

Systematic Fiscal Policy and Macroeconomic Performance: A Critical Overview of the Literature

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Abstract

The literature on systematic fiscal policy and macroeconomic performance in industrialized countries is large but fragmented. Based on a broad overview of that literature, several patterns emerge. First, the empirical literature points toward strongly anticyclical policy, which consists of procyclical tax revenues, acyclical tax rates and government purchases, and countercyclical transfer payments. Secondly, consolidation in response to the debt has come primarily through adjustments to taxes and possibly purchases. Thirdly, a large government is associated with reduced macroeconomic volatility. Meanwhile, the theoretical literature on anticyclical fiscal policy has gone from mostly focusing on government purchases and tax rates toward beginning to focus on transfer payments, although more quantitative work remains to be done in linking theory with empirics. In addition, a policy literature has begun to develop, which has applied lessons from the theoretical literature in order to understand different consolidation scenarios and different proposed fiscal rules, particularly in Europe.

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1 Introduction

Traditionally, macroeconomists have put great emphasis upon the macroeconomic effects of systematic fiscal policy. Systematic fiscal policy is defined here as the component of fiscal policy which varies systematically in response to the public debt, output, or other economic aggregates; an example of systematic fiscal policy would be automatic stabilizers. However, despite this interest, since the events of the 1970s and 1980s, and particularly since the formulation of the Taylor (1993) rule, more emphasis has gone instead into evaluating the effects of monetary policy. This situation has begun to change since the Great Recession and arrival of interest rates at the zero lower bound. Given the inability to lower interest rates past this bound, discussion has begun to swing back toward the effects of fiscal policy. While the major part of this discussion has emphasized discretionary fiscal policy, another part of this discussion has emphasized systematic fiscal policy, particularly fiscal rules.¹ Given these developments, an appraisal of the current state of the literature is in order. Based on a broad overview of both the empirical and theoretical literature on systematic fiscal policy, both literatures have begun to place an increased emphasis on the role of transfer payments and the role of rule-of-thumb consumers or credit-market constraints as a propagation mechanism, although more work remains to be done in this area. Additionally, a small but expanding policy literature has begun to apply the lessons of the theoretical literature to the current situation. However, as with the theoretical literature, the policy literature can also benefit from a closer degree of integration with the empirical literature.

Looking at individual substrands of the literature, it is possible to synthesize a number of key points. The early empirical literature on systematic fiscal policy focuses on fiscal sustainability and fiscal-monetary interactions, particularly on the qualitative fiscal prerequisites for price stability. Out of that literature stems a broader quantitative literature, which has shifted its focus toward quantifying the strength of fiscal consolidation in response to the debt ("consolidation policy")

¹ For instance, Cogan, Cwik, Taylor, and Wieland (2010), Drautzburg and Uhlig (2011), and Coenen, Erceg, et al. (2012), among others, discuss the effects of different discretionary stimulus measures, while Alesina, Favero, and Giavazzi (2013) and Cogan, Taylor, Wieland, and Wolters (2013), among others, have discussed different discretionary consolidation scenarios.

in addition to quantifying the strength of anticyclical fiscal policy ("stabilization policy"). Synthesizing the results from the current state of this literature with respect to industrialized countries, fiscal authorities have tended to engage in a strong degree of stabilization policy which features countercyclical adjustments to transfer payments and constant tax rates over the business cycle, while fiscal authorities have engaged in consolidation policy primarily through adjustments to taxes and possibly purchases. Additionally, a larger government or welfare state tends to be associated with less output volatility. While the empirical literature is rather fragmented, these are the patterns that seem to emerge.

Meanwhile, the theoretical literature has focused on a wider variety of issues such as basic fiscal transmission mechanisms, optimal fiscal policy, stabilization policies, the interrelationship between systematic fiscal policy and fiscal multipliers, and the role of government size. With the exception of the literature on the role of government size, the theoretical literature has not lined up closely with the empirical literature. Based on a comparison of the two literatures, the theoretical literature in general might benefit from an increasing emphasis on rule-of-thumb consumers and transfer payments as a tool of stabilization policy, rather than procyclical tax rates or countercyclical government purchases. Additionally, this emphasis on rule-of-thumb consumers might go hand-in-hand with recent developments from the labor market literature. Alongside this theoretical literature, a new and expanding literature on policy scenarios could benefit from a stronger integration with the empirical literature in particular, to the extent that any proposed policy framework might wish to take the actual historical behavior of fiscal policy into account.

Because of the fragmented nature of the overall literature, a broad survey like this one can help to uncover a few commonalities which would otherwise go undetected. Such a survey is designed to help guide readers toward the main findings from the different strands of the literature and to provide a synthesis of these different strands. This survey is ordered in sections according to two main strands—an empirical strand and a theoretical strand—with an additional, smaller, policy-oriented strand. The empirical section covers the early qualitative literature on fiscal sustainability and fiscal-monetary interactions, as well as the subsequent quantitative literature on the behavior of systematic fiscal policy, before concluding with a quantitative discussion on the relationship between government size and

output volatility. The theoretical section proceeds in parallel, in a somewhat more fragmented way. That section gives a brief overview concerning the main transmission channels of fiscal policy, before moving on to talk about fiscal-monetary interactions, optimal fiscal policy, fiscal stabilization policy, the effects of systematic fiscal policy (particularly consolidation policy) on fiscal multipliers, and the role of government size. The subsequent section gives an overview of the policy literature, which tends to relate more closely with the theoretical literature than with the empirical literature. Approaching the literature with this structure in mind is intended to uncover some commonalities and gaps within the literature as a whole, and within the theoretical literature in particular.

