear indications on the (above or below potential) state of the economy, these findings suggest that fiscal policy-makers should adopt a prudent approach to business cycle stabilisation through discretionary measures.

The second issue relates to the effects of fiscal policy expansions upon the economy, in particular as far as *government expenditure policies* are concerned. Indeed, there is still uncertainty, in both policy circles and the academic debate, on whether the expansionary fiscal policies implemented during the 2008–2009 crisis, but also in previous episodes, have been effective in spurring private demand and stimulating economic activity. On the theoretical side, models in the Neoclassical tradition, characterised by optimising agents and fully flexible prices, tend to predict a moderate rise in output and employment and a fall in private consumption and real wages following an exogenous increase in government goods purchases (see, e.g. Baxter and King, 1993). On the other hand, New Keynesian sticky price models typically indicate an increase in real wages, a rise in private consumption, and a strong output expansion in reaction to a positive government spending shock (see, e.g. Galí *et al.*, 2007). On the empirical side, results are mixed. Studies based on structural vector autoregression (VAR) models generally predict results in line with the New Keynesian framework, in that private consumption and investment are crowded-in following a government spending impulse (see, e.g. Perotti, 2007).⁴ At the same time, studies based on the “narrative approach” tend to find a negative response of private consumption and small output effects (see, e.g. Ramey, 2009). In general, estimates of fiscal policy multipliers are heterogeneous, ranging from values largely above unity to negative ones.⁵ While several studies have focused on the United States, results are more scant for the euro area, primarily because of data availability. However, following the publication of a new quarterly fiscal dataset for the euro area by Paredes *et al.* (2009), new research has recently appeared in this field.

Based on this newly available dataset, Kirchner *et al.* (2010) analyse how the effects of government spending shocks in the euro area have changed over the 1980–2008 period. This article also provides an explanation of the possible sources behind time variation in the effects of spending shocks upon the economy, including considerations on how monetary policy may have affected the fiscal transmission mechanism. The main findings from this study can be summarised as follows: in reaction to a 1 per cent of GDP government spending shock, the short-run *GDP multiplier tends to follow a hump-shape*. It increased up to around 1 at the end of the 1980s, but it decreased thereafter, reaching values of around 0.5 in the most recent period. The initial response of inflation was close to 0 over the whole sample, but a stronger response over the medium term emerged during the 1980s and most of the 1990s. The monetary policy reaction to the fiscal expansion was *accommodative* (i.e. the short-term interest rate reacted negatively), until around 1999–2002. Among other factors, this may contribute to explaining why fiscal policy was particularly powerful over the 1980s. However, the monetary reaction *vis-à-vis* the fiscal shock became *less accommodative over time* in the euro area, in particular since the introduction of the single currency: the impact reaction of the short-term interest rate to the inflationary rise following the fiscal expansion turned positive around the beginning of the 2000s.⁶ The medium- to long-run response of the interest rate has also become more aggressive over time. The increasingly offsetting reaction of monetary policy

⁴See Leeper *et al.* (2009) on the implications of fiscal anticipation effects for empirical analysis based on structural VAR models.

⁵For a review of results on the effects of fiscal expansions in VARs and structural models, see European Central Bank (ECB; 2010) and Coenen *et al.* (2010).

⁶As highlighted by Walsh (2010), the ECB follows *de facto* an inflation targeting regime.

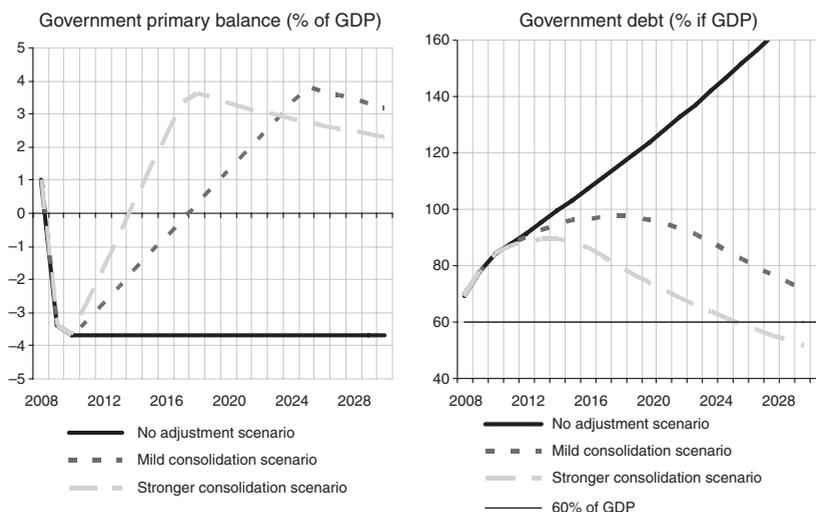


Figure 3. Scenarios for the Gross Government Debt-to-Gross Domestic Product Ratio in the Euro Area
Source: Van Riet (ed.) (2010).

to the expansionary fiscal shock may also help explain the observed decline in spending multipliers.⁷ In the most recent period, which coincides with the start of the 2008–2009 crisis, fiscal policy multipliers have been positive in the short-run, although relatively low. This confirms that the adoption of fiscal stimulus measures in the euro area has probably helped to avert an even more severe collapse in economic activity. However, as discussed before, this clearly came at the cost of mounting fiscal imbalances.

4. Risks to the Long-term Sustainability of Public Finances

Looking ahead, the recent severe deterioration of government budget balances may put the long-term sustainability of public finances at serious risk in the euro area. Expanding public deficits, if not promptly corrected, will be reflected in rising debt-to-GDP ratios over the next decades. A recent ECB study provides some insights on the size of fiscal challenges ahead for the euro area (see Van Riet, 2010, notably chapter 5 by Attinasi, Leiner-Killinger and Slavik). Figure 3 reports some mechanical simulations for the euro area gross government debt ratio from that paper. Three different scenarios are analysed, with a horizon up to 2030 and using given assumptions on interest rates and growth (thus excluding negative feedback effects from rising government debt). In the first scenario (no adjustment), the government primary balance is assumed to remain at –3.7 per cent of GDP, the value then-estimated for 2010 (solid line). This scenario is associated with an exploding path of the debt ratio, which is projected to overshoot 140 per cent of GDP in the mid-2020s even without taking account of the rising costs of ageing. The second scenario (dotted line) is characterised by a primary balance improving by 0.5 p.p. of GDP per year, until the overall government budget is balanced (in 2025). Under this (mild consolidation) scenario, it will take around 20 years to return to the pre-crisis level of the debt ratio. In the third scenario (dashed line), the primary balance is assumed to improve more significantly, that is by 1 p.p. of GDP per year until an overall budget balance is reached (in 2018). Even under this more ambitious consolidation scenario, around ten years are necessary to revert the debt ratio to the pre-crisis level. In summary, the profound fiscal deterioration that followed the 2008–2009 crisis, which led to serious

⁷On more theoretical considerations about the interplay between monetary and fiscal authorities, see Libich and Savage (2010).

sovereign debt problems in a several euro area countries, certainly poses daunting challenges for the years ahead.

5. A Reform of Economic Governance in the Euro Area

At the European level, there is a broad consensus on the fact that the necessary fiscal adjustment will need to be complemented by a reform of the European Union's system of fiscal rules. This is deemed necessary to make sure that past policy errors, which led to unfavourable fiscal positions and macroeconomic imbalances in many euro area countries at the start of the 2008–2009 crisis, will not be repeated in the future. In March 2010, the European Council established a Task Force to make proposals to strengthen economic governance in Europe.⁸ More specifically, the Task Force was mandated to make proposals for: (i) strengthening fiscal surveillance, (ii) broadening macroeconomic surveillance and coordination and (iii) a permanent crisis management framework. In this context, the ECB also put forward some proposals for the reform of the euro area economic governance framework.⁹ The main elements of the ECB's proposals consist of: (i) strengthening surveillance over budgetary policies and more effective prevention and correction of excessive deficits and debts; (ii) an improved framework for competitiveness surveillance and the correction of macroeconomic imbalances; (iii) the design of an appropriate framework for euro area crisis management and (iv) enhancing national fiscal frameworks and the quality of fiscal statistics. While at the current juncture discussions on these reforms are still ongoing, it appears evident that major institutional reforms are necessary to strengthen the foundations of the European Economic and Monetary Union.

