Fiscal Policy Changes and Aggregate Demand in the U.S. During and Following the Great Recession

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Abstract

We examine the effect of federal and subnational fiscal policy changes on aggregate demand in the U.S. by introducing the fiscal effect (FE) measure. FE captures the effect of *all* fiscal policy changes on aggregate demand, not just those which are discretionary as in Follette and Lutz (2011). We decompose this new measure into three components. Discretionary FE quantifies the effect of discretionary or legislated policy changes. Cyclical FE captures the effect of the automatic stabilizers—changes in government taxes and spending arising from the business cycle. Residual FE measures the effect of all changes in government revenues and outlays which cannot be categorized as either discretionary or cyclical; for example, it captures the effect of the secular increase in entitlement program spending due to the aging of the population. We use FE to examine the contribution of fiscal policy changes to growth in real GDP over the course of the Great Recession and current expansion. We compare this contribution to the contributions to growth in aggregate demand made by fiscal policy changes over past expansions. In doing so, we highlight that the strong support of government policy to GDP growth during the Great Recession was followed by a historically weak contribution over the course of the current expansion.

Introduction

Changes in fiscal policy can have significant effects on economic growth. Government outlays are often increased in the wake of an economic slowdown to buttress economic activity and taxes automatically dampen the swings of the business cycle. In this paper we develop a new measure to quantify the effect of fiscal policy changes on aggregate demand. Our measure, Fiscal Effect (FE), quantifies the direct, or first-round change in aggregate demand arising from changes in taxes, transfers and government purchases at the federal, state, and local government levels.

We decompose changes in fiscal policy into discretionary, cyclical, and residual components in order to estimate their contribution to real GDP growth. FE is related to the "Fiscal Impetus" (FI) measure that previous research has used to quantify the effect of government policy actions on aggregate demand growth (see Follette and Lutz, 2011). The main distinction between FI and FE is that FE quantifies the effect of all types of policy changes while FI focuses solely on discretionary changes. Including all three types of changes allows this new measure to comprehensively capture the effect of all fiscal policy changes on the growth in aggregate demand.

Over the period 1970-2015, we find that changes in fiscal policy boosted growth in real GDP by $\frac{1}{3}$ percentage points annually on average. Moreover, FE has a clear counter-cyclical pattern, as fiscal policy changes boosted aggregate demand by 1½ percentage points during contractions, which was more or less evenly divided between discretionary policy actions and the impact of the automatic stabilizers. Our estimate of FE also indicates historically large contributions to growth during the Great Recession. In contrast, we estimate FE to be negative in the years following the Great Recession, whereas it had been positive on average during prior expansions. The unusual restraint from policy changes was primarily due to discretionary policy actions.

The next section outlines our methodology for FE and the following section discusses the results. The final section concludes.

Methodology

FE is a bottom–up approach that involves developing a measure of each major type of fiscal policy change—for example, a discretionary cut in personal taxes or a cyclical increase in

unemployment insurance claims—and aggregating them into a single fiscal indicator that quantifies the impulse to growth in real GDP coming from *changes* in fiscal policy. Our measure only accounts for the direct, or first-round change in aggregate demand arising from fiscal policy. In particular, it does not account for follow-on, or multiplier, effects that may result from the first-round changes in aggregate demand. FE captures the effect of fiscal policy at all levels of government, including federal, state and local, and is based upon estimates of government revenues and expenditures in the National Income and Product Accounts (NIPA). The FE methodology draws heavily from past work on discretionary fiscal effects of Follette and Lutz (2011) and Follette, Kusko and Lutz (2008).[1]

FE is constructed in three steps. First, we decompose the total annual change in taxes, transfers, and government purchases into discretionary, cyclical and residual components. Second, we estimate the effect of these changes in outlays and revenues on aggregate demand. To do so, we must make assumptions with respect to both the magnitude and timing of the effect. We develop these assumptions using guidance from the FRB/US model, and research about the response of consumers and businesses to changes in fiscal policy.[2] Thus, FE is model dependent; different modeling approaches might point toward different behavioral responses in terms of both magnitude and timing, and hence different estimates of FE. Third, we aggregate the effects from the second step into a single measure. Below, we discuss the specifics of the first two steps of the procedure. The appendix contains a more formal presentation of this material.

Before discussing the specifics of each step, though, it is helpful to provide a precise statement of the counterfactual baselines implicitly used to define each of the components of FE. Discretionary FE can viewed as estimating the effect on aggregate demand of a discretionary change in government policy versus a counterfactual in which the change in discretionary policy did not occur. Cyclical FE can be viewed as estimating the effect on aggregate demand of a cyclical swing in outlays and revenues against a counterfactual in which these outlays and revenues are held constant as a share of potential GDP and thus are not allowed to vary with the business cycle. Residual FE can be viewed as estimating the effect on aggregate demand of a

[1] In these past papers, the measure was termed Fiscal Impetus (FI). Discretionary FE and FI are equivalent, save for the change in terminology. Total FE is a broader concept than FI, as it captures the effect of cyclical and residual changes in policy as well as discretionary changes.
[2] For information on the FRB/US model, see Brayton, Laubach and Reifschneider (2014) and the references therein.

change in revenues and outlays not attributable to either discretionary actions or to swings in the business cycle against a counterfactual in which these residual changes did not occur. For instance, the secular increase in Social Security payments due to the aging of the population is captured by residual FE. In this case, the counterfactual is a constant real outlay for Social Security – i.e. outlays which are not influenced by the aging of the population.

Decomposing Changes in Fiscal Policy

The first step of the procedure requires that annual changes in real outlays and revenues be decomposed into discretionary, cyclical and residual pieces. Starting with discretionary fiscal policy changes, all changes in real purchases are considered to be discretionary because they are generally controlled by the annual appropriations process. We estimate the discretionary (or legislated) changes in federal taxes, other revenues and transfer programs such as Social Security using a wide variety of sources, including the estimates of the Congressional Budget Office (CBO) and Joint Committee on Taxation (JCT).

Turning to the subnational level, for state government discretionary revenue changes we use the data collected by the National Association of State Budget Officers (NASBO). We lack data sources for discretionary changes in either local revenues or for state or local transfer expenditures; instead, we use the NIPA-based measures of discretionary policy change developed in Follette and Lutz (2010) for these revenues and outlays. For instance, with regard to property taxes, our policy indicator is the ratio of NIPA property tax receipts to nominal potential GDP, which we dub the effective property tax rate. When this effective tax rate is constant from one year to the next, policy is defined as being constant. Movements in the effective tax rate are interpreted as changes in discretionary policy.