Another word about the structure of this survey is in order. It is not possible to provide a detailed listing of every paper within each strand of the literature, nor to discuss every single finding. The criterion as to whether or not a given paper or a strand of literature was included within this survey is the answer to the question, "Does this paper, or this strand of literature, add substantially to an understanding about the effects of systematic fiscal policy or fiscal rules, within a macroeconomic context?" Based on this criterion, a focus on the macroeconomic consequences of systematic fiscal policy by necessity omits an extensive discussion of political economy issues as well as fiscal multipliers at or away from the zero lower bound, apart from a discussion about basic transmission mechanisms and intertemporal considerations. The issue of fiscal multipliers is already a well-researched issue, and those interested in the state of the literature on multipliers should see Ramey (2011) on spending multipliers, Mertens and Ravn (2012) on tax multipliers, or Hebous (2011) on discretionary fiscal policy in general.

2 Quantifying systematic fiscal policy

2.1 Testing for sustainability

The early empirical literature on systematic fiscal policy focuses on the issue of fiscal sustainability and its relationship with monetary policy, following the theoretical results of Sargent and Wallace (1981) and subsequent results. These results state that fiscal policy must be "Ricardian", or that the government must act

to honor its budget constraint in all states of the world, in order to ensure monetary control of the price level. Motivated by these results, a fair amount of econometric work went into developing statistical tests for debt sustainability. For instance, Hamilton and Flavin (1986), Wilcox (1989), Kremers (1989), Trehan and Walsh (1991), and Hakkio and Rush (1991) all develop tests to see whether or not the U.S. public debt has followed a sustainable course, with mixed results. These tests test whether the debt has historically followed a stationary process, or else they test whether revenues and spending were cointegrated one-to-one. Using a VECM to test for cointegration based on this idea, Bohn (1991) finds evidence that public deficits in the United States respond negatively to the debt stock based on a time series starting in 1791, which would imply sustainability. In further work, Bohn (1995) discusses issues related to the discounting of future cash flows when discussing debt sustainability in the presence of risk; and Bohn (1998) discusses the regime-dependence of long-run fiscal policy in the United States, which has featured periods of debt instability caused by wars, followed by consolidation during peacetime. In line with these results, Canzoneri, Cumby, and Diba (2001) also argue that the U.S. data tend to support a Ricardian view.

The subsequent literature on sustainability has also expanded to cover a wider range of countries. Afonso (2005) argues that the data do not support the Ricardian view for the EU-15 countries, while Mendoza and Ostry (2008) argue that on average, international fiscal policy is Ricardian. Altogether, the sustainability literature for both the US and for other countries has led to mixed conclusions depending on the time sample (since the beginning of the Republic, the postwar period, or some other period) and notion of sustainability employed. On the issue of sustainability, Bohn (2007) critiques that literature by noting that a debt ratio of any finite order of integration may be compatible with the transversality conditions implied by the theoretical literature. With a finite sample, there is always an order of integration greater than the length of the sample which will allow for Ricardian fiscal policy. In practice, the patterns from the literature indicate that findings of debt sustainability are more likely to occur when looking at a long time series and when modeling the public debt as $I(1)$ rather than $I(0)$, although it is not truly possible to test for sustainability without other auxiliary assumptions.

2.2 Quantifying systematic fiscal policy in the United States

Since the initial literature on sustainability, the subsequent literature has focused more on quantifying the ways in which systematic fiscal policy responds to the debt (consolidation policy) and to the business cycle (stabilization policy). The early quantitative literature has looked at the systematic response of fiscal policy to past fiscal shocks and to other types of shocks, by focusing on Granger Causality. These early studies include those of Anderson, Wallace, and Warner (1986), Manage and Marlow (1986), and Ram (1988), who seek to ascertain whether spending Granger causes taxes, or vice versa. These studies come to mixed conclusions. Subsequently, von Furstenberg, Green, and Jeong (1986), based on a VECM, find that taxes have tended to carry most of the burden of fiscal consolidation policy based on a sample from 1954 through 1981. Additionally, Miller and Russek (1990) report similar results, with some qualifications. Subsequent work by Bohn (1991) looks at the behavior of total federal government spending and revenue beginning in 1792 using a VECM. He finds that adjustments to taxes and to total spending each have accounted for a significant share of consolidation policy. Finally, using a narrative-based approach in a VAR, Romer and Romer (2009) find evidence that discretionary tax cuts "crowd in" government spending, while a large portion of tax policy is driven by future changes in spending.