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⁸The Task Force was headed by the President of the EU Council, Mr Van Rompuy.

⁹See ECB, "Reinforcing Economic Governance in the Euro Area," 10 June 2010, at <http://www.ecb.int/pub/pdf/other/reinforcingeconomicgovernanceintheeuroareaen.pdf>.

Reforming Fiscal Responsibility Legislation

Stephen Kirchner¹

Monetary and fiscal rules are complementary. Whereas monetary policy and monetary institutions have been reformed in line with developments in modern macroeconomics, fiscal policies and institutions have not kept pace with these developments. Murray's (2008) review of Australia's existing fiscal responsibility legislation, the Charter of Budget Honesty, has pointed out significant shortcomings. This paper outlines a proposal by Carling and Kirchner (2009) to reform Australia's fiscal responsibility legislation. It proposes three fiscal policy rules that are designed primarily to tie-down expectations in relation to the long-run path of the Commonwealth government's net debt. It also proposes the establishment of an independent Fiscal Commission to monitor and enforce compliance with the rules and to improve the transparency, independence and accountability of the federal budget process. The proposal aims to give politicians the commitment technology they need to address the fiscal challenges posed by an aging population and innovations in the terms of trade.

Keywords: fiscal responsibility legislation, fiscal rules.

Monetary and fiscal policy rules are complementary, not least because the various versions of the fiscal theory of the price level suggest that, under certain conditions, the fiscal authority can dominate the monetary authority in the determination of the price level (Kocherlakota and Phelan, 1999). Fiscal policy that does not heed the government's inter-temporal budget constraint can subvert even a well-designed monetary regime, thereby destabilising long-run inflation expectations and leading to increased macroeconomic instability. Fiscal policy rules may also be useful in addressing the common pool externality and principal-agent problems that give rise to an excessive government spending and budget deficit bias (von Hagen and Harden, 1995). This is analogous to the role of monetary policy rules and increased central bank independence and transparency in addressing the inflation bias in monetary policy.

Inflation and other macroeconomic outcomes have been shown to be sensitive to the choice of monetary policy rules and monetary institutions (Cukierman, 1992; Clarida *et al.*, 1998, 2000). Similarly, fiscal outcomes have been shown to be sensitive to the choice of fiscal institutions, budgetary procedures and fiscal policy rules in a variety of settings (see, e.g. the papers collected in Poterba and von Hagen, 1999; von Hagen, 2002).

Central banking institutions and monetary policy practice in Australia and elsewhere now closely reflect the New Keynesian orthodoxy in macroeconomics, including a commitment to rules-based monetary policy (Clarida *et al.*, 1999). In contrast, the conduct of fiscal policy and the development of fiscal institutions have not kept pace with modern macroeconomic thinking (Leeper, 2010).

Former Senator Andrew Murray's (2008) review of the *Charter of Budget Honesty Act 1998* as part of the Rudd government's "Operation Sunlight" reforms highlighted many of the shortcomings of

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Australia's existing fiscal responsibility legislation. The Charter only requires governments to pay lip service to principles of fiscal soundness, but is otherwise non-prescriptive about fiscal policy outcomes. The Charter explicitly precludes any form of administrative or judicial review that would make its provisions enforceable.

The literature suggests the following requirements for effective fiscal policy rules: "the fiscal target must be clear-cut and comprehensive, enforcement should rely on independent agents, and the formal restraints involved should be difficult to amend" (von Hagen and Strauch, 2001, p. 20). Carling and Kirchner (2009) make the case for reforming Australia's existing federal fiscal responsibility legislation based on these criteria and consistent with Leeper's (2010) call for fiscal institutions to be reformed to reflect developments in modern macroeconomics, just as central banking institutions have been reformed since the early 1990s.

An important potential benefit of a rules-based approach to monetary policy is to stabilise expectations in relation to the long-run price level. Fiscal policy rules can perform a similar function in relation to expectations for the future path of fiscal variables such as the net debt burden. Just as the expected path of the real official interest rate is more important to the stance of monetary policy than the actual interest rate, the expected future path of fiscal policy variables is just as important as *ex post* fiscal policy outcomes. As Leeper (2009, p. 12) notes, "consumption-saving decisions are influenced, not by the current tax rate on saving, but by the expected tax rate because it is the tax rate in the future that affects the expected return to saving."

Many of the debates about fiscal policy in Australia, including the effectiveness of fiscal stimulus and election policy costings are second- and third-order issues compared with the institutional framework in which fiscal policy is conducted and its role in conditioning expectations for future fiscal outcomes. The case for fiscal policy rules has typically been motivated by concerns over deficit spending and growing debt burdens. However, in the Australian context, an equally valid concern has been whether fiscal policy before the 2007–2008 financial crisis, at least on an *ex post* basis, was too tight. With pre-crisis budget surpluses in excess of 2 per cent of gross domestic product (GDP; inclusive of Future Fund earnings) and with Commonwealth net debt having been eliminated in 2004–2005, the federal government found that the management of large budget surpluses raises just as many issues as large deficits (Kirchner, 2006). A discretionary fiscal policy designed to lift national saving by increasing public sector saving is no more likely to succeed than a discretionary fiscal policy designed to boost aggregate demand because of offsetting private sector responses (Kirchner, 2007).

Some may see it as a sign of fiscal prudence that the Commonwealth should run large budget surpluses and accumulate a positive net asset position. However, as with any other type of saving, public saving is just deferred spending and we have no reason to expect that future governments will spend today's saving any more wisely than they do currently. If we think governments today make poor spending decisions, why would we expect future governments to behave any differently in the absence of specific changes in incentives? The dynamic inconsistency problem that drives the case for monetary policy pre-commitment is relevant in this context, because the accumulation of a large Commonwealth net asset position could create incentives for fiscal irresponsibility in the future in the absence of improved fiscal responsibility legislation. Even where politicians recognise the government's inter-temporal budget constraint, they currently lack an appropriate commitment technology that would enable them to make time-consistent fiscal policy choices. The Carling–Kirchner proposal to reform Australia's fiscal responsibility legislation aims to give politicians the technology they need to make these choices.

The 2010 Australian federal election outcome has seen renewed impetus for reform in this area, which seems to have coalesced around the idea of an independent parliamentary budget office, although the role and scope of this institution have not been defined at the time of writing. A new Office for Budget Responsibility has also been established by the Conservative-led coalition government in the United Kingdom, while a similar institution is in place in Canada (Fleming, 2010). The US Congressional Budget Office (CBO) has also been suggested as a model for Australia, but the CBO is designed for a different system of government in which the legislature rather than the

executive plays the larger role in formulating the budget. Whatever might be said for the CBO, fiscal policy outcomes in the United States have been disastrous, not least because the legislature is allowed too great a role in formulating the budget.

While visiting the Reserve Bank of New Zealand, Larry Ball (1996) proposed a Macroeconomic Policy Committee that would assume responsibility for the discretionary component of both monetary and fiscal policy. This was an idea picked-up locally by Nicholas Gruen (1997) in his proposal for the Business Council of Australia. The Ball approach is mainly concerned with relocating the responsibility for running short-term discretionary demand management, whereas the Carling–Kirchner approach is partly predicated on the view that short-term demand management is the wrong focus for fiscal policy and is likely to be ineffective in an institutional environment in which expectations are not well managed.

Carling and Kirchner propose an independent statutory Fiscal Commission, with Commissioners appointed in consultation with the states, much like the Australian Competition and Consumer Commission Commissioners. The role of the Commission would include defining the parameters for the annual budget and other fiscal policy statements, including the economic forecasts and fiscal projections, as well as producing analytical reports such as Intergenerational Reports and policy costings.