Identifying the cyclical component of fiscal policy is considerably more involved. To identify changes in government revenues and expenditures which occur as a result of the business cycle – the so-called "automatic stabilizers" – we use the high-employment budget framework. Our implementation is based on the methodology developed for the federal budget by Frank de Leeuw et al (1980), refined by Cohen and Follette (2000) and Follette and Lutz (2010), and subsequently applied to the state and local sector by Knight, Kusko, and Rubin (2003), and Follette, Kusko and Lutz (2008). It is quite similar to the high-employment methodology currently used by the CBO to produce cyclically-adjusted federal budget deficit

estimates – i.e. the deficit that would prevail given current policy if GDP growth equaled its potential growth (Russek and Kowalewski, 2015). Here we provide only a very brief overview of our high-employment approach and refer those interested in additional details to the above works and the appendix.[3]

To calculate the cyclical component of receipts, we estimate the elasticity of total government receipts with respect to the GDP gap – the difference between actual GDP and potential GDP divided by potential GDP (using the CBO's potential GDP concept and estimates, see CBO 2016). This elasticity depends upon three factors: the composition of receipts, the estimated cyclicality of the base for each major tax, and the elasticity of the tax to the base. A bit more formally, the overall cyclical elasticity of the tax system, $\varepsilon_{T/GDPGAP}$, is:

$$\varepsilon_{T/GDPGAP} = \sum \varepsilon_{B_i} \cdot \varepsilon_{\tau_i} \cdot \frac{T_i}{T} \tag{1}$$

where T is total tax collections, T_i is the collection from tax i, B_i is the tax base of tax i, ε_{B_i} is the elasticity of B_i with respect to the GDP gap and ε_{τ_i} is the elasticity of tax i with respect to B_i. ε_{B_i} is estimated with time-series regressions of components of the tax base with respect to the GDP gap. On the contrary, we do not estimate ε_{τ_i} using simple time-series regressions because movements in tax receipts in these data include frequent and sometimes substantial policy changes. Rather, we take a more nuanced approach and construct the tax elasticities using detailed information about the tax code, its changes over time and a variety of auxiliary regressions.[4] [5] The elasticities are allowed to be time-varying in many cases. Finally, cyclical receipts for each year are calculated using estimates of $\varepsilon_{i/GDPGAP}$ and the CBO's estimate of the GDP gap that year.

Cyclical transfers, which are generally much smaller in absolute value than cyclical receipts, are generally calculated as a function of changes in the unemployment rate.

[3] The mostly minor changes in methodology relative to Follette and Lutz (2010) are discussed in the appendix.
[4] For instance, we construct the personal income tax elasticity based on a variety of data including the administrative definition of personal income for tax purposes, the NIPA definition of personal income, the number of tax returns, income per return, number of filers versus non-filers, information on the tax schedule and information on the distribution of income. We allow for a break in our estimation approach before and after the Tax Reform Act of 1986. See Cohen and Follette (2000) for details.
[5] While we do not use time-series regressions to estimate the tax elasticities, in many cases our estimated elasticities are quite similar to those estimated from time-series regressions.

Unemployment benefits are by far the largest contributor to cyclical expenditures. Other cyclical expenditures include food stamps, welfare (currently the TANF program), and Medicaid. Some transfers programs, such as Social Security, are assumed to be non-cyclical. Finally, once we have calculated the level of cyclical revenues and transfers using the high-employment framework, we calculate cyclical changes by simply taking first differences.

Residual changes in fiscal policy capture all changes in revenues and outlays that cannot be accounted for by discretionary and cyclical changes. Thus, they are calculated as the difference between the total annual change in revenues (expenditures) and the sum of discretionary and cyclical revenues (expenditures).

Response to Fiscal Policy Changes

The second step of the FE procedure involves determining the effect of fiscal policy changes on aggregate demand. Our approach involves applying estimates of the marginal propensity to consume (MPC) to the revenue and expenditure changes calculated in the first step of the FE procedure. The MPC estimates are taken from either the coefficients in the macroeconomic models used by the Federal Reserve Board staff or from the relevant literature and are allowed to vary across each major type of revenue and outlay and whether the change is discretionary, cyclical, or residual. For instance, a discretionary change in personal income taxes and a cyclical change in transfer payments have specific MPCs assigned. Table 1 displays our chosen dynamic MPC estimates, distinguishing between permanent and temporary fiscal policy changes. In general, we assume that consumers and businesses do not respond to a change in fiscal policy until it is realized.[6] For example, consumers are assumed to respond to an income tax rebate upon its receipt rather than its announcement. Consistent with the research literature, we assign larger total MPCs to permanent tax changes, but set these MPCs below one (Jappelli and Pistaferri, 2010).

[6] Some studies, such as Auerbach (2003), instead base the timing on when the policy is enacted. It is our judgment that the empirical literature finds relatively little support for quantitatively important announcement effects on aggregate demand. For example, the consumption literature, in general, finds "rule of thumb" behavior by many consumers but little support for "Ricardian" behavior. Survey evidence shows little awareness of tax law changes. By contrast, there is some support for anticipatory changes in taxable income to tax law changes: The timing of dividends, bonus payments and other forms of income were shifted into late 2012 in response to the expected increase in tax rates in 2013.

Discretionary MPCs

We assume that changes in government purchases affect aggregate demand on a one-for-one basis and hence have an MPC of 1: a $1 million increase in purchases immediately boosts demand by $1 million. As a change in government purchases maps one-for-one into a change in GDP in the NIPA, this is a very natural assumption.

For discretionary personal income tax changes we use an MPC of 0.7 phased in over two years following the tax policy change.[7] Thus, a $1 billion personal income tax cut—which increases the disposable income of households—would be scored as boosting the level of GDP by $700 million by the end of two years. For temporary personal income tax changes, our MPC of 0.5 reflects recent studies (e.g. Parker et al., 2013) which find a sizeable consumption response to temporary income shocks in the first few quarters upon receipt. We also use these personal income tax MPCs for discretionary changes in sales and property taxes.

For corporate discretionary tax changes we account for two effects: the standard income channel and the incentive channel. For the income channel, we assign relatively smaller MPCs to both permanent and temporary corporate income tax changes, which partly reflects recent findings (e.g. Patel et al., 2015) that the marginal propensity to invest out of corporate income tax changes is small and may be zero.[8] To account for the incentive channel due to partial expensing (i.e bonus depreciation) we use the findings in House and Shapiro (2008) and Cohen and Cummings (2006).

Discretionary transfers include extended unemployment insurance (EUC), old-age programs such as Old-Age and Survivors Insurance (OASI), and programs targeted at low-income households such as the Supplemental Nutrition Assistance Program (SNAP). Despite its

[7] See Jappelli and Pistaferri (2010) for a review of the literature on the consumption response to income changes. Our 0.7 MPC is broadly consistent with this review.

[8] Nonetheless, the permanent corporate tax change MPCs equals 0.5 as the tax changes likely capitalize into the value of the firms and thereby increase the wealth of the household sector.