More recently, emphasis has swung away from large VAR or VECM systems and toward more parsimonious models of fiscal policy, following the approach employed by Taylor (1993) in modeling monetary policy. In this vein, Taylor (2000) proposes a rule-of-thumb fiscal rule (or fiscal reaction function) based on past estimates, whereby fiscal authorities automatically engage in stabilization policy whereby the deficit-GDP ratio responds by 0.5 percentage points for every one percent fall in the output gap. Some results from this study and subsequent studies are shown in Figure 1; these studies all make use of Taylor's insight that fiscal policy could be modeled as following either an explicit or an implicit type of rule. Expanding Taylor's work on fiscal rules to look at revenues and spending at the same time, Auerbach (2002) estimates rules for revenue and spending, and he comes up with similar results to Bohn (1991) for a sample beginning in 1984. Using a different methodology, Muscatelli, Tirelli, and Trecroci (2004a) find a strong positive response of the level of government spending to growth in the output

Table 1: Estimated fiscal reaction functions for the United States

Source	Cyc.?	Order	Scaling	Dep. var.	Output	Debt	(Lag)	Notes
Taylor (2000)	No	Levels	GDP	Pri. Balance	0.45			OLS regression Sample: 1960:1-1999:III, federal government
Auerbach (2002)	Yes	Diff.	Full emp. GDP	Full emp. surplus	-0.057		-0.070	OLS regression; lagged budget surplus used Sample: 1956:II-2001:IV
Reicher (2014)	No	Diff.	Pot. GDP	Pri. def	0.381	0.137		Nonlinear 2SLS regressions, AR(1) error Sample: 1955-2007
					0.077	0.075		
			Pot. GDP	Gov. Purch.	0.017	-0.040		
			Pot. GDP	Taxes	0.032	0.039		
			Pot. GDP	Transfers	0.340	0.067		
			GDP	Taxes	0.065	0.059		
					-0.066	-0.028		
					0.020	0.021		
					0.118	0.062		
					0.064	0.054		

This table presents estimation results for a fiscal reaction function for the United States. This columns to this table describe the published source, whether or not the dependent variable is cyclically adjusted, whether or not the estimates are in levels or first differences, the scaling variable used, the dependent variable, and coefficients on the output gap, past debt levels, and a lagged dependent variable, plus any notes where applicable. Standard errors, where relevant, are in italics. Not included: Muscatelli, Trefli, and Trecroci (2004a) estimate a tax and spending rule within a DSGE model, based on quarterly data. Their rule allows for a richer lag structure than most other rules.

gap when estimating a fiscal rule embedded within DSGE model, and they find a strong positive response of the level of the tax rate to the level of the output gap. They also find that government spending falls in response to lagged budget deficits and that taxes rise in response to lagged budget deficits. Using a methodology similar to Auerbach, Reicher (2012, 2014) estimates a simple multi-instrument fiscal rule using postwar U.S. data where tax revenues, government purchases, transfer payments, and a balancing item may respond to either the public debt or to output, under the assumption that the driving process behind the residuals to these items (for instance, foreign conditions or the demographically-driven demand for transfer payments) follows a unit root. Reicher finds that the entire government sector for the United States has adjusted taxes and, depending on the time period, government purchases in response to the changes in the debt ratio. Altogether, the evidence for the United States has pointed toward a strong response of taxes to the public debt and a possible response of government purchases to the public debt, with transfer payments and tax levels, but not tax rates, responding to the output gap.

2.3 Quantifying systematic fiscal policy outside the United States

A quantitative literature parallel to that for the United States has looked at systematic fiscal policy in industrialized countries outside of the United States. This literature has faced similar challenges and come to mixed conclusions. One strand of that literature has concentrated on measuring the cyclicity of fiscal aggregates for industrialized countries. One of the first papers in this literature is that of van den Noord (2000), who compiles evidence on how tax revenues relate to the output gap for a number of countries, using information regarding the tax system of each country. Based on that set of metrics, he describes the systematic differences in the degree of stabilization policy across countries, and he describes the danger of stop-and-go fiscal policy whereby automatic stabilizers are offset by fiscal consolidation. The other main approach to measure cyclicity is a regression-based approach like that used for the United States. Using this approach, Lane (2003) provides econometric evidence that political power dispersion may positively affect the procyclicality of various categories of government spending, while GDP per capita may negatively affect the procyclicality of government spending.

Table 2: Estimated fiscal reaction functions for the Euro area and OECD

Source	Region	Cyc.?	Order	Scaling	Dep. var.	Output	Debt	Lag	Notes
van den Noord (2000)	OECD	No	Levels	GDP	Tot. balance	0.49			Based on information from tax code, transfer system
Boutheyllain et al. (2001)	Euro area	No	Levels	GDP	Tot. balance	0.49			Based on information from tax code, transfer system
Lane (2003)	OECD	No	Levels	(log)	Pri. spending	-0.12			Avg. of country-specific OLS regressions, AR(1) error
		No	Levels	GDP	Pri. balance	0.28			Sample: Unbalanced panel, 1960-1998
Girouard and Auré (2005)	OECD	No	Levels	GDP	Tot. balance	0.44			Based on information from tax code, transfer system
	Euro area	No	Levels	GDP	Tot. balance	0.48			Based heavily on van den Noord (2000)
Egert (2010)	OECD	No	Levels	?	Pri. balance	0.236	0.025	0.709	OLS panel regressions with fixed effects
		Yes	Levels	?	Pri. balance	0.002	0.02	0.771	Author did not provide standard errors,
		No	Diff.	?	Pri. balance	0.427	0.048	0.011	only asterisks
		Yes	Diff.	?	Pri. balance	0.097	-0.052	0.054	
Fatas and Mihov (2012)	OECD	No	Levels	GDP	Tot. balance	0.503	0.015	0.741	OLS panel regressions
		No	Levels	GDP	Pri. balance	0.034	0.004	0.024	Sample: Unbalanced panel, 1960-2010
		No	Levels	GDP	Pri. balance	0.463	0.021	0.728	
		Yes	Levels	Pot. GDP	Tot. balance	0.034	0.004	0.025	
		No	Levels	Pot. GDP	Pri. deficit	0.219	0.0128	0.806	
Plödt and Reicher (2014)	Euro area	No	Levels	Pot. GDP	Pri. deficit	0.493	0.081	0.026	Nonlinear 2SLS regressions, fixed eff., AR(1) error
		Diff.	Pot. GDP	Pri. deficit	Pri. deficit	0.133	0.014		Sample: Unbalanced panel, 1970 to 2007
						0.443	0.087		Results for alternative detrending methods similar
						0.110	0.021		
Reicher (2014)	OECD	No	Diff.	Pot. GDP	Pri. deficit	0.408	0.060		Pooled nonlinear 2SLS regressions, AR(1) error
						0.036	0.015		Sample: Unbalanced panel, 1955 to 2007
					Govt. purch.	-0.022	-0.042		
					Taxes	0.016	0.007		
					Transfers	0.308	0.027		
					Taxes	0.027	0.011		
					Transfers	-0.074	0.011		
					Taxes	0.011	0.006		
					Taxes	-0.016	0.034		
					Taxes	0.027	0.011		