The federal government would formulate its budget within the parameters defined by the Commission, but also subject to legislated fiscal rules the Commission would monitor and enforce. The federal government would still enjoy substantial discretion to make tax and spending decisions within this overall framework, but the framework would serve to tie down expectations in relation to long-run fiscal outcomes, while also taking some of the politics out of key elements of the budget process.

Before describing the fiscal policy rules, it is important to emphasise that we see these being made subject to well-defined caveats such as those contained in the Reserve Bank of New Zealand's Policy Targets Agreements, which would allow for temporary breaches of the rules in the event of war, natural disaster and other severe supply shocks. Most aggregate demand shocks could be accommodated through the operation of the automatic stabilisers, without having to invoke a caveat to the rules.

The first fiscal rule would require the Commonwealth fiscal balance to be maintained within a range of +2 to –2 per cent of GDP on both an *ex post* and *ex ante* basis. A four percentage point range would have been sufficient to accommodate most of the cyclical variation in the budget balance we have seen in recent decades. The traditional objection to a budget balance rule is that it might force a poorly timed fiscal consolidation. This assumes that fiscal consolidations are necessarily contractionary, which need not be the case if expectations are appropriately managed.

The second rule would limit the net debt to GDP ratio to 10 per cent, which is above the average ratio for recent decades, although below the peak seen in the wake of the early 1990 recession. This would serve as a constraint on the ability of governments to run continuous budget deficits. It would also serve to tie down expectations in relation to the future path of net debt, which recent Intergenerational Reports have suggested will rise indefinitely beyond the current projection period on a “no policy change” basis. The 2007 report was honest enough to note that current policy settings “result in an unsustainable path for net debt towards the end of the projection period” (Commonwealth of Australia, 2007, p. xii), but this characterisation was dropped from the 2010 report (Commonwealth of Australia 2010). This projected path for net debt is potentially the most destabilising aspect of current fiscal policy settings from an expectations management perspective.

The third rule would cap the Commonwealth revenue and expenditure shares of GDP at 25 per cent. The current government has already undertaken to maintain the tax share of GDP below the level of 2007–2008, which was 23.6 per cent of GDP, according to the 2010–2011 Budget papers. Adding non-tax revenue of 1.4 per cent of GDP gave a revenue share of 25 per cent of GDP in 2007–2008, so the proposed rule would simply serve to codify and enforce an existing policy commitment. This would limit the size of government in relative terms, but not in absolute terms. To the extent that anchoring long-run fiscal expectations yields stronger economic growth, this can be expected to yield *more* resources for government for a given revenue share of GDP.

The parameters for these proposed rules are necessarily somewhat arbitrary, although they are designed to be consistent with the range of federal fiscal policy outcomes seen in recent decades,

as well as existing policy commitments. The specific parameters for the rules are less important than the need for a well-defined fiscal policy framework that anchors long-run expectations, while allowing policy-makers to retain discretion over policy priorities within the chosen parameters. The fiscal policy choices made within that framework are then a matter for governments and the parliament to determine.

Enforcement problems have been a significant limitation on the effectiveness of fiscal policy rules in other countries. We propose an enforcement regime that would see the Fiscal Commission impose pecuniary penalties on all members of federal parliament for breaches of the rules not subject to one of the explicit caveats, as determined by the Commission. This would require cutting politicians' overall remuneration by 1 per cent for every one percentage point breach of each of the three policy rules. The pecuniary penalty is probably less significant than the loss of political reputation that would accompany the imposition of such penalties by an independent Commission. Unlike the existing *Charter of Budget Honesty Act*, any new fiscal responsibility legislation should be made subject to administrative and judicial review.

In summary, our proposed changes to Australia's fiscal responsibility legislation would assist politicians in better managing fiscal policy challenges such as demographic change and cycles in the terms of trade. The proposed fiscal policy rules would serve to tie down expectations in relation to long-run fiscal policy outcomes. The Fiscal Commission would provide for greater transparency and accountability in the conduct of fiscal policy and take some of the politics out of key aspects of the budget process.

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Fiscal Limits in Advanced Economies*

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Ageing populations in advanced economies are placing ever-increasing demands on government spending in the form of old-age benefits, particularly for health care. Economies that have promised substantially more benefits than they have made provision to finance are heading into a prolonged era of fiscal stress. Unresolved fiscal stress raises the possibility that the economies will hit their fiscal limits where taxes and spending no longer adjust to stabilise debt. In such economies, monetary policy may lose its ability to control inflation and influence the economy in the usual ways. The paper discusses models of fiscal limits and their implications and lays out a research agenda to integrate political economy and empirical considerations with general equilibrium models of monetary and fiscal interactions.

Keywords: fiscal sustainability, fiscal limit, monetary–fiscal policy interactions.

1. Introduction

Extreme fiscal stress and fears of outright sovereign debt default were once the exclusive domains of emerging economies, and a sizeable literature has grown up to understand the causes and consequences of those fiscal crises. But these are topsy–turvy times. Emerging economies are in good fiscal shape, whereas advanced economies are heading into a prolonged era of fiscal stress. Important structural differences between emerging and advanced economies may limit applying insights from the emerging markets literature to the problems that advanced economies face.

Large adverse external shocks frequently precipitate sovereign debt crises in emerging economies.⁴ Emerging economies typically have weak fiscal infrastructures that make the countries' government finances especially susceptible to shocks originating outside their economies – large swings in commodity prices, sudden stops of capital inflows, sharp changes in real exchange rates – as well as to tax evasion and the swift movement of economic activity underground. Weak fiscal infrastructures, combined with fragile political systems, fixed exchange rates and government debt denominated in foreign currency, can leave the economy with no choice but to default or substantially restructure its sovereign debt obligations. Important ingredients in these crises are: they usually come on suddenly, with few early warning signals; following a default, the country is temporarily locked out of credit markets, making default potentially costly in terms of output losses; several emerging economies are serial defaulters, so fiscal crises are recurring, rather than one-off events.

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⁴Sturzenegger and Zettelmeyer (2006) is an excellent recent survey of sovereign debt crises in emerging economies, whereas Reinhart and Rogoff (2009) provide a broader historical perspective on financial crises.

JEL classifications: H60, E30, E62, H30

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Table 1. Net Present Value of Impact on Fiscal Deficit of Ageing-related Spending, in Per Cent of GDP

Country	Ageing-related spending
Australia	482
Canada	726
France	276
Germany	280
Italy	169
Japan	158
Korea	683
Spain	652
United Kingdom	335
United States	495
Advanced G-20 countries	409

Source: International Monetary Fund (2009).

Fiscal stress facing advanced economies differs from this characterisation of emerging economies along several dimensions. In most, but not all, advanced economies, fiscal stress has been a slowly evolving problem brought on by ageing populations and pay-as-you-go social benefits programmes for the aged. Growing promised old-age benefits, with no plans on the books to finance them, have placed fiscal projections on unsustainable trajectories. Advanced economies tend to be more diversified and, therefore, less sensitive to external disturbances, whereas their political systems are more stable and their fiscal infrastructures more sound. Flexible exchange rates and home currency denominated government debt open channels of adjustment to fiscal stress that are not available to emerging economies.

Table 1 reports the International Monetary Fund's (2009) calculations of the net present value of ageing-related spending in several advanced economies. Averaged across the G-20 countries, spending promises exceed funding plans to the tune of 400 per cent of GDP. In the United States alone, the long-term imbalance associated with Social Security and Medicare is \$75 trillion in present value (Gokhale and Smetters, 2007). Although the Australian fiscal position is now quite healthy, sizeable unfunded liabilities lurk in the future, according to the IMF.