Table 1: MPC Selections

Component	Type		Duration	*t*	*t-1*	*t-2*	*t-3*	*t-4*	*t-5*	*t-6*	*t-7*	*t-8*	Total
Discretionary	Taxes	Personal income	Permanent	-0.25	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.70
			Temporary	-0.28	-0.18	-0.04							-0.50
		Corporate income	Permanent	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.05	-0.50
			Temporary	0.00									0.00
		Social Insurance	Permanent	-0.25	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.70
			Temporary	-0.28	-0.18	-0.04							-0.50
		Production and Import	Permanent	-0.10	-0.10	-0.10	-0.10	-0.10	0.00	0.00	0.00	0.00	-0.50
			Temporary	-0.05	-0.05	-0.05	-0.05	-0.05	0.00	0.00	0.00	0.00	-0.25
		Property and Sales	Permanent	-0.25	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.70
			Temporary	-0.28	-0.18	-0.04							-0.50
	Transfers	Unemployment Insurance		0.50	0.50								1.00
		Other	Permanent	0.35	0.25	0.10	0.05	0.05	0.05	0.05	0.05	0.05	1.00
			Temporary	-0.28	-0.18	0.04							0.50
Automatic stabilizer	Taxes	Personal income		-0.27	-0.14	-0.04	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.57
		Corporate income		0.00									0.00
		Social Insurance		-0.28	-0.18	-0.04							-0.50
		Production and Import		-0.05	-0.05	-0.05	-0.05	-0.05					-0.25
		Property and Sales		-0.28	-0.18	-0.04							-0.50
	Transfers	Unemployment insurance		0.50	0.50								1.00
		Other		0.45	0.45								0.90
Residual	Taxes	Personal income		-0.27	-0.14	-0.04	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.57
		Corporate income		0.00									0.00
		Social Insurance		-0.28	-0.18	-0.04							-0.50
		Production and Import		0.00									0.00
		Property and Sales		-0.28	-0.18	-0.04							-0.50
	Transfers	Unemployment insurance		0.50	0.50								1.00
		Other		0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.70
		Medicaid		0.45	0.45								0.90

Note: Some patterns extend beyond nine quarters. Transfers includes all domestic social benefits.

temporary nature, we apply an MPC of one for EUC because the households receiving it are likely to be liquidity constrained and thus "hand-to-mouth" (HtM) consumers. Misra and Surico (2014) find that such households have an MPC out of temporary income changes that exceeds one half and for some HtM households exceeds one. For permanent changes to transfers, we also use an MPC of one. We do so because low-income recipients are likely to be HtM households, while retired households are in the dissaving portion of the life cycle. Finally, we apply an MPC of 0.5 to temporary legislative changes to transfers. In recent years, such legislative changes have focused on retired households (e.g. the 2008 tax rebate). An MPC of 0.5 seems appropriate because on the one hand, retired households are dissaving and have a shorter time horizon, which would argue for an MPC closer to one. On the other hand, the transfer is temporary and retired households are much less likely to be HtM consumers than the rest of the population (Kaplan and Violante, 2014), which would suggest an MPC out of a temporary transfer that is close to zero.

Cyclical MPCs

Cyclical changes in taxes and transfers are by definition temporary. For this reason, we set most of the MPCs in the cyclical category equal to (or close to) their corresponding temporary MPCs from the discretionary category, with the exception of personal income taxes and non-UI transfers. The cyclical non-UI transfers category includes mostly transfer programs targeted at low-income households such as SNAP. Accordingly, we apply an MPC closer to one.

Residual MPCs

The MPCs that we apply to residual changes in taxes and transfers are by and large the temporary MPCs applied for discretionary changes. One exception is the 'Other transfers' category. This category consists primarily of secular growth in OASI and Medicare due to an aging population. We use a relatively large MPC of 0.7 in this case as the switch from a regime in which these payments in aggregate rise with the aging of the population to a regime in which the aggregate payment is fixed amounts to a sudden and permanent reduction in payments for program recipients.

Uncertainty and Limitations

There are at least four important sources of uncertainty surrounding the FE measure. The first arises from the MPC estimates used to construct FE. Although these MPC estimates are firmly grounded in the research literature and the FRB/US model, they remain subject to considerable uncertainty. The second source of uncertainty concerns difficulty in assessing the timing of the response to a change. (In general, we time the impetus with the implementation of the policy, rather than with the enactment.) The third source of uncertainty arises from our estimates of the magnitude of discretionary policy changes. While we generally obtain these estimates from organizations well equipped to conduct such budget scoring—e.g. the Congressional Budget Office (CBO) and Joint Committee on Taxation (JCT)—they are subject to error. Finally, our estimates of the cyclical component of government taxes and transfers are subject to significant uncertainty owing to use of latent, unobserved potential GDP, the complexity and noise surrounding the cyclical elasticities of taxes and transfers, and the presence of phenomena that may have some cyclical component, but do not move in lockstep with the business cycle such as financial markets or the housing market.

Finally, there are two limitations to the FE methodology that are worth highlighting. First, FE may fail to capture some fiscal policy changes that influence aggregate demand. For instance, it has been argued that federal credit policies (e.g. student loans) provided substantial support to aggregate demand in the period during and following the financial crisis of 2008 when private credit markets were impaired (Lucas 2016). However, the NIPA, by design, does not capture the financial flows that result from the credit programs.[9] Thus, FE fails to account for any effects of the spike in loan disbursements from these programs in the years following 2008. Second, FE is only appropriate for assessing the aggregate demand effects of short to medium-run changes in fiscal policy as our chosen MPC's are unlikely to be appropriate for longer-run responses. In the longer term, households and businesses have substantially more margin for adjustment to policies than in the short to medium run. As a result, the appropriate long-run MPCs may differ from the MPCs we have chosen.

9 In general, these financial flows are instead captured in the Financial Accounts of the U.S. The NIPA does, though, book interest payments from the loan program as federal receipts.

Results

Given that it has been the focus of many past analyses, we start with discretionary fiscal policy changes. Figure 1 displays our estimates from 1970 to present of discretionary FE. The second column of Table 2 describes the average contribution to GDP growth from discretionary policy actions over different parts of the business cycle. Positive values indicate that discretionary actions are stimulating the growth of aggregate demand, while negative values suggest that policy is restraining growth in demand.

Table 2: Fiscal Effects over the Cycle

	Total	Discretionary	Cyclical	Residual
All	0.33	0.40	0.03	-0.10
Expansion	0.11	0.34	-0.12	-0.11
Contractions	1.47	0.73	0.77	-0.02