This table presents estimation results for either the (semi-)elasticity of fiscal policy with respect to the output gap, or else for a fiscal reaction function, for regions outside the United States.

This columns to this table describe the published source, region under consideration, whether or not the dependent variable is cyclically adjusted, whether or not the estimates are in levels or first differences, the scaling variable used, the dependent variable, and coefficients on the output gap, past debt levels, and a lagged dependent variable, plus any notes where applicable.

Standard errors, where relevant, are in italics. Not included: Ballabriga and Martinez-Mongey (2003) estimate country-specific fiscal rules whose specification varies across countries; Claeys

(2006) includes inflation and interest rates in a policy rule, estimated by GMM for individual countries. Galí and Perotti (2003) include terms interacted with post-Maastricht dummies, and

Bénérix and Lane (2013) include terms interacted with post-Maastricht and post-EMU dummies.

Subsequent studies which discuss the measurement of the strength of stabilization policy in industrialized countries follow one or both of these approaches. Selected results from these studies are shown in Figure 2. These studies include those of Bouthevillain et al. (2001), who adopt a hybrid approach, Girouard and André (2005), who update the approach of van den Noord and find a large automatic component to stabilization policy, Égert (2010), who finds a strong degree of stabilization policy when a fiscal reaction function is estimated in first differences, and Bénétrix and Lane (2013), who find only a weak degree of stabilization policy when a fiscal reaction function is estimated in levels. Additional studies on the strength of stabilization and/or consolidation policy include those of Galí and Perotti (2003), Ballabriga and Martínez-Mongay (2003), and Claeys (2006), who find a broad pattern of consolidation policy in response to deficits as well as a strong degree of stabilization policy, without a clear pattern of consolidation policy in response to debt levels. Yet more studies include those of Fedelino et al. (2009), who discuss detrending, Golinelli and Momigliano (2009), who discuss the role that model specification and data revisions play in the estimated degree of stabilization policy, and García, Arroyo, Mínguez, and Uxó (2009), who discuss heterogeneity in fiscal policy within Europe. In addition, Égert (2010), Fatás and Mihov (2012) show that results are sensitive to the econometric specification, and Bénétrix and Lane (2013) find a weak response of fiscal policy to output when they include a lagged dependent variable in their regressions. Put together, this strand of the literature has come to contradictory conclusions, with econometric estimates often finding a lower degree of stabilization policy than more structural approaches. In order to analyze these differences, Plödt and Reicher (2014) apply different econometric assumptions to a common data set for the euro area, and they argue that taken together, the econometric evidence supports a specification which gives results more in line with those of Girouard and André (2005) and less in line with those of Bénétrix and Lane (2013).²

While there has been much work on the behavior of debt and deficits, less empirical work has related individual fiscal instruments to either the business cycle

² There is also a literature on the cyclicity of fiscal policy in developing countries which is not discussed here. For instance, Gavin and Perotti (1997) and Kaminsky, Reinhart, and Végh (2004) discuss the cyclicity of fiscal policy in Latin American countries, finding a certain degree of procyclicality.

or to the debt in a cross-country setting. Exceptions include the work of Végh and Vuletin (2012), who measure the procyclicality of top and marginal statutory tax rates in a panel of countries using a regression approach. They find that tax rates are acyclical for industrialized countries (but countercyclical in developing countries). In line with this approach, Reicher (2014) estimates a set of rich multi-instrument rules for a panel of twenty countries, finding that most industrialized countries have engaged in systematic fiscal policy in a broadly similar way to the United States, with a few cross-country differences as well. Interestingly, tax rates are acyclical in industrialized countries, while transfer payments are strongly countercyclical. The former finding is in line with the findings of Végh and Vuletin (2012), and both findings indicate that fluctuations in disposable income, rather than in tax rates or government purchases, are likely to be the main mechanism through which stabilization policies might stabilize the economy.