Emerging economies do not face the fiscal stress depicted in Table 1, in large part because their populations are much younger. With more young people working to support benefits to the old, the type of fiscal stress facing advanced economies does not appear on the horizon for emerging economies, as Figure 1 illustrates. The figure shows how old-age dependency ratios – population aged sixty-five or over relative to population aged fifteen to sixty-four – change across time in selected advanced and emerging economies. Japan stands out as having the oldest population in 2005 and projected for 2050, with Korea, Germany and Spain not far behind. Emerging economies have much younger populations, now and going forward, than do advanced economies. Because advanced economies also tend to have broader old-age programmes, their older populations portend ever-increasing demands on government spending coupled with an ever-shrinking stock of young workers to support those demands. This is a recipe for fiscal stress.

With emerging economies in mind, theoretical work on sovereign debt default has largely built on Eaton and Gersovitz (1981) to address the question of why creditors are willing to lend to sovereigns in the first place. Eaton and Gersovitz's key emphasis was on a sovereign's *willingness* to pay, rather than its *ability*. Another line of work treats sovereign debt default as an economic or political necessity, rather than as the outgrowth of an optimal policy problem, and derives the implications for monetary policy's ability to control inflation (Uribe, 2006; Bi *et al.*, 2010; Schabert, 2010).⁵

⁵See also Juessen *et al.* (2009), Bi (2009) and Bi and Leeper (2010) for non-monetary analyses.

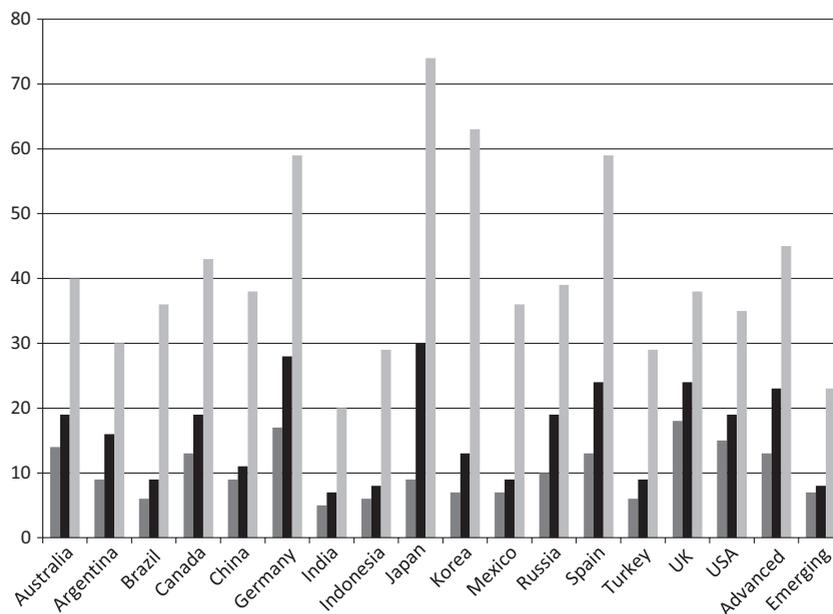


Figure 1. Population Ageing in Advanced and Emerging Economies, 1960 (Left Bar), 2005 (Centre Bar) and 2050 (Right Bar)

Note: Old-age dependency ratio, defined as population aged sixty-five or over relative to population aged fifteen to sixty-four, in per cent.

Source: United Nations (2008).

A third line of attack takes outright default off the table to examine the impacts of alternative fiscal and monetary policy adjustments that ensure government solvency.⁶ To our thinking, this line may be most pertinent to the problems facing many advanced economies with no recent history of sovereign debt default.

Ruling out default means that bondholders must expect *some* adjustments in future policies to occur that ensure the government continues to honour its debt obligations. Most governments have been exceedingly uninformative about which policies will adjust and when they will adjust. In the absence of credible policy plans, it is reasonable for people to contemplate the possibility that unresolved fiscal stress will push the economy to its *fiscal limit* – the point beyond which taxes and government expenditures can no longer adjust to stabilise the value of government debt. Macroeconomic policies can perform very differently in an economy that is staring at its fiscal limit. This paper describes how fiscal stress can affect the macro economy: first, by undermining the ability of the central bank to control inflation and influence the real economy in the usual ways; second, by injecting additional uncertainty into the economy. Beyond the literature on sovereign debt default, there is little work on how to model fiscal limits. We discuss what has been done on fiscal limits and how that work can be improved. The paper concludes by sketching a research agenda, pointing to some major unresolved theoretical and empirical issues associated with fiscal stress; there are many.

⁶Work taking this approach includes Cochrane (2011), Daniel and Shiamptanis (2010), Davig *et al.* (2010, 2011), Davig and Leeper (2010) and Sims (2011).

2. Fiscal Stress, Inflation Control and Heightened Uncertainty

A simple model can illustrate how unresolved fiscal stress and its concomitant uncertainty about future policies undermines the central bank's ability to control inflation.⁷ The model emphasises that monetary and fiscal policies have two tasks to perform – control inflation and stabilise the value of government debt – and it points to two different policy assignments that can achieve those tasks, but with very different consequences for monetary and fiscal policy effects.

2.1 A Model

We now lay out a simple model that describes the link between fiscal limits and inflation. The economy lasts for S periods. A representative household receives an endowment, y , of goods each period and chooses sequences of consumption and bonds, $\{c_t, B_t\}$, to maximise

$$E_0 \sum_{t=0}^S \beta^t u(c_t), \quad 0 < \beta < 1 \quad (1)$$

subject to the budget constraint

$$c_t + \frac{B_t}{P_t} + \tau_t = y + \lambda_t z_t + \frac{R_{t-1} B_{t-1}}{P_t} \quad (2)$$

taking prices and $R_{-1} B_{-1} > 0$ as given. The household pays taxes, τ_t , and receives transfers, $\lambda_t z_t$, each period, both of which are lump sum. Bonds are denominated in nominal terms (“dollars”) and pay a gross nominal return of R . The budget constraint distinguishes between the transfers that the government promises to pay, z_t , and the transfers the government actually delivers, $\lambda_t z_t$, which must ultimately be financed.

Government spending is zero each period, so the government chooses sequences of taxes, delivered transfers and debt to satisfy its flow constraint

$$\frac{B_t}{P_t} + \tau_t = \lambda_t z_t + \frac{R_{t-1} B_{t-1}}{P_t} \quad (3)$$

given $R_{-1} B_{-1} > 0$, whereas the monetary authority chooses a sequence for the nominal interest rate.

After imposing goods market clearing, $c_t = y$ for $t \geq 0$, the household's consumption Euler's equation reduces to the simple Fisher's relation

$$\frac{1}{R_t} = \beta E_t \left(\frac{P_t}{P_{t+1}} \right). \quad (4)$$

The exogenous (fixed) gross real interest rate, $1/\beta$, makes the analysis easier but is not without some loss of generality, as Davig *et al.* (2010) show in the context of fiscal financing in a model with nominal rigidities.

2.2 Policy Behaviour

Monetary policy follows a conventional interest rate rule, written in terms of the inverse of the nominal interest and inflation rates

$$R_t^{-1} = R^{*-1} + \alpha \left(\frac{P_{t-1}}{P_t} - \frac{1}{\pi^*} \right), \quad (5)$$

where π^* is the inflation target and $R^* = \pi^*/\beta$ is the steady-state nominal interest rate. When $\alpha > 1/\beta$ monetary policy is hawkish, responding to increases in inflation by sharply raising the nominal interest rate with the aim of stabilising inflation around π^* . This is called “active” monetary policy. Weak responses of interest rates to inflation are called “passive” monetary policy.

⁷The points that this illustrative model make have been generalised in numerical work by Davig *et al.* (2010, 2011) and Davig and Leeper (2010).

Fiscal policy adjusts taxes in response to the state of government debt

$$\tau_t = \tau^* + \gamma \left(\frac{B_{t-1}}{P_{t-1}} - b^* \right), \quad (6)$$

where b^* is the debt target, τ^* is the steady-state level of taxes and $r = 1/\beta - 1$ is the net real interest rate. When $\gamma > r$ any increase in government debt creates an expectation that future taxes will rise by enough to both service the higher debt and retire it back to b^* . This is called “passive” fiscal policy. Weak responses of taxes to debt correspond to “active” fiscal policy.