Note: Annualized contribution to GDP Growth

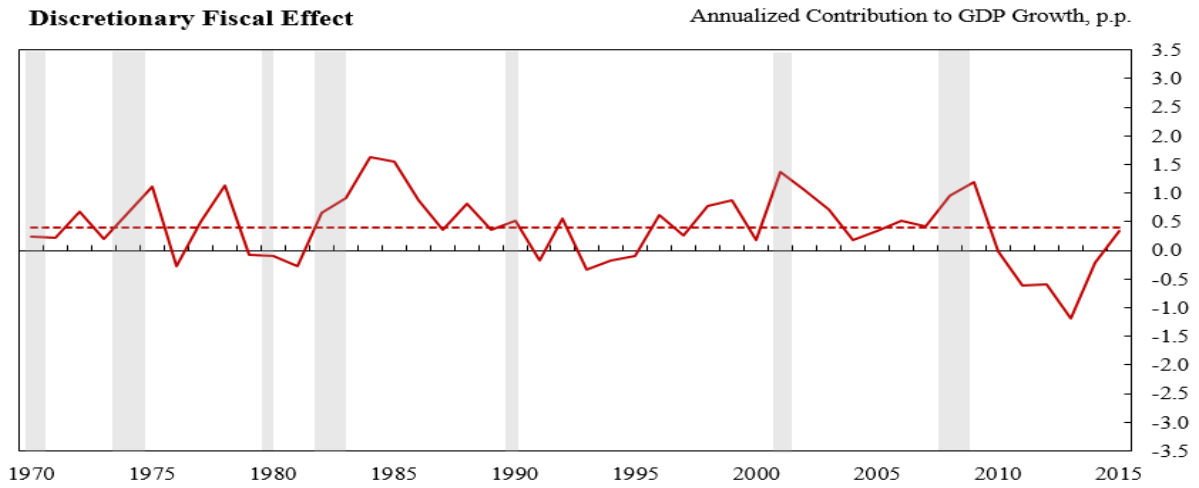
Several observations jump out. First, discretionary policy is typically stimulative, boosting GDP growth by 0.40 percentage point per year, on average, over this period. Moreover, discretionary fiscal policy tends to be more stimulative during and shortly after contractions than during expansions. The level of stimulus from discretionary policy during and immediately following the Great Recession was not extraordinary; discretionary FE in this period is broadly similar to that in the early 2000s and is lower than in the early 1980s. Finally, the duration, and to a lesser extent the depth, of fiscal restraint from discretionary policy over the last several years has been extraordinary.

Next, we examine total FE, which includes the effects of not only discretionary policy changes but also cyclical and residual fiscal policy changes. Figure 2 plots total FE and its components. Table 3 includes the correlations between total FE and the individual pieces. Two observations are worth noting when comparing total and discretionary FE. First, total FE is less stimulative than discretionary FE, boosting GDP growth by 0.33 percentage points per year, on average, over this period. Total FE is smaller than discretionary FE because, on average, the residual component is a drag on GDP growth of -0.10 percentage points over this period, while the cyclical component is approximately neutral. Second, total FE tends to be more

countercyclical than discretionary FE. The difference is primarily due to cyclical policy effects that provide a large boost during recessions and a drag during recoveries

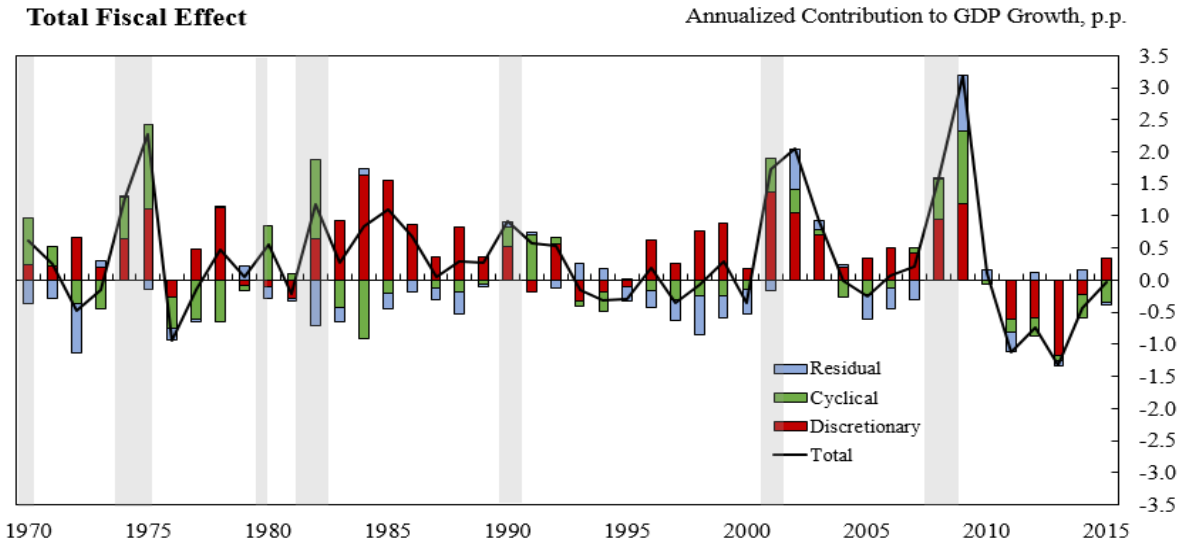
In terms of the non-discretionary components, cyclical FE averages roughly zero and, as expected, is extremely stimulative during contractions and imposes a mild drag during expansions. Residual FE is slightly negative on average and, perhaps surprisingly, is mildly countercyclical as it imposes more drag during expansions than during contractions.

Figure 1.



Note: Dashed line is average from 1970-2015. Grey indicates contractionary periods as defined by the National Bureau of Economic Research.

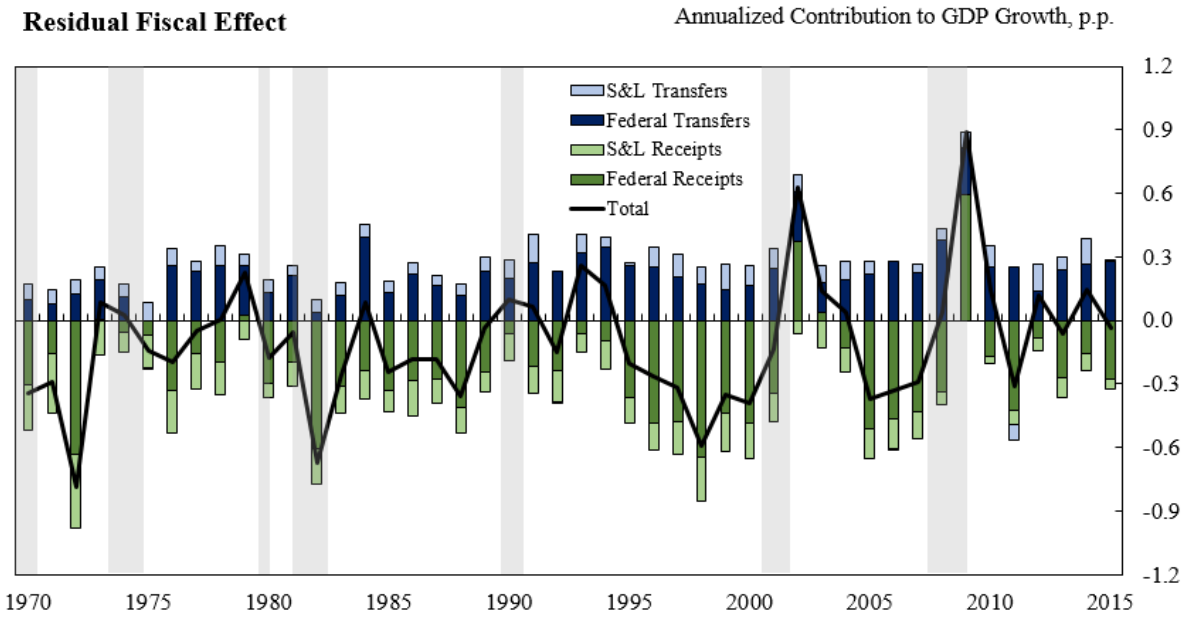
Figure 2.