2.4 Quantifying the stabilizing effects of government size

In addition to the literature on stabilization and consolidation policies, there is also a small but relatively well-focused literature on the stabilizing effects of government size. This literature is based heavily on work by Galí (1994) and Fatás and Mihov (2001, 2012), who document that, in a cross section of countries and U.S. states, a higher share of government spending in GDP is associated with reduced volatility in GDP, employment, private investment, and private consumption. In addition, Debrun and Kapoor (2010) regress volatility in output growth on measures of government size (following Fatás and Mihov (2001)) and on the anticyclicity of fiscal policy derived from a regression approach. They find that while government size seems to be associated with less volatility, the measured strength of consolidation policy seems not to be strongly related with volatility. Elaborating upon this finding, Reicher (2014) finds that a large welfare state (expressed as a high rate of taxes or transfer payments, less so government purchases, relative to GDP) seems to be associated with less volatility, although the evidence on the effects of stabilization policy are ambiguous. Both Debrun and Kapoor (2010) and Reicher (2014) caution that attenuation bias might be an issue in these regressions with respect to the issue of stabilization policy. However, at the very least, there

does appear to be a clear, negative statistical relationship between government size (in particular the size of the tax and transfer state) and output volatility.

3 Understanding systematic fiscal policy in theory

3.1 Understanding standard fiscal policy transmission mechanisms

To understand the effects of fiscal policy rules in theory, an overview of the main fiscal policy transmission mechanisms is in order. A rather strong theoretical benchmark for understanding fiscal policy transmission remains the result of Barro (1974), which states that if fiscal policy is financed entirely through nondistortionary taxes or transfers, then the pricing of government debt should ensure that a fiscal expansion today must be associated with a correspondingly large fiscal contraction tomorrow, in present value terms. This would imply that households should feel no richer or poorer than before, and should therefore not change their behavior. In practice, there are ways in which this might not hold. This section focuses on three of these ways, which imply that fiscal policy might affect macroeconomic behavior. First of all, government purchases might vary over time; this mechanism operates through an income effect. Secondly, taxes may be distortionary; this mechanism operates through a substitution effect. Thirdly, a share of consumers might spend transfer payments instead of saving them, due to market imperfections. A short overview of these main mechanisms is helpful in understanding how systematic fiscal policy might affect macroeconomic aggregates, in order to make it possible to discuss the macroeconomic effects of systematic fiscal policy.

On the spending side, Baxter and King (1993) set up an RBC-style model where fiscal policy actions are taken through adjustments to government purchases, which represent a component of final demand. In such models, an increase in government spending operates through an income effect. By making households feel poorer, an increase in government spending should cause workers to work harder, increasing total output but crowding out private consumption. The crowding-out of private consumption is a controversial proposition, given the state of empirical work on multipliers, which sometimes does not find crowding out. To address this issue, Linnemann and Schabert (2004) and Linnemann (2006) find that if preferences

between private and government consumption are nonseparable, then an increase in government purchases can increase both private consumption and real output. In general, however, the transmission channel of government purchases in standard RBC-style models is best understood as operating through an income effect, which might be amplified through an increase in inflation when monetary policy is accommodative, or when monetary policy finds itself at the zero lower bound.

On the taxation side, Braun (1994), McGrattan (1994), and Chang (1995) analyze the effects of distortionary taxation on the business cycle. Their propagation mechanism relies upon the idea that distortionary taxes drive a wedge between the supply and demand for factors of production. When labor taxes are high, for instance, workers move inward along their labor supply curves and work fewer hours. This transmission channel for taxes reflects standard microeconomic reasoning whereby taxes operate through a substitution effect. In addition, tax cuts can have other more "Keynesian" effects since tax cuts increase disposable income, as would an increase in transfer payments.

On the transfer side, rule-of-thumb consumers can generate an effect of taxes and transfer payments on real aggregate demand and on production, using some degree of old Keynesian logic. In this vein, Mankiw (2000) and Galí, López-Salido, and Vallés (2007) obtain fiscal non-neutrality by assuming that a fraction of consumers consumes entirely from its disposable income, perhaps because they lack access to credit markets. An increase in transfers to households would result in an increase in consumption among these households, providing an additional channel through which fiscal stimulus may have real effects. Additional work has sought to develop better microfoundations for this type of behavior. For instance, as Challe and Ragot (2011) and others discuss, this type of behavior may occur in circumstances where households face credit constraints, with an additional effect of fiscal policy coming through the role of government debt as collateral. Altogether, crowding out may become less of an issue in this set of models than in models with homogeneous consumers, although Cogan, Cwik, Taylor, and Wieland (2010) caution that the results from New Keynesian models with rule-of-thumb consumers tend to look more like the results from RBC models than from old Keynesian models. Taking this caveat into account, the transmission channel for transfer payments and related interventions is centered around market incompleteness or non-optimizing behavior, rather than income or substitution effects per se.

3.2 Fiscal-monetary interactions in New Keynesian models

In addition to operating through the standard transmission mechanisms, fiscal policy might affect the ability of monetary policymakers to stabilize inflation. Since the work of Sargent and Wallace (1981), the literature on fiscal-monetary interactions has shown how systematic fiscal policy can affect whether or not monetary policy can successfully target the price level, based on the more general observation that changes in the price level affect the real value of the public debt. Work in this strand of literature, including that of Leeper (1991, 1993), Sims (1994), Woodford (1994, 1995, 2001), and others, has emphasized the point that the ability of central bankers to determine the price level depends on the presence of a fiscal policy regime which works to stabilize the public debt through consolidation in response to the debt (a "Ricardian" fiscal policy), absent default. This observation is based on the debt valuation equation, which implies that the real value of the public debt should equal the present value of real primary surpluses. When the systematic conduct of fiscal policy does not ensure that surpluses adjust to match the debt, something else (such as a change in the price level) must adjust the real value of the government debt. In such a situation, it is not possible for monetary authorities to control the price level.