We assume that “promised” government transfers evolve exogenously according to the stochastic process

$$z_t = (1 - \rho)z^* + \rho z_{t-1} + \varepsilon_t, \quad 0 < \rho < 1, \quad (7)$$

where z^* is steady-state transfers and ε_t is a serially uncorrelated shock with $E_t \varepsilon_{t+1} = 0$.

Most macroeconomic models contain no uncertainty about future policy regimes, making the implausible assumption that agents know exactly what monetary and fiscal policies will be in effect at every date in the future. Although this assumption is widely maintained, it is difficult to reconcile the assumption with observed policy behaviour. In fact, policies *do* change and, therefore, they *can* change. In the face of a history of changes in policy regimes, analyses that fail to incorporate the possibility of regime change into expectations formation run the risk of misspecifying expectations and providing misleading policy advice.⁸ Given the prominent role ascribed to expectations formation in policy discussions and deliberations, this is a potentially serious misspecification of policy models.

We introduce uncertainty about policy in a stark fashion that allows us to extract some implications of policy uncertainty while retaining analytical tractability. The economy hits the fiscal limit at a known date T , at which point taxes become active, no longer responding to stabilise debt. At the fiscal limit, taxes are fixed: $\tau_t = \tau^{\max}$ for all $t \geq T$. Uncertainty arises because agents are uncertain which policy regime will be adopted at the fiscal limit. Agents place probability q on a regime that combines passive monetary policy with active *transfers* policy. Active transfers means that promised transfers are delivered and $\lambda_t = 1$. In this regime, neither taxes nor transfers can adjust to stabilise debt, so monetary policy takes on the role of stabilising debt.

Agents place probability $1 - q$ on a regime with active monetary policy and passive transfers policy. In polite company, passive transfers policy is referred to as “entitlements reform.” To avoid the tangle of euphemisms, we refer to this as “renewing on promised transfers.” Instead of receiving promised transfers of z_t at time t , agents receive $\lambda_t z_t$ ($\lambda_t \in [0,1]$), a fraction of promised transfers that the government honours. That fraction adjusts as needed to stabilise debt. Because monetary policy continues to aggressively target inflation, once the economy enters this regime, inflation will always be on target: $\pi_t = \pi^*$ for $t \geq T$.

For simplicity, we reduce the model to just four periods. In the initial two periods ($t = 0, 1$), the fiscal limit has not been reached, promised transfers follow the process in Equation 7, monetary policy is active and tax policy is passive. The economy begins with $R_{-1}B_{-1} > 0$ given and some arbitrary P_{-1} . At the beginning of period 2 ($t = 2$), the fiscal limit is reached but agents remain uncertain about which mix of policies will be adopted. This uncertainty is resolved at the end of period 2, so that in period 3 there is no uncertainty about policy.

2.3 Equilibrium

Combining the Fisher’s relation, Equation 4, with the active monetary policy rule, Equation 5, for periods 0 and 1 yields

⁸This is the theme of Cooley *et al.* (1982, 1984), Sims (1982, 1987), Andolfatto and Gomme (2003), Leeper and Zha (2003), Davig (2004), Davig and Leeper (2006a,b, 2007, 2011), Chung *et al.* (2007) and Davig *et al.* (2010).

$$E_0\left(\frac{P_1}{P_2} - \frac{1}{\pi^*}\right) = \frac{\alpha^2}{\beta^2}\left(\frac{P_{-1}}{P_0} - \frac{1}{\pi^*}\right) \quad (8)$$

and combining the government budget constraint, Equation 3, with the passive tax rule, Equation 6, yields

$$E_0\left(\frac{B_1}{P_1} - b^*\right) = E_0(z_1 - z^*) + (\beta^{-1} - \gamma)\left(\frac{B_0}{P_0} - b^*\right). \quad (9)$$

Agents know that in the next period ($t = 2$), the fiscal limit will be reached and policy will switch to either a passive monetary/active transfers regime with probability q or an active monetary/passive transfers regime with probability $(1 - q)$. Assume that the renegeing rate is fixed and known at $t = 0$, so $\lambda_2 = \lambda_3 = \lambda \in [0, 1]$. Then the conditional probability distribution of these policies is given by

Probability	Monetary policy	Transfers policy
q	$R_2^{-1} = R^{*-1}$	$z_2 = \rho z_1 + \varepsilon_2$
$(1 - q)$	$R_2^{-1} = R^{*-1} + \alpha\left(\frac{P_1}{P_2} - \frac{1}{\pi^*}\right)$	$\lambda z_2 = \lambda \rho z_1 + \lambda \varepsilon_2$

The analogues of Equations 8 and 9 for period 2 are

$$E_2\left(\frac{P_2}{P_3} - \frac{1}{\pi^*}\right) = (1 - q)\frac{\alpha}{\beta}\left(\frac{P_1}{P_2} - \frac{1}{\pi^*}\right), \quad (10)$$

$$E_1\left(\frac{B_2}{P_2} - b^*\right) = [q + (1 - q)\lambda]E_1z_2 - z^* + \beta^{-1}\left(\frac{B_1}{P_1} - b^*\right). \quad (11)$$

In Equation 11, we have imposed that $\tau^{\max} = \tau^*$, the steady-state level of taxes, in order to make the relationships transparent.

In period 3, τ_3 is set to completely retire debt ($B_3 = 0$) no matter which policy regime is realised in period 2. This corresponds to $\tau_3 = \delta z_3 + (R_2 B_2)/P_3$, where $\delta = 1$ if the economy is in the passive monetary/active transfers regime and $\delta = \lambda$ if the active monetary/passive transfer regime is realised. This assumption implies that agents know one period in advance which tax policy will be in place in the final period.

Combining Equations 8 and 10, we obtain a relationship that connects expected inflation between periods 2 and 3 to actual inflation in the initial period

$$E_0\left(\frac{P_2}{P_3} - \frac{1}{\pi^*}\right) = (1 - q)\frac{\alpha^3}{\beta^3}\left(\frac{P_{-1}}{P_0} - \frac{1}{\pi^*}\right). \quad (12)$$

Given the discount rate β , this solution for expected inflation shows that whether expected inflation converges to target or drifts from target depends on the probability of switching to passive monetary/active transfers policies relative to how hawkishly monetary policy targets inflation when it is active.

As we assume that taxes in period 3 are known, and they are a function of exogenous objects, we can treat τ_3 as fixed. Combining Equations 9 and 11 and imposing that $B_3 = 0$ as the debt target in the last period

$$\frac{B_0}{P_0} - b^* = \left(\frac{1}{\beta^{-1} - \gamma}\right)E_0\{\beta^2[(\tau_3 - \tau^*) - (\vartheta z_3 - z^*)] - \beta(\vartheta z_2 - z^*) - (z_1 - z^*)\}, \quad (13)$$

where $\vartheta = q + (1 - q)\lambda$ determines expected post-renegeing transfers.

Because all the objects on the right side of Equation 13 are known or exogenous, this expression uniquely determines the value of debt in period 0 as a function of the expected present value of surpluses. We can combine Equation 13 with the government's flow constraint at $t = 0$ to obtain a unique expression for P_0 as a function of $R_{-1}B_{-1}$, τ_0 , z_0 and the parameters in the expression for equilibrium B_0/P_0 .