Residual FE

In this section, we assess why residual FE has been negative on average, why it exhibits some countercyclicality, and whether measurement error in the other components of FE may be responsible for a portion of the observed variation in residual FE.

Figure 3.



Note: Grey indicates contractionary periods as defined by the National Bureau of Economic Research.

We begin by examining the major components of residual FE and their contributions to its magnitude over time, which are displayed in Figure 3. Provided that we accurately estimate discretionary and cyclical FE, we would expect that residual FE captures secular trends such as the secular growth in real incomes and the secular growth in entitlement spending due to the aging of the population. We would also expect that residual FE captures swings in tax receipts and transfers that are not due to discretionary policy action and do not necessarily move in lock step with the cycle, such as capital gains realizations.

In general, transfers have boosted residual FE since 1970, while tax receipts have restrained it. The fact that residual transfers have had a positive effect on GDP growth is consistent with increased mandatory outlays by the government on public pensions and health care for an aging population. Similarly, the negative contribution of tax receipts is consistent with secular real income growth pushing up tax collections (including the effect of real bracket

creep). Because the tax receipts effect has dominated, residual FE has been slightly negative on average.

While the average contribution of the major components of residual FE matches our priors, we nonetheless observe some countercyclicality, which could be due to measurement error – that is, discretionary or cyclical policy changes incorrectly allocated to the residual category. To determine whether this may be the case, we first examine the correlations between residual, discretionary, and cyclical FE, shown in Table 3. Residual FE is nearly uncorrelated with discretionary FE and the correlation between residual and cyclical FE is weak, with a correlation coefficient of only 0.13. While hardly definitive, these findings are reassuring and suggest that residual FE is not obviously contaminated by discretionary or cyclical effects.

Table 3: Correlation between Components of Fiscal Effect

	Total	**Discretionary**	**Cyclical**	**Residual**
Total	1.00	-	-	-
Discretionary	0.73	1.00	-	-
Cyclical	0.67	0.11	1.00	-
Residual	0.40	-0.02	0.13	1.00

A close look at Figure 3 reveals two large positive outliers in residual FE in 2002 and 2009. These years are the only years in which residual federal receipts made a large positive contribution to GDP growth. Comparing federal receipts in 2002 and 2009 to other years, one component stands out – capital gains realizations. In most years, capital gains realizations made a small and negative contribution to GDP growth. In contrast, capital gains realizations in 2002 and 2009 fell sharply, resulting in lower tax receipts and a relatively large positive contribution to GDP growth. The decline in capital gains realizations could explain up to 50 percent and 33 percent of the contribution of residual federal receipts to GDP growth in 2002 and 2009, respectively.

We believe that the declines in capital gains realizations in 2002 and 2009 were related to the cycle, but our current approach of modeling capital gains realizations jointly with personal income may not adequately capture these potential cyclical effects. In particular, our procedure is likely ill-suited to dealing with the relatively strong correlation between capital gains realizations and economic activity over the last two cycles—reflecting the dot-com bubble and

financial crisis—but a much weaker correlation between capital gains realizations and the cycle in earlier periods.[10]

Notwithstanding capital gains realizations, the contributions of the components that comprise residual FE are consistent with our beliefs about the secular trends that have affected fiscal policy since 1970. And while we have additional work to do to better understand the residual FE component, its inclusion in our total FE measure does not fundamentally alter the patterns we observe in FE during or following the Great Recession (discussed below).

Fiscal Effect During the Current Cycle

Next, we examine the effects of fiscal policy changes during the current cycle. Figure 4 breaks out the effects of the three channels of total FE. As indicated by the black line, total FE swings from positive in 2008-2009 to neutral in 2010, and then to negative over the next several years. This contour reflects the contributions from both discretionary and cyclical policy changes.

Figure 5 demonstrates that the contour of discretionary FE can be attributed largely to two factors. First, discretionary "stimulus" policies boosted GDP growth from 2008 to 2010 but then became a source of restraint starting in 2011, as they began to expire. These "stimulus" policies include fiscal policy changes that were enacted at the federal level to explicitly provide short-term, temporary support to the economy such as the 2009 American Recovery and Reinvestment Act (ARRA). Second, the discretionary fiscal "consolidation" yielded a notable drag on GDP growth in 2013 and then a more subdued drag in 2014. "Consolidation" includes a number of policies at the federal level that were enacted to reduce the deficit, in particular spending cuts associated with the Budget Control Act (BCA) of 2011 and tax increases enacted as part of the "fiscal cliff" budget agreement in 2013. As the restraint from the consolidation policies and the expiration of the stimulus policies waned, discretionary FE provided a boost to GDP growth in 2015. However, total FE was neutral in 2015 due to the continued drag from cyclical FE.[11]

[10] We intend to model capital gains realizations separately in the future, perhaps basing our approach on Miller and Ozanne (2000).

[11] The "other" category on Figure 5, captures all other discretionary policy actions. Most notably over this period they include budget actions at the state and local level and the drawdown of overseas military operations.

Figure 4.

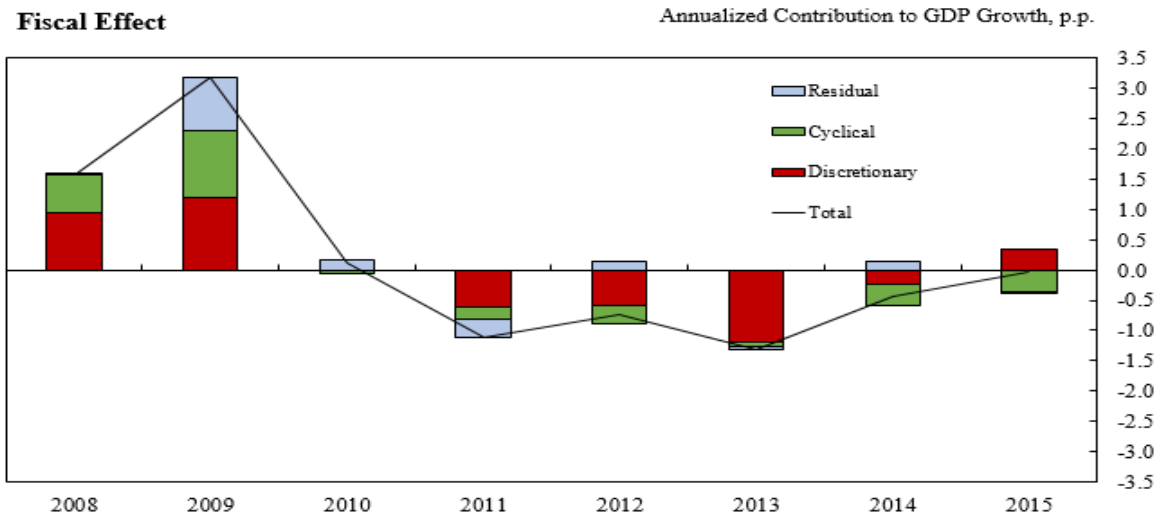
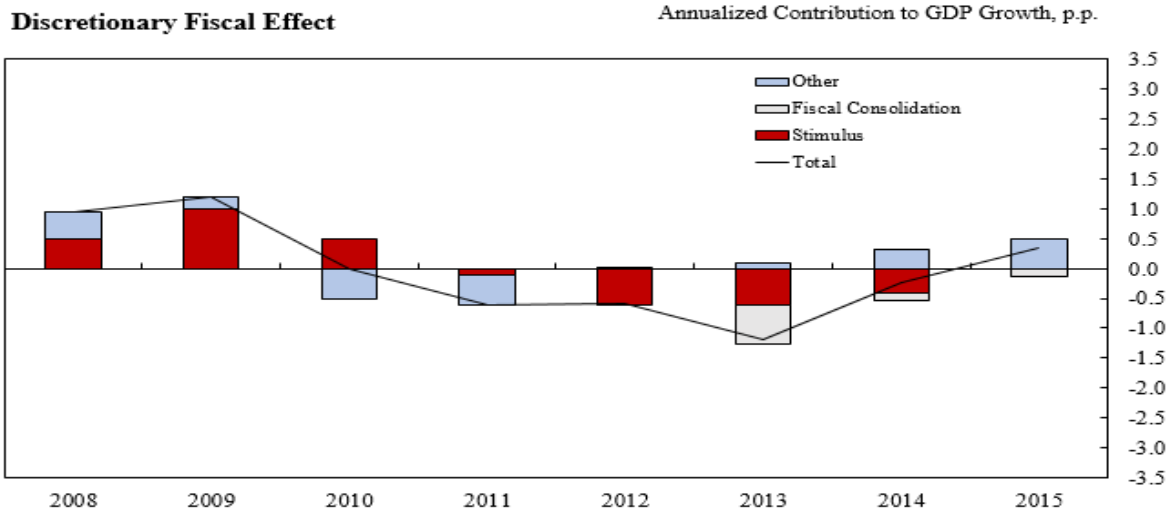


Figure 5.

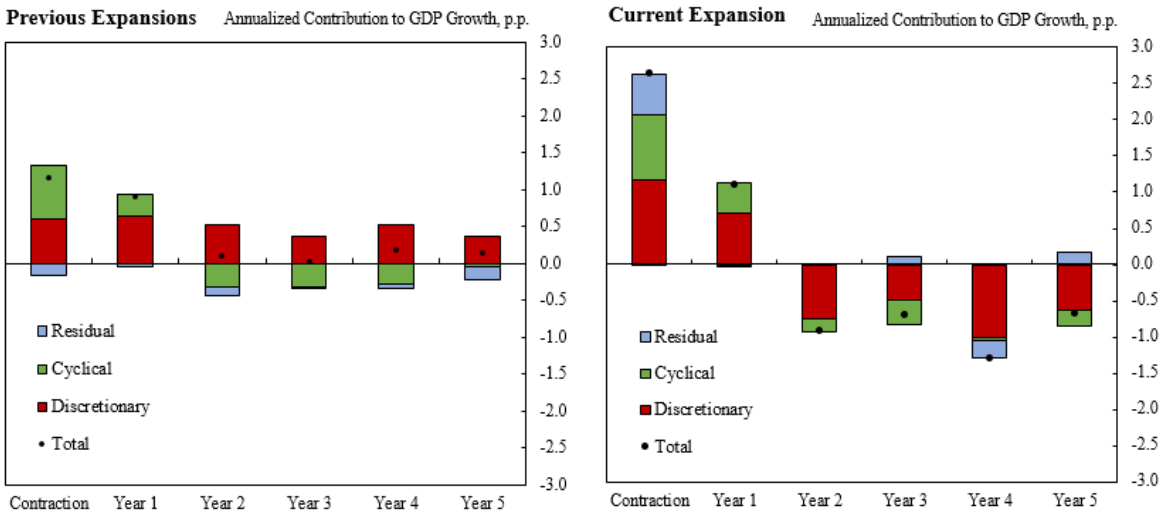


Now we turn to whether the effects of fiscal policy during the current cycle are similar to other episodes. Figure 6 examines our estimates of FE during the contraction and in the subsequent years after the trough. The left panel displays the average over previous recoveries since 1970 and the right panel displays the current expansion.

Focusing on the contractions, total FE was significantly stronger during the most recent recession compared to previous recessions, reflecting all three components of FE. Although the effect of discretionary policies was not extraordinary during the Great Recession—see Figure

1—it was nonetheless above average relative to past contractions. The large and positive residual component also played an important role in the comparatively large total FE reading during the most recent recession. As discussed above though, we suspect that some portion of residual FE in this period is associated with the collapse in capital gains which could be viewed as a cyclical phenomenon. Finally, the cyclical component was moderately larger during the Great Recession than in prior downturns.

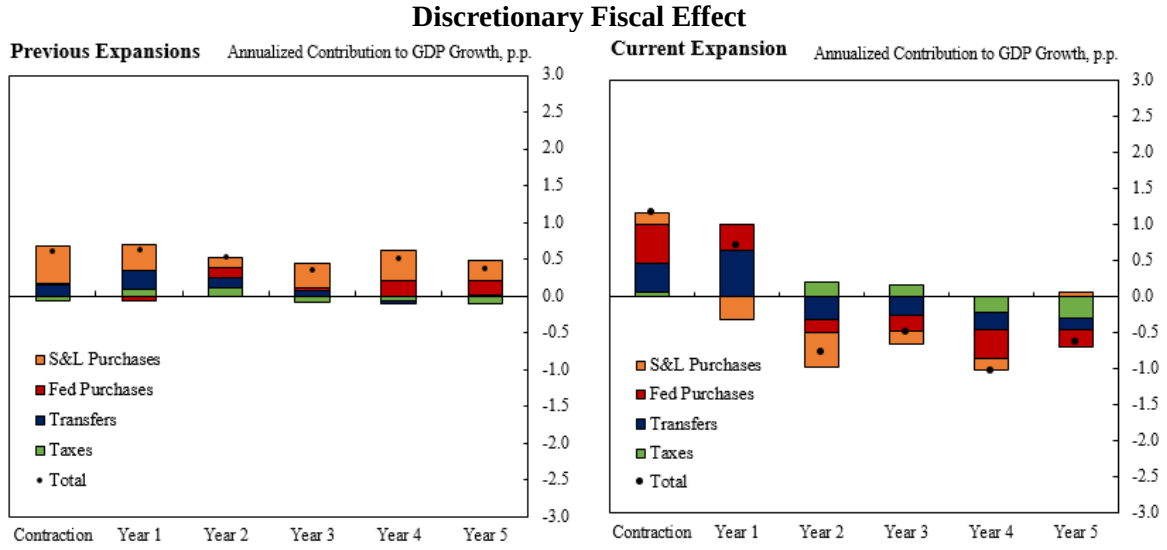
Figure 6.



Note: Previous Expansions includes expansions following the 1970, 1975, 1980, 1982 and 2001 troughs as defined by the National Bureau of Economic Research. Contraction values are the geometric average of the annualized quarterly values over the length of the contraction.