In fact, in this situation (an "active" fiscal policy regime), for the price level to be stabilized, monetary authorities must follow a "passive" monetary policy regime whereby interest rates do not adjust by more than one-for-one in response to inflation. Otherwise the system characterized by inflation, interest rates, output, and debt levels has too many unstable eigenvalues. This situation is the inverse of one where monetary policy is "active" and follows the Taylor principle, whereby interest rates adjust by more than one-for-one in response to inflation. The line of reasoning for the case with active fiscal policy and passive monetary policy has come to be known as the "fiscal theory of the price level", and this line of reasoning is the basis for much of the literature on fiscal-monetary interactions. It should be emphasized that the fiscal theory of the price level does not depend on old Keynesian logic with respect to aggregate demand, but rather depends on new Keynesian logic with respect to making sure that the system has the right number of stable and unstable eigenvalues. That said, fiscal policy can affect output in

these models by affecting inflation, which then affects output through a Phillips Curve relationship.

3.3 Understanding optimal fiscal policy

Based on the types of transmission mechanisms and stability considerations outlined above, there is an extensive literature on optimal fiscal policy. Early work in this line includes Bohn (1992), who demonstrates that an optimizing fiscal authority would adjust both real purchases and distortionary taxes in response to shocks. In subsequent work, Chari, Christiano, and Kehoe (1994) and Benigno and Woodford (2006) derive an optimal fiscal policy path through a linear-quadratic approach, based on an RBC model. They find that optimal labor taxes should fluctuate relatively little, since the distortions from labor taxes are large and convex. Siu (2004) and Schmitt-Grohé and Uribe (2005) arrive at similar conclusions, based on results from computing a Ramsey optimal fiscal and monetary policy path based on a New Keynesian model.³ However, Arseneau and Chugh (2008) caution that this set of results is not necessarily robust to different specifications of the labor market and of the wage bargaining process; in particular, the presence of a "labor wedge" seems to tilt optimal fiscal policy toward the direction of more stabilization policy.

More recently, studies such as those of Cantore et al. (2013) and Burgert and Schmidt (2014) have begun to look at optimal fiscal policy under the zero lower bound on nominal interest rates, given that other research on the zero lower bound has hinted at large government spending multipliers. Burgert and Schmidt find that the initial debt level affects the degree to which the response of fiscal policy to past debt levels should be stronger or weaker. Beyond these two studies, this is an area where further work is being done, and results from this area are likely to guide policymakers so long as interest rates remain at or near zero in most industrialized countries.

³ Results from studies using simple rules have tended to come up with similar results. See Aurelio (2005), Kirsanova, Satchi, Vines, and Wren-Lewis (2007), Schmitt-Grohé and Uribe (2007) for an analysis of simple fiscal policy rules. See Beetsma and Jensen (2005), Chadha and Nolan (2007), Adam and Billi (2008), Galí and Monacelli (2008), Ferrero (2009), Mankiw and Weinzierl (2011), and Bi and Kumhof (2011) for an analysis of fiscal-monetary interactions using optimal simple rules.

3.4 Understanding the stabilizing effects of stabilization policy

While there is a large literature on optimal policy, there is also a significant literature on rules-based policy. A large portion of this literature has looked at rules-based stabilization policy in particular, based on the idea of Taylor (2000) that systematic fiscal policy could be modeled as following rule-like behavior. On this subject, Andersen (2005) presents a review of the early literature. As with the optimal policy literature, studies in the rules-based policy literature have tended to focus on one fiscal instrument at a time. This section discusses, in turn, the effects of tax-based stabilization policy, spending-based stabilization policy, and transfer-based stabilization policy.

With respect to tax policy, it is useful to distinguish between the effects of procyclical movements in marginal tax rates, and the effects of progressive tax rates. On procyclical movements in tax rates, Jones (2002) shows that procyclical movements in tax rates may have exerted an important stabilizing effect in postwar U.S. data, based on simulations conducted using an RBC model. In addition, Moldovan (2010) finds that procyclical tax rates can stabilize output but not increase welfare in an RBC model with monopolistic competition. This stabilization result appears because a larger tax wedge during good times can help to undo the effects of the original shock. However, the welfare properties of standard RBC models are such that deviations in allocations from the equilibrium allocation are necessarily welfare-reducing. This property of RBC models implies that while standard RBC models point toward a clear channel through which procyclical movements in tax rates may stabilize output, they lack a clear motive for output stabilization in the first place. To address this issue, Muscatelli, Tirelli, and Trecroci (2004a, 2004b) find ambiguous effects of automatic stabilizers in a New Keynesian economy which, thanks to nominal frictions, features a possible motive for output stabilization. As with the RBC literature, Muscatelli et al. find that procyclical tax rates tend to exert a stabilizing role in their economy as well, particularly in the presence of rule-of-thumb consumers.

There is another channel through which tax-based stabilization policy would operate, and that channel relies upon progressive tax rates. Progressive tax rates would operate through the same basic channels through which a procyclical marginal tax rate would stabilize output—by changing marginal tax rates and by buffering

changes in disposable income over the business cycle. For the first point, see Christiano and Harrison (1999), and see McKay and Reis (2013) for both points. However, it should also be noted that empirical work by Végh and Vuletin (2012) and Reicher (2014) finds that average tax rates appear to be acyclical in the data, and so it might be the case that the theoretical idea behind procyclical marginal tax rates might be of limited empirical relevance.