2.4 Implications

Solutions in Equations 12 and 13, together with the government's budget constraint, yield the equilibrium price level, expected inflation and nominal debt at the initial date, $t = 0$. The solutions encapsulate the sense in which monetary policy loses control of inflation if fiscal expectations are not appropriately anchored. We can now summarise the implications:

- 1 Monetary policy can consistently achieve its inflation target, $\pi_t = \pi^*$, only if fiscal expectations are anchored on policies in which debt is stabilised entirely by fiscal adjustments. In this model, such anchoring requires that $q = 0$, so there is *no possibility* of a regime in which monetary policy becomes passive ($0 \leq \alpha < 1/\beta$) and transfers policy is active, with promised transfers being fully honoured ($\lambda = 1$).
- 2 If people deem the passive monetary/active transfers regime to be possible, $q > 0$, then expressions (12) and (13) guide the determination of actual and expected inflation, yielding some striking results.
 - (a) For a given $q > 0$, the more hawkish is monetary policy, the more decoupled expected inflation is from past inflation: in Equation 12, larger α makes deviations of expected inflation from target drift farther from deviations of actual inflation from target.
 - (b) As the probability of the passive monetary/active transfers regime, q , rises, expected inflation departs less from actual inflation; in fact, as $q \rightarrow 1$, expected inflation converges to π^* .
 - (c) Higher q reduces the value of debt in expression (13), which raises the initial price level, P_0 .
 - (d) The smaller the rate of renegeing on transfers, the higher is λ , the lower the value of debt and the higher the price level P_0 .

Higher q and lower λ raise inflation through the standard fiscal theory of the price level mechanisms.⁹ Higher q means there is less likelihood that the government will renege, so expected transfers and, therefore, household wealth rise. Households attempt to convert the higher wealth into consumption goods, driving up the price level until real wealth falls sufficiently that households are content to consume their original consumption place. Lower λ also raises the expected value of transfers, increasing wealth and raising the price level through the same channels.

Expectational effects associated with switching policies can be seen explicitly in Equations 12 and 13. Equation 13 shows that the value of debt is still determined by the discounted expected value of net surpluses. In contrast to models without uncertainty about future policies, now the actual surplus is conditional on the realised policy regime. Conditional on time $t = 0$ information, the expected transfers process in periods 2 and 3 is unknown. If $q \in (0,1)$ and at the end of period 2 passive monetary policy is realised, agents will be "surprised" by amount $z_2(1 - q)(1 - \lambda)$ in period 2 and by amount $z_3(1 - q)(1 - \lambda)$ in period 3. With transfers surprisingly high – because the passive transfers regime with renegeing was not realised – households feel wealthier and try to convert that wealth into consumption. This drives up the price level in periods 2 and 3, revaluing debt downward. This surprise acts as an innovation to the agent's information set due to policy uncertainty. Naturally, as agents put high probability on this regime occurring ($q \approx 1$) or assume the amount of renegeing is small ($\lambda_2, \lambda_3 \approx 1$), the surprise is also small, and vice versa.

Expected inflation in period 1 now depends on q , which summarises beliefs about future policies. But q is a parameter of both monetary and transfers policy. This illustrates that monetary

⁹See, for example, Leeper (1991), Sims (1994), Woodford (2001) or Walsh (2003) for expositions of the fiscal theory.

policy alone cannot determine either actual or *expected* inflation. If agents put high probability on the passive monetary/active transfers regime ($q \approx 1$), then expected inflation at the beginning of period 2 will be primarily pinned down by the nominal interest rate peg. It is in this sense that expectational effects about policy uncertainty can dramatically alter equilibrium outcomes.

In this simple setup, these expectational effects are limited in magnitude because agents know precisely when the fiscal limit is reached. The additional level of uncertainty not examined in these simple models, but present in Davig *et al.* (2010), is randomness about *when* tax policy will hit the fiscal limit. In that environment, the conditional probability of switching policies outlined above would contain an additional term specifying the conditional probability of hitting the fiscal limit in that period. This implies that, because there is positive probability of hitting the fiscal limit in *every* period up to T , these expectational effects will be present from $t = 0, \dots, T$ and will gradually become more prominent as the probability of hitting the fiscal limit increases. In effect, the endogenous probability of hitting the fiscal limit makes the probability q time varying.

The illustrative model places in high relief a general lesson for policy-makers: unresolved fiscal stress can undermine the ability of monetary policy to control inflation, regardless of how devoutly the central bank targets inflation. Loss of inflation control arises for *fiscal* reasons that are beyond the purview of the central bank. More aggressive inflation targeting cannot compensate for inappropriately anchored fiscal expectations.

3. Modelling Fiscal Limits

Although there is little doubt that every country possesses a fiscal limit, we are very far from understanding how to quantify that limit. Once more setting aside sovereign debt default as a type of fiscal limit, there are at least three categories of limits that arise in the literature.

Sargent and Wallace (1981) invoke that the public's desired level of savings imposes an upper bound on the equilibrium debt–GDP ratio that can be attained. Their economy starts in a regime where both monetary and fiscal policy are active – money growth and the primary fiscal surplus are exogenous processes – and government debt accumulates to cover any budget shortfalls. When debt reaches its upper bound, Sargent and Wallace posit that monetary policy switches to passively generate the seigniorage revenues required to stabilise debt at that fiscal limit.

The notion that the debt–GDP ratio must be bounded is closely related to the second category of fiscal limits: higher distorting taxes diminish incentives to work, save, and invest, so there is some set of tax rates that maximise tax revenue and place the economy at the peak of its Laffer curves.¹⁰ Holding government expenditures fixed, maximum tax revenues imply some maximum stream of primary surpluses. Because government debt derives its value from the expected present value of primary surpluses plus seigniorage revenues, and that present value is bounded, so, too, is the size of government debt relative to the economy. Tax distortions, therefore, create a natural fiscal limit by imposing a limit on the “cash flows” that support government debt.

Although it provides a natural *economic* fiscal limit, Laffer curve reasoning fails to bring in political economy arguments that are more likely to determine fiscal limits in democratic societies. Top all-in marginal tax rates vary tremendously across advanced economies: from 38 per cent in New Zealand to 63 per cent in Denmark, and averaging about 48 per cent.¹¹ Trabandt and Uhlig (2009) estimate that, with only a couple of exceptions, average labour, capital and consumption tax rates in fourteen European Union countries and the United States lie below the peak of their

¹⁰Some authors have studied equilibria in which debt is not bounded in order to argue that monetarist/Ricardian equilibria are, in some sense, “general” (McCallum, 1984; Canzoneri *et al.*, 2001). Those equilibria fall apart, however, under the plausible assumption that the government does not have unlimited access to non-distorting taxes.

¹¹Statistics based on the marginal combined personal income tax rate on gross wage income (derived according to the OECD Taxing Wages framework) for a single person without dependants based on the earnings level where the top statutory rate first applies, combined central and sub-central governments (Organization for Economic Co-operation and Development, 2009).

respective Laffer curves and, frequently, well below the peak. By revealed preference, even countries that face fiscal stress are reluctant to push tax rates to the point where revenue is maximised.

We believe that both economic and political factors weigh heavily in the fiscal limit calculus. Political intolerance of high and rising marginal tax rates is likely to place an effective upper bound on rates well before reaching the peak of the Laffer curve. Major tax reforms in the United States, the United Kingdom, Sweden and elsewhere in the 1980s and 1990s, which dramatically lowered marginal tax rates across the board, were brought on by demands by the electorate for smaller government or reduced inefficiencies. That political consensus continues to reign even as populations age and fiscal stresses grow.

Several papers take a reduced-form approach to modelling political intolerance for rising marginal tax rates (Davig *et al.*, 2010, 2011; Davig and Leeper, 2011; Richter, 2011). Those papers posit that, as in the simple model above, there is a regime in which higher debt is financed by higher marginal tax rates. But as tax rates increase, political dissatisfaction rises. An increasingly disgruntled electorate raises the probability that the economy will hit its fiscal limit, at which point tax rates can no longer rise. Figure 2 illustrates the logistic function those papers employ to characterise how the probability of the limit increases with the tax rate.