Moving on to the post-recession recoveries, the difference between the current and past expansions is stark. Although total FE in the first year of the current expansion was similar to the historical average, in the following four years it was substantially below the historical norm. Total FE *boosted* real GDP growth by an average of 0.12 percentage points in years two through five of past expansions. By contrast, over the same time span during the current expansion, fiscal policy changes *restrained* real GDP growth by an average of 0.90 percentage points. Thus, we estimate that fiscal policy changes over this period contributed around 1 percentage point less to the growth in real GDP per year than they did on average in earlier periods. The differences in years two through five is driven largely by discretionary policy.

Figure 7.



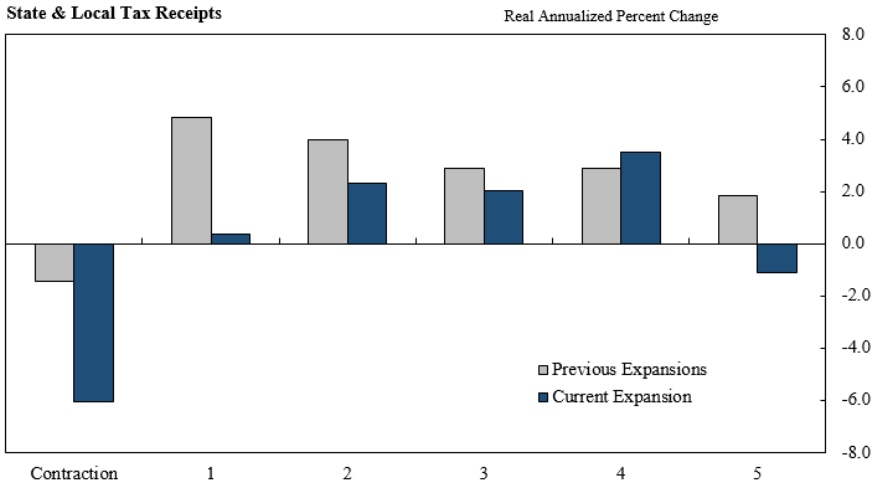
Note: Previous Expansions includes expansions following the 1970, 1975, 1980, 1982 and 2001 troughs as defined by the National Bureau of Economic Research. Contraction values are the geometric average of the annualized quarterly values over the length of the contraction.

The atypical restraint from discretionary fiscal policy largely reflects three factors. The first two, the expiration of the stimulus policies and fiscal consolidation at the federal level, were discussed above. The third factor is a sharp reduction in state and local government purchases in the first three years of the expansion followed by very sluggish growth thereafter. By contrast, state and local government purchases provided significant impetus to aggregate demand in past expansions. This can be seen in the orange bars in Figure 7.

The unusual behavior of state and local governments in the current cycle primarily reflects the steep deterioration in their tax receipts driven by the depth of the recession and anemic recovery. Figure 8 contrasts the changes in tax receipts in the current cycle to those in previous episodes. State and local governments operate under relatively binding balanced budget rules. While they have some ability to smooth through revenue shocks using reserve funds and other techniques, their balanced budget rules require them to bring operating expenditures into line with revenues over time. Thus, at the state and local level, the shortfall in revenues caused by the Great Recession required either spending cuts and/or tax increases. In

practice, budget shortfalls were mostly closed by reducing purchases of goods and services, particularly state and local government payrolls.[12]

Figure 8.



Source: Bureau of Economic Analysis

Note: Previous Expansions includes expansions following the 1970, 1975, 1980, 1982 and 2001 troughs as defined by the National Bureau of Economic Research. Contraction values are the geometric average of the annualized values over the length of the contraction. Deflated by BEA Price Deflator for S&L consumption and investment.

Conclusions

This paper develops a comprehensive framework for assessing the contribution of fiscal policy changes to growth in aggregate demand. We find that over the period 1970-2015 there was an average annual contribution of $\frac{1}{3}$ percentage points to GDP growth (on a Q4 over Q4 basis). We find that the Fiscal Effect is stronger during and immediately following contractions. Finally we note that the Fiscal Effect during the most recent contraction was significantly

[12] The FE methodology defines all changes in state and local purchases as discretionary as these outlays are generally determined by annual legislation. However, a reasonable alternative would be to allow non-capital purchases to be partially cyclical. (Capital expenditures are not subject to balanced budget constraints, can be funded by debt, and are therefore more unambiguously discretionary.) Specifically, any changes in non-capital purchases that arise due to cyclical changes in tax revenues interacting with binding balance budget constraints could be defined as discretionary. However, the appropriate way to identify the cyclical component of non-capital purchases is unclear.

stronger than in previous recoveries, reflecting all three components of FE. However, total FE has been a noticeable drag on GDP growth in the recent recovery. In contrast, FE was modestly stimulative in previous recoveries. We attribute the difference largely to discretionary policy actions.

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Appendix: Fiscal Effect Framework

The fiscal effect (FE) framework quantifies the first order contribution of government actions to the real growth in gross domestic product (GDP). The government has two[13] major channels by which it impacts GDP growth: personal income which it effects through taxes and transfers, and government purchases (consumption and investment). Any change to the level of one of these channels (in real terms) is recorded as either a discretionary, cyclical or residual effect.

The Fiscal Effect Framework builds on the framework of the 'Fiscal Impetus' concept in Follette and Lutz (2010) and Follette, Kusko and Lutz (2008).

Purchases

As a direct input to GDP, the calculation of the fiscal effect of purchases is simple and defined as:

$$Purchases\ FE = \frac{\Delta G_i}{GDP_{t-1}}$$

where G_i is the real level of a government purchases or investment (e.g. defense spending). All government purchases are considered discretionary as they are authorized through annual budget processes at the Federal, State and Local level.

Taxes and Transfers

Changes to the level of taxes and transfers directly affect NIPA personal income, which is either saved or consumed. Marginal propensities to consume (MPC) are applied to quarterly changes in the real[14] level of these taxes and transfers in order to estimate the first order impact of these changes on GDP. The MPC's differ depending on whether the change is categorized as a permanent discretionary, temporary discretionary, cyclical or residual change. MPC's also vary by type of tax or transfer (e.g. the MPCs for unemployment insurance and Medicare outlays differ).

The calculation of FE is performed over five steps for each type of tax and transfer T_t:

i. The real equilibrium (cyclically adjusted) level of T_t is estimated as T_t^E and the cyclical change is then defined as $\Delta C_t = \Delta(T_t - T_t^E)$
ii. The discretionary change in taxes and transfers, ΔD_t, is estimated based on outside sources such as CBO
iii. Any change in taxes or transfers, ΔT, which has not been defined as either discretionary or cyclical is assigned to the residual category, ΔR_t, such that

[13] Other channels exist as well, for example changes to corporate taxes may influence investment.
[14] The Bureau of Economic Analysis deflator for personal consumption expenditure is used for the taxes and transfer series.

$$\Delta T = \Delta C_t + \Delta D_t + \Delta R_t$$

iv. MPC's are applied to estimate the effect and timing on GDP in each quarter:

$$\Omega_t = \sum_{j=0}^{n} \Delta C_{t-j} mpc_{C,j} + \Delta D_{t-j} mpc_{D,j} + \Delta R_{t-j} mpc_{R,j}$$

v. Final we calculate the Fiscal Effect as:

$$Taxes\ and\ Transfers\ FE = \frac{\Omega_t}{GDP_{t-1}}$$

Marginal Propensities to Consume

Component	Type		Duration	*t*	*t-1*	*t-2*	*t-3*	*t-4*	*t-5*	*t-6*	*t-7*	*t-8*	Total
Discretionary	Taxes	Personal income	Permanent	-0.25	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.70
			Temporary	-0.28	-0.18	-0.04							-0.50
		Corporate income	Permanent	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.05	-0.50
			Temporary	0.00									0.00
		Social Insurance	Permanent	-0.25	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.70
			Temporary	-0.28	-0.18	-0.04							-0.50
		Production and Import	Permanent	-0.10	-0.10	-0.10	-0.10	-0.10	0.00	0.00	0.00	0.00	-0.50
			Temporary	-0.05	-0.05	-0.05	-0.05	-0.05	0.00	0.00	0.00	0.00	-0.25
		Property and Sales	Permanent	-0.25	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.70
			Temporary	-0.28	-0.18	-0.04							-0.50
	Transfers	Unemployment Insurance		0.50	0.50								1.00
		Other	Permanent	0.35	0.25	0.10	0.05	0.05	0.05	0.05	0.05	0.05	1.00
			Temporary	-0.28	-0.18	0.04							0.50
Automatic stabilizer	Taxes	Personal income		-0.27	-0.14	-0.04	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.57
		Corporate income		0.00									0.00
		Social Insurance		-0.28	-0.18	-0.04							-0.50
		Production and Import		-0.05	-0.05	-0.05	-0.05	-0.05					-0.25
		Property and Sales		-0.28	-0.18	-0.04							-0.50
	Transfers	Unemployment insurance		0.50	0.50								1.00
		Other		0.45	0.45								0.90
Residual	Taxes	Personal income		-0.27	-0.14	-0.04	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.57
		Corporate income		0.00									0.00
		Social Insurance		-0.28	-0.18	-0.04							-0.50
		Production and Import		0.00									0.00
		Property and Sales		-0.28	-0.18	-0.04							-0.50
	Transfers	Unemployment insurance		0.50	0.50								1.00
		Other		0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.70
		Medicaid		0.45	0.45								0.90

Note: Some patterns extend beyond nine quarters. Transfers includes all domestic social benefits.

Cyclical Component

Determining the cyclical component for the change in a tax or transfer requires calculating T_t^E, the equilibrium level of that tax or transfer (i.e. the level that we would expect to observe if the economy was operating at its potential). In order to do so, we generally follow the procedures of Russek and Kowalewski (2015) Follette and Lutz (2010).

Cyclical Taxes

Receipts in nearly all cases follow a three-step process: [15]

i. The ratio of each NIPA Tax base B to CBO's measure of potential GDP is estimated as a function of a time trend and the GDP Gap:

$$\frac{B_t}{POTGDP_t} = \alpha_t + \sum_{j=0}^{n} \beta_j GDPGAP_{t-j} + \varepsilon_t$$

where $GDPGAP = \frac{Potential\ GDP - GDP}{Potential\ GDP}$ and α_t is a time trend which varies by business cycle.

The equilibrium base, B_t^E, is then estimated as:

$$B_t^E = POTGDP_t \left(\frac{B_t}{POTGDP_t} - \sum_{j=0}^{n} \beta_j GDPGAP_{t-j} \right)$$

Finally, equilibrium tax receipts are estimated by applying an elasticity δ_t to the difference in the observed and equilibrium base and multiplying by observed NIPA receipts R:

$$R_t^E = R_t \cdot e^{\delta_t \left(\ln \frac{B_t^E}{B_t} \right)}$$

Estimates β_j of sensitivity of tax base to the business cycle

Base	GDP GAP				
	t	t-1	t-2	t-3	t-4
Wages & Salaries	-0.2804	-0.1561	-0.0236	-0.0273	-0.1932
Proprieters	-0.1201	0.0076	-0.0068	-0.0510	0.0507
Rental	0.0139	0.0077	-0.0025	0.0027	0.0394
Dividend	-0.0466	-0.0277	-0.0118	0.0218	-0.0082
Interest Income	0.0340	-0.0560	-0.0244	-0.0253	-0.0794
Coporate Profits	-0.5406	0.1470	-0.0147	-0.0964	0.2893

Note: Corporate profits excludes Federal Reserve and Rest of the World. Data sourced from BEA and fit over period 1960-2015.

[15] Unemployment insurance taxes and taxes on production and imports follow a different process (see Russek and Kowalewski, 2015). Local property taxes are assumed to have no cyclical component.

Elasticity of cyclically sensitive taxes to their base

Tax		Base	Elasticity (δ)	
			2015	Average 1970 - 2015
Federal	Personal	*	2.35	1.99
	Corporate	Corporate Profits	0.90	0.83
	FICA	Wages and Salaries	0.86	0.84
	SECA	Proprieters Income	0.89	0.87
	Production and Import	GDP	1.01	1.04
State and Local	Personal	*	1.50	1.36
	Corporate	Corporate Profits	1.00	1.00
	Sales	Personal Consumption	1.00	1.00

Note: * is the NIPA Tax base, the sum of wages/salaries, single proprietor's, dividend, rental and interest income.

Elasticities vary by year and are based on the methods in Cohen and Follette (2000), Follette, Kusko and Lutz (2008), Russek and Kowalewski (2015) and CBO (2011). In many cases, they are similar to the actual observed elasticities in the NIPAs.

Cyclical Transfers

Based on our estimates for the period 1970 to 2015, 70 percent of the cyclical component of government transfers originate with federal unemployment insurance. Equilibrium unemployment insurance is derived according to the following process:

i. The change in the ratio of non-discretionary unemployment benefits UI to NIPA wages and salaries WS is estimated as:

$$\Delta \frac{UI}{POTWS} = \sum_{j=0}^{n} \beta_j \Delta URGAP_{t-j} + \varepsilon_t$$

Where $URGAP = UR - POTUR$ is the difference between the Bureau of Labor Statistics' Unemployment Rate and CBO's measure of the natural rate of unemployment, and POTWS is potential wages and salaries derived according to the procedures outlined in this document

ii. The equilibrium level of unemployment insurance UI_t^E is then estimated as:

$$UI_t^E = POTWS_t \left(\frac{UI_t}{POTWS_t} - \sum_{j=0}^{n} \beta_j UIGAP_{t-j} \right)$$

where $\beta = (0.144,0.089,0.022,-0.122)$ after 1984 and . $\beta = (0.203,0.127,0.062,-0.090)$ before .

The estimation for Foodstamps (SNAP) also follows the procedure detailed above. Other cyclical changes in expenditures such as state and local outlays for Medicaid or family assistance are smaller and we follow the assumptions and procedures of Follette and Lutz (2011).