Ratchet-Down, Dynamic Scoring Effects of Spending Caps, and Anti-Ratchet Rule Effects

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Abstract

The growth rule for a Tax Expenditure Limitation (TEL) can be a cap or a goal, which can apply, annually, to the current cap amount or to the current spending level. The first thirteen years of Colorado's TEL – it's Taxpayer Bill of Rights (TABOR) - demonstrated that using current spending or the current cap as the base for estimating spending growth can be an important political choice. The Colorado TEL yielded large rebates in several years, and then yielded several years in which revenue fell short of the TABOR cap. Because the cap level for year X was X-1's spending level, each shortfall lowered the maximum for all future spending limits. The fiscal stress that resulted from that ratcheting down of potential spending limits led [barely] to the 2005 passage of Referendum C, which created a 5-year suspension of the cap, and then a cap redefinition to curb future ratchet-down effects. We examine how ratchet-down prevention effects such as government size and budget volatility vary with key TEL design parameters like growth cap basis (population + inflation or personal income), ratchet-down potential, and budget stabilization fund presence and rules. We measure the size of intuitive effects, and also find that steadier cap growth (no ratcheting down) decreases budget stability.

1. Introduction and Overview

Tax and expenditure limits (TEL) cap spending growth at population + inflation, or population + inflation + productivity growth (personal income), based on the previous year's spending cap or the previous year's spending level. The former provides for steady growth (SG) in the TEL cap. In the latter case, spending less than the maximum allowed lowers all future maximums; a so-called "ratchet-down" effect that became a political issue in Colorado (the only state with a binding constitutional limit[1]), yielding Referendum C in 2005 to replace the latter with the former. The economic and fiscal conditions that led to Referendum C's passage contain fiscal and political lessons for states considering a binding TEL to prevent growth-stifling, rapid spending growth and/or the fiscal instability that has been especially noteworthy during the last decade.

[1] California's 1978 Gann Amendment became non-binding in the 1990s through additional constitutional amendments.

The purpose of this chapter is to describe the differences between TEL caps based on the previous year's spending (annually "re-based"), that can cause "ratchet-down" effects, for better or worse, and ratchet-down immune, Steady Growth (SG) TEL caps that don't lower future maximums when current maximums are not attained. The next section reviews the relevant literature. Section 3 describes our dynamic scoring simulation model. Section 4 describes our state fiscal and economic data. Section 5 describes the key differences in personal income-based and population-plus-inflation-based TELs and actual fiscal and economic outcomes. We vary some potentially key parameters to assess the robustness of our findings for the TEL designs we examine. Section 6 contains a summary and concluding remarks.

2. Literature Review

The fiscal stress experienced by the states in recent recessions has increased interest in how fiscal rules impact budget stability over the business cycle. If we define budget stability as a steady growth in spending over the business cycle, an important question is whether tax and expenditure limits (TELs) contribute to improved budget stabilization. Kioko (2011) points out that a TEL must constraint state spending to impact spending over the business cycle. So, the design of TEL rules will determine how effective they are in stabilizing spending over the business cycle, as well as how effective they are in constraining spending in the long run. Recent research reveals that it is the combination of TEL rules and how they interact that determine how effective they are, and several questions in this literature remain unresolved.

One of the most controversial issues in the TEL literature is the so called 'ratchet-down effect'. Kioko (2011) notes that a TEL compels the state to establish the base year general fund revenues or expenditure level subject to the TEL limit and then adjust the base with the fiscal growth factor (FGF). The FGF is a composite index of one or more of the following socio-economic variables: population growth, inflation, or personal income. A major determinant of

TEL effectiveness is whether or not a state 'rebases' the limit to establish a new base. Most states do not. They multiply the fiscal growth factor times the prior year spending limit to determine the current year spending limit. However, ten states do rebase. Connecticut, Montana, New Jersey, Texas, and Washington multiply the fiscal growth factor by the prior year actual revenue or spending. Another five states rebase the limit as a percent of annually estimated revenues: Delaware, Iowa, Missouri, Oklahoma, and Rhode Island. It is this 'rebasing' of the limit using actual or estimated fiscal outcomes that creates the potential for 'ratchet-down effects' of the limit in subsequent years.