This reduced-form approach has the virtue of treating the fiscal limit as uncertain, yet dependent on the state of fiscal policy. But it also has important shortcomings. First, there is no microeconomic rationale for using a logistic function to describe how the probability of hitting the limit evolves over time. Second, it is not obvious how best to connect the parameters of the fiscal limit function to observed data. Third, by taking a reduced-form approach, the method does not attempt to model any of the political or economic factors that determine the fiscal limit. Finally, as Figure 2 makes clear, the limit is couched only in terms of tax adjustments; social attitudes towards the government's provision of goods and services play an equally important role in fiscal adjustments.

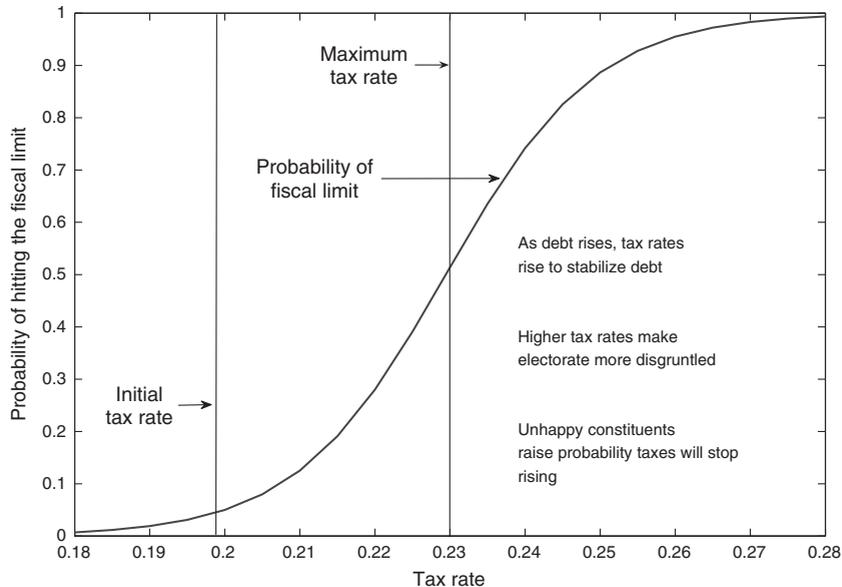


Figure 2. Probability of Hitting the Fiscal Limit – A Fixed Maximum Marginal Tax Rate – As a Function of the Tax Rate

Source: Davig *et al.* (2010).

Understanding what factors influence a society's attitudes towards taxation and government spending is essential to understand the consequences of fiscal stress. We turn now to suggestions for future research that will contribute to that understanding.

4. A Research Agenda

A country's fiscal limit depends not only on the current fiscal situation but also on expected *future* surpluses and is therefore, unobservable. For this reason, there are many subtle aspects to understanding and modelling fiscal limits in advanced economies. This section focuses on four elements of fiscal limits that we believe are important for future research: (i) identifying policy behaviour; (ii) quantifying fiscal limits; (iii) integrating heterogeneity and policy uncertainty; and (iv) anchoring fiscal expectations appropriately so that monetary policy can control inflation. These elements are obviously interrelated. Quantifying fiscal limits requires an accurate depiction of policy behaviour, which depends on modelling the political economy, and so forth. The list is not exhaustive, but represents our views about the most important omissions in our own work and in the current literature.

4.1 Identifying Policy Behaviour

Leeper (2010) argues that conducting fiscal policy analysis is much more challenging than monetary policy analysis due to "fiscal complexity." Relative to monetary policy, fiscal policy-makers have an ever-expanding range of fiscal instruments at their disposal – a complex tax code, a range of government spending decisions, debt maturity structure and so forth. And the ability to legislate implies that entirely new fiscal instruments can be created to deal with fiscal stress. All of these fiscal instruments will have an impact on a country's fiscal limit. In light of this complexity, modelling or identifying fiscal policy behaviour can be quite challenging. But because these fiscal changes distort important economic margins, an accurate depiction of (future) policy behaviour is critical to modelling fiscal limits.

Advanced economies have sophisticated political economy structures underlying their fiscal policies. Modelling fiscal policy using simple rules or as a benevolent social planner (or malevolent dictator), as is often done, seems inappropriate. Replacing the logistic curve of Figure 2 with a coherent political economy structure would advance the literature.

Recent work in political economy incorporates intricate policy formulations into a dynamic, stochastic, equilibrium framework (e.g. Battaglini and Coate, 2008). Entitlements reform is an example. As outlined in Section 2.2, which draws on the work by Davig *et al.* (2010, 2011) and Davig and Leeper (2010), entitlements reform or "reneging" on promised transfers enters the model through a reduced form parameter λ , the fraction of promised transfers that is delivered. Calibrating λ is quite difficult without linking it explicitly to the political economy. Many citizens view promised old-age benefits as a social contract whose violation has wide-ranging repercussions for the relationship between the electorate and its government. Here there is an inherent tension: fiscal stress is arising from ageing populations, but it is the same bulge in the population that is being asked to sacrifice through entitlements reform – will the old vote to make themselves less well off? Capturing these delicate relationships through a political economy setup would be a welcome addition to the literature.

It is not feasible to capture every dimension of fiscal policy in identifying policy behaviour. To understand fiscal limits, it might be more important to identify specific *characteristics* of policy formation. For example, policy stickiness suggests that advanced economies with well-developed democratic institutions may not be able to act quickly enough to mitigate the deleterious effects of fiscal limits (Alesina and Drazen, 1991). Stickiness is an outgrowth of the checks and balances of a democratic society, "by which the excellences of republican government may be retained and its imperfections lessened or avoided," as Hamilton (1787) wrote. But policy stickiness may also hasten the arrival of a fiscal limit by delaying the policy responses that would keep the economy away from the limit. Auerbach and Hassett (1992, 2001, 2002) and Hassett and Metcalf (1999) show that policy stickiness dramatically affects investment and consumption decisions in a standard dynamic

stochastic overlapping generations model. Auerbach and Hassett (2007) find that policy stickiness dramatically changes the nature of the equilibrium and of optimal policy. These results would be amplified in an environment with a looming fiscal limit.

4.2 Quantifying Fiscal Limits

How close is a country to its fiscal limit? This question is central to articulating the options available to policy-makers and to understanding the economic ramifications of a fiscal limit. But there is a dearth of research on the question. Quantifying the fiscal limit is challenging for reasons of fiscal complexity and because it relies on taking stands on unknown policy outcomes. There may be ways, though, to estimate a country's fiscal limit. For example, one policy option is to raise taxes to continue to fund old-age benefits until tax revenues decline; that is, until the peak of the Laffer curve is reached. Countries that are currently close to the peak of the Laffer curve will hit the fiscal limit sooner than those with room to raise taxes and increase revenue.

Recent work by Trabandt and Uhlig (2009) attempts to estimate Laffer curves for several countries. They document tremendous diversity in tax rates (and tax structures) across advanced countries. In 2007, the highest labour income tax rate was in Sweden (54.6 per cent) and the lowest was in the United States (28.4 per cent); for capital tax rates, the highest was in Denmark (59.3 per cent) and the lowest was in Greece (14.5 per cent); the United States had the lowest consumption tax rate by far (4.2 per cent), whereas Denmark had the highest (34.3 per cent). Using estimates from a stochastic growth model, Trabandt and Uhlig find similar heterogeneity with regard to where countries lie on their Laffer curves. They claim that some countries are already operating on the wrong side of the Laffer curve, whereas others have a substantial buffer before hitting the peak of the Laffer curve. Coupled with the fact that many advanced economies have dramatically different government spending programmes, tax diversity suggests that a one-size-fits-all approach to quantifying fiscal limits would be unproductive. Many pundits (and academics) cite the debt-to-GDP ratio as a measure of fiscal stress. Trabandt and Uhlig's results argue for more subtlety. For example, suppose two countries have identical debt-to-GDP ratios but country A is operating on the wrong side of the Laffer curve, whereas country B still has the ability to raise tax revenues. Surely, country B is much further away from its fiscal limit.¹²

There is a clear need to take models of fiscal policy to data as Trabandt and Uhlig (2009) have done. But the fiscal stress facing advanced economies is unprecedented, which raises the question: how can we extrapolate from past data to better quantify the fiscal limit? Although the United States and several other countries have encountered some form of fiscal stress in past decades, this time *is* different. At no point in the history of the United States (or other advanced economies) have we had the demographic trends playing out today. These are important limitations to the data that must be overcome through solid theoretical foundations. However, just as we should not rely solely on data that have no relevant observations, we also should not throw out all data and rely only on theoretical constructs.

We offer two examples of how data might be able to enhance our understanding of fiscal stress and fiscal limits. First, although there are few relevant data points to quantify fiscal limits in advanced economies, there are some projections that are likely to be quite accurate. These projections could be inserted into general equilibrium models as a way to simulate data points. For example, demographic projections over the next twenty to fifty years will be accurate (barring some unforeseen catastrophe). Although we are unsure of how fiscal policy will respond to ageing baby boomers, we are relatively confident that projections of old-age dependency ratios, like those in Figure 1, will come to fruition. These demographic changes would be the driving processes in a

¹²Ghosh *et al.* (2011) use data for 23 advanced economies from 1970–2007 and to conclude that fiscal limits vary substantially across advanced economies. Bi (2009) documents the wide range of debt–GDP ratios at which countries run into sovereign debt problems.

political economy model that examines alternative policy responses to fiscal stress. In a similar fashion, Davig *et al.* (2010) use Congressional Budget Office projections of the growth in entitlements programmes over the next sixty years to calibrate a non-stationary transfers process. Although it is debatable whether promised entitlements will actually be paid in the future, it is hard to argue that the CBO is grossly miscalculating the trend growth rate in these spending programmes.

A second example involves a recent occurrence in American politics to combat fiscal pressures. In times of fiscal stress, proposals to amend the US constitution to require the federal government to operate under a balanced budget rule gain currency. Calls for a balanced budget amendment became particularly strident in the 1980s and 1990s. An amendment requiring a balanced budget was nearly passed in 1995: the House of Representative approved the amendment by 300 to 132 but it fell one vote short in the Senate. More recently, Senators Lindsay Graham and Jim DeMint introduced a balanced budget amendment last year (SJ Res 24), which is still in committee. As fiscal pressures increase, this type of policy reaction becomes increasingly likely. Although this empirical observation does not provide a clear indication of how to model fiscal policy, it does suggest the importance of building in the possibility of adopting a policy rule that incorporates a balanced budget.

4.3 Combining Heterogeneity with Policy Uncertainty

There is a large and compelling literature that focuses on important intergenerational and distributional consequences of fiscal stress and fiscal limits (e.g. Auerbach and Kotlikoff, 1987; Kotlikoff *et al.*, 1998, 1999, 2007; İmrohoroğlu *et al.*, 1995, 1999; Cooley and Soares, 1999; De Nardi *et al.*, 1999; Huggett and Ventura, 1999; Altig *et al.*, 2001; Smetters and Walliser, 2004). The canonical model used in these papers is an overlapping generations model in which each cohort lives for fifty-five periods. This model permits rich dynamics in demographics – population-age distributions, increasing longevity – intra-generational heterogeneity, bequest motives, liquidity constraints, earnings uncertainty and so forth; it also allows for flexibility in modelling fiscal variables and alternative policy scenarios. The literature emphasises that heterogeneity in demographics and policy are first order when considering how fiscal policy affects welfare. The richness and complexity of the models, though, mean that only perfect foresight equilibria (or slight deviations from perfect foresight) are computed. The forward looking nature of the equilibrium pushes nearly all of the effects of fiscal stress into the present, which places unrealistically high weight on gloom-and-doom outcomes that are difficult to reconcile with observed data.

Papers by Davig, Leeper and Walker focus on modelling policy uncertainty and the complex interactions between fiscal and monetary policies. Their shortcoming is that the analysis is carried out in a representative agent environment that does not address the important distributional effects of fiscal policy.

A synthesis of these two approaches is essential for effectively modelling fiscal limits. Ignoring heterogeneity ignores the root cause of the problem. Demographics are driving the economy closer to the fiscal limit. But ignoring policy uncertainty assumes agents know far too much about pending policy adjustments. While acknowledging the need to act, politicians have done very little to inform their constituents about which policies will adjust and when.

Capturing both heterogeneity and substantial policy uncertainty in a dynamic, stochastic general equilibrium model is challenging. Nonlinear methods, which come with steep computational costs, must be employed. Recent work by Richter (2011) is an example of a model that captures both elements. He introduces a non-stationary promised entitlements process into the infinite period OLG setup of Yaari (1965) and Blanchard (1985). The primary benefit of his setup *vis-a-vis* traditional OLG frameworks is the ability to examine the distributional consequences of fiscal uncertainty. The flexibility of the model permits a regime-switching approach to policy uncertainty along with an OLG framework to address distributional effects. Preliminary results suggest that the distributional consequences of policy uncertainty are substantial. These findings are intriguing and further work along these lines is needed.

4.4 Anchoring Fiscal Expectations and Non-Rational Expectations

As the simple model in Section 2.2 makes clear, anchoring fiscal expectations in the appropriate way is essential for monetary policy to control inflation. Once taxes have reached the fiscal limit, there are only two possible sources of fiscal financing: (i) renegeing on promised transfers and (ii) surprise revaluations of outstanding nominal government bonds. Only under case (i) does an active monetary policy rule – such as the Taylor rule – continue to control inflation.

In a rational expectations environment, if agents place positive probability on scenario (ii) (even if it is not realised), monetary policy loses control of inflation. As scenario (ii) becomes more (less) likely, the actions of the monetary authority become more (less) futile. These powerful expectation effects are precisely what undermines “sound” fiscal policy.

But is a rational expectations framework appropriate in an environment where agents have almost no guidance from their government about how the fiscal stress will be resolved? Given that policy uncertainty must be cleanly modelled in a rational expectations framework – that is, agents’ subjective probability distributions must coincide with actual probability distributions – a non-rational expectations framework may be better suited to address questions of anchoring expectations. If agents have substantial uncertainty over which regime will materialise, allowing for subjective distributions to be robust to alternative policy scenarios seems reasonable.

We mention two examples of work that examines fiscal policy uncertainty and deviates from the rational expectations paradigm. First, Eusepi and Preston (2010, 2011) use a learning environment to give the notion of “anchoring fiscal expectations” precise content. They show that learning dynamics restrict the set of equilibria, relative to the rational expectations framework, in a model with uncertainty about monetary and fiscal policy. A key result is that the advantages of anchoring monetary policy are greatly diminished if fiscal expectations are not equally anchored. Agents must learn about stabilisation policies in both fiscal and monetary policy simultaneously. A stable, learnable monetary policy rule is not effective without a “passive” and learnable fiscal policy rule.

Second, Karantounias *et al.* (2009) introduce model uncertainty into the optimal fiscal policy problem of Lucas and Stokey (1983), and find that “expectations management” plays an important role that is absent from a rational expectations framework. A social planner has a novel incentive to smooth the shadow value of the agents’ subjective beliefs concerning government debt. Hence, optimal policy requires an anchoring of *subjective* fiscal expectations.

In describing the uncertainty surrounding fiscal policy, Sargent (2006) replaces the usual probability triple with a series of question marks. Entering an era of prolonged fiscal stress suggests that the level of uncertainty will only increase. Perhaps deviating from the rational expectations paradigm is necessary to capture this form of Knightian uncertainty.

5. Concluding Remarks

We have argued that there are striking parallels between monetary and fiscal policies in terms of controlling inflation, affecting the real economy, and stabilising the value of government debt. It is strange, therefore, that most macroeconomic research focuses on one policy alone, to the exclusion of the other policy. This artificial dichotomy runs the risk of providing misleading or incomplete understandings of how unresolved fiscal stress affects the economy and how alternative resolutions to the stress will play out.

Our call for research on fiscal stress carries an urgency not often present in academic work. Policy decisions will be made, even in a research void. The time to fill that void is now.

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