With respect to real government purchases, the literature has pointed toward a stabilizing effect in the case that these government purchases vary countercyclically. Stabilization occurs because, in most DSGE models, an increase in government purchases during bad times puts downward pressure on private consumption, shifting labor supply outward and increasing output. Based on this mechanism, Andersen and Holden (2002), Andersen and Spange (2006), Andrés and Doménech (2006), Ratto, Roeger, and in 't Veld (2006), Kirsanova, Satchi, Vines, and Wren-Lewis (2007), Colciago, Ropele, Muscatelli, and Tirelli (2008), and Kumhof and Laxton (2009) all find that countercyclical government spending may stabilize total output. However, the stabilization of output through government purchases may destabilize private consumption through crowding out and hence reduce welfare. This should be the case unless the share of rule-of-thumb consumers is particularly high, or else some other mechanism such as nonseparable preferences helps to sufficiently mitigate crowding out.

More recently, the literature has begun to analyze the effects of countercyclical transfer payments. To explore this idea, Kumhof and Laxton (2013) and Bi and Kumhof (2011) specify a fiscal rule where fiscal surpluses respond to the contemporaneous tax gap and to the public debt, in a model driven by technology shocks. This fiscal rule deviates from usual modeling of fiscal policy rules in that there are time t fiscal variables on the left-hand and right-hand sides of the rule. Bi and Kumhof find a large gain in welfare from an optimal simple rule which allows for transfers (or tax cuts) targeted to liquidity-constrained consumers to respond aggressively to the tax revenue gap. Subsequent work by Motta and Tirelli (2012) find similar results. In addition, McKay and Reis (2013) find that institutional features of the U.S. transfer system, particularly unemployment insurance and safety-net programs, in the presence of rule-of-thumb consumers, may result in a certain degree of automatic stabilization. Since the empirical evidence in this area points toward the importance of countercyclical transfer payments, more work in

this direction may help to reconcile the theoretical and empirical literatures in this area. In this work, one particular issue to take into account would be the way in which unemployment is modeled. Since countercyclical unemployment insurance payments can result in an elevated "outside option" for employed workers during periods of labor market slack, countercyclical unemployment insurance payments may have two opposing effects. One effect would come through an increase in the outside option which would destabilize the economy, while an opposing effect comes through an increase in the incomes of credit-constrained consumers which would stabilize the economy. Taking both effects into account, the simulations of McKay and Reis (2013) suggest that, for the United States, the latter effect should win out.

3.5 Understanding fiscal multipliers and consolidation policy

The literature on fiscal multipliers in the presence of systematic fiscal policy (particularly consolidation policy) has focused on the role of anticipated fiscal reversals in determining the effects of discretionary fiscal policy. To address fiscal reversals, Leeper, Plante, and Traum (2010) include a multi-instrument fiscal rule in a simple estimated DSGE model. Their model features a role for real government purchases and for distortionary taxes but not transfer payments. Based on this model, they find that the manner in which the public debt is stabilized may play an important role in determining the size and time path of fiscal multipliers, with a tradeoff between the short-run and long-run effects of consolidation. Other work on fiscal reversals, such as the studies of Leeper, Walker, and Yang (2010), Uhlig (2010), Drautzburg and Uhlig (2011), and Coenen, Erceg, et al. (2012) also emphasize these short-run / long-run tradeoffs. However, Corsetti, Meier, and Müller (2012) follow a different approach by including in their model a simple fiscal rule where the government adjusts purchases in response to debt levels. They find further evidence that systematic fiscal policy can affect the fiscal multiplier—in particular, that an aggressive response of government spending to the public debt can increase the government spending multiplier in the short run. Their findings sit somewhat in conflict with those of Leeper, Plante, and Traum (2010), which suggests that the choice of modeling assumptions may potentially play an important role in determining the multiplier effects of fiscal shocks under fiscal rules.

3.6 Understanding the stabilizing effects of government size

In contrast with the theoretical literature on stabilization policy and multipliers, the theoretical literature on government size tends to line up well with the empirical literature. Early work on the issue of government size includes the work of Galí (1994), who shows that the RBC model produces mixed results when attempting to match the negative empirical relationship between government size and macroeconomic volatility. On one hand, government purchases tend not to vary with the business cycle, and hence a larger government should stabilize total output (but not necessarily private consumption). On the other hand, a high tax rate should tend to destabilize the business cycle, which is not in line with the data. To reconcile this fact with theory, Andrés, Doménech, and Fatás (2008) include Keynesian rule-of-thumb consumers into an RBC model. Since consumers now consume partly out of current income, and current income is smoothed out through acyclical government purchases, private consumption is also smoothed out. Altogether, rule-of-thumb consumers, when inserted into a larger model, seem to help to bring the relatively small theoretical literature on government size into line with the empirical literature.

While the literature on government size has made significant progress, one place where the theoretical literature is still developing is on the effects of steady-state public employment and public wages on macroeconomic volatility. While there is work—notably the studies of Quadrini and Trigari (2007), Bradley, Postel-Vinay, and Turon (2013), and Gomes (2014)—on the effects of public sector employment and wage policies, the evidence on the effects of such policies does not yet appear to be settled. More work in this direction can help to uncover to what extent, if any, higher levels of public employment and wages might help to stabilize or destabilize the total economy and/or the private economy.

4 Informing the policy debate

Out of the theoretical literature, an applied policy literature on systematic fiscal policy has begun to develop, particularly following the European debt crisis. This applied literature is rather varied, although it has tended to focus on the twin issues

of stabilization and consolidation. On the issue of stabilization, Coenen, Straub, and Trabandt (2012) estimate the fiscal shocks to hit the Euro Area from 1985 onward, using an extensive multi-instrument fiscal feedback rule within a New Keynesian model. They find that discretionary anticyclical fiscal stabilization measures (particularly an increase in transfer payments) may have provided a fair amount of stimulus during the Great Recession, particularly during 2009. On the issue of consolidation, Coenen, Mohr, and Straub (2008) point out a tradeoff between the short-run and long-run effects of consolidation, in line with some of the literature on fiscal multipliers. Studies on different consolidation scenarios in the presence of these tradeoffs include those of Papageorgiu (2012) for Greece, Stähler and Thomas (2012) for Spain, and Cogan, Taylor, Wieland, and Wolters (2013) for the United States. All of these studies argue that consolidation should come through public consumption and not to public investment.

The results from these consolidation scenarios stand alongside a debate about "expansionary austerity", which can be summarized by the IMF's World Economic Outlook (2010, Chapter 3), in addition to more recent work by Alesina, Favero, and Giavazzi (2012), Bi, Leeper, and Leith (2013), and Alesina and Ardagna (2013). To summarize the results from this debate, it appears that most past episodes of fiscal consolidation appear to have been contractionary in their effects, with spending cuts less contractionary than tax increases. Other factors that influence whether or not the results of a consolidation episode are contractionary appear to include the stance of monetary policy, the role of net exports, uncertainty about the composition of a consolidation package, and expectations as to the effects of consolidation on future policy. Taken together, based on the results from this debate, it appears unlikely that a round of fiscal consolidation in the current environment would be expansionary in its effects, although some proposed consolidation packages may be more or less contractionary than others.

Other policy-related work has gone into evaluating the issues surrounding the implementation and likely effects of proposed fiscal rules. In this vein, Wyplosz (2005, 2013) discusses the institutional issues inherent in implementing fiscal rules, while Marattin and Marzo (2008) analyze the effects of the Stability and Growth Pact and other rules on macroeconomic outcomes. These issues are relevant in that the recent Fiscal Compact proposes a binding short-run debt-GDP target for the Eurozone, whereby member states reduce their debt ratios by 1/20 of the excess

debt ratio over 60% per year. Such a rule, as pointed out by Barnes, Davidsson, and Rawdanowicz (2012), combined with preexisting rules such as the Excessive Deficit Procedure, would require a rapid degree of consolidation in the short run and a low debt ratio in the long run. To mitigate the pain that this speed of consolidation would cause with respect to more volatile output in the short run, Snower, Burmeister, and Seidel (2011) propose an alternative fiscal rule for the Euro Area countries which would allow for slower consolidation in the presence of strong stabilization policies. Meanwhile, in the German context, Truger and Will (2013) criticize Germany's debt brake as excessively procyclical, while Mayer and Stähler (2009) point out that a debt brake promotes less procyclicality in fiscal policy than a stricter balanced budget rule. Altogether, the policy literature has addressed issues regarding consolidation and fiscal rules using tools gained from the theoretical literature in particular, although more work remains to be done to integrate the policy literature, particularly the literature on fiscal rules, with the empirical literature. In addition, more work remains to be done in designing fiscal rules that ensure a reasonable tradeoff between output volatility and a reasonable degree of consolidation policy.

5 Summary and conclusions

The main findings from the literature on systematic fiscal policy could be distilled down to the following main points:

1. In most industrialized countries, including the United States, procyclical tax revenues (but not tax rates) and countercyclical transfer payments comprise the main share of stabilization policy. Meanwhile, government purchases are acyclical.
2. In most industrialized countries, adjustments to taxes and possibly purchases, in that order, but not transfer payments, account for most consolidation policy in response to the public debt.
3. A large government size and particularly a large welfare state appear to be associated with less output volatility in the cross section.
4. Most of the theoretical literature on stabilization policy, meanwhile, has focused so far on procyclical tax rates and countercyclical government purchases, while recent work has begun to look more at transfer payments. More work remains

to be done in order to better link this strand of the literature with the empirical literature, and this work must take credit market imperfections as well as the structure of labor markets into account.

5. Systematic fiscal policy, particularly consolidation policy, has important implications for the size and the time path of fiscal multipliers because of anticipation effects.

6. A rapidly-growing policy literature has begun to apply the insights found in the theoretical literature, in particular, toward the issues of consolidation and fiscal rules. As with the theoretical literature, the policy literature can benefit from a stronger link with the empirical literature.

In general, the literature on systematic fiscal policy has had several successes and faces several challenges. Empirical work has made some progress in characterizing the basic time-series behavior of fiscal aggregates and in understanding the relationship between fiscal policy and macroeconomic stability. Meanwhile, the theoretical literature has begun to focus less on purchases and taxes and more on transfer payments. Meanwhile, the insights from the theoretical literature in particular have begun to provide guidance toward researchers, particularly in Europe, who seek to understand the effects of different possible fiscal policy regimes. Altogether, the path forward seems to involve putting more quantitative structure onto future theoretical and policy-related work, to the extent that certain major patterns seem to hold in the data.

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