Kioko (2011) finds that when states rebase the limit using actual revenues or spending, actual revenue or spending stays close to the limit over time. However, when states do not 'rebase' the limit, but rather apply the limit to the prior year limit, a typically growing gap between the limit and actual revenue or spending emerges during economic downturns. Kioko (2011) estimates that gap or 'slack' between a TEL cap, based on personal income growth, and actual appropriations during the 'Great Recession'. In contrast, most states that 'rebase' the limit had little or no slack, and in one case appropriations exceeded the TEL cap.

Another key TEL design issue is the disposition of surplus revenue. Four states keep the surplus revenue in the general fund: Arkansas, Hawaii, South Carolina, and Texas. Their TELs defer spending to a later period and have little impact on spending in the long run. Four states (California, Colorado, Massachusetts, and Oregon) mandate surplus revenue taxpayer rebates, which can reduce spending in the long run. Thirteen states allocate a portion of the surplus revenue to a budget stabilization fund (BSF), often referred to as a rainy day fund or reserve fund. Surplus revenue may also be earmarked for emergency funds, capital funds, maintenance and repair, education, or debt relief (Merrifield and Monson 2011; Primo 2006; Waisenen 2010; Zycher 2013).

In the simulations analyzed by Kioko (2011), the assumption is that surplus revenue is offset by tax rebates. If some portion of the surplus is offset by allocations to a BSF, emergency fund, or capital fund this could impact spending in future years. Several studies explore the impact of TELs on spending when surplus revenue is offset in these ways. Shunk and Woodward (2005) simulate the impact of a TEL on spending when surplus revenue is offset by a BSF and capital fund and tax relief fund. In their analysis of the TEL limit, population growth plus inflation, is 'rebased' when revenue falls short of the limit. The budget stabilization fund is then used to offset revenue shortfall during the first year of the recession. In subsequent years the state is required to adjust spending to the lower 'rebased' limit. Merrifield and Poulson (2014a) show that such fiscal rules can create what they refer to as a 'cliff effect'. The BSF boosts spending during the initial year(s) of a deep recession, then runs out of money, which creates a large 'ratchet down effect', which then lowers the limit for all subsequent years. In contrast to Shunk and Woodward (2005), our simulations rebase only when spending, including money from the BSF, falls short of the limit.

Other studies have introduced refinements in the simulations analysis of TELs. Merrifield and Monson (2011) simulate a TEL linked to a BSF, emergency fund, and capital fund. Merrifield and Poulson (2014a) simulate a TEL linked to a BSF, emergency fund, and capital fund, with some surplus revenue offset by tax cuts as well as tax rebates. Merrifield and Poulson (2014a) also explore the impact of different TEL designs using this simulation model.

To resolve these issues, we must determine how the combination of TEL rules impact spending over the business cycle. One set of rules defines the TEL limit. The TEL rules linked to population growth and inflation have a different impact on state spending than TEL rules based on personal income growth.

A second set of TEL rules defines the base against which the TEL limit is applied. When the TEL limit is 'rebased' using actual revenue or spending this has a different impact than when the TEL limit is not 'rebased', i.e. when the limit is applied to the prior year limit. The 'ratchet down effect' of 'rebasing' on the limit in subsequent years is at the center of this controversy.

A third set of rules involves the disposition of surplus revenue. When a portion of the surplus revenue above the TEL limit is allocated to a budget stabilization fund (BSF) this can impact spending in subsequent years. The rules for the allocation of surplus revenue to the BSF and for withdrawals from the BSF will determine how they impact spending over the business cycle. If these rules allow much or all of the BSF to be expended during the initial years of a recession there is likely to be a 'cliff effect', i.e. a discontinuous drop in spending in the later years of the recession.

These issues in the design of TELs are important not only in determining their impact on spending, but also in determining the political support for fiscal rules as a constraint on spending. As Kioko (2011) points out, when fiscal rules undermine a state's ability to stabilize the budget over the business cycle, this can weaken support for TELs, including possible efforts to override or modify the TEL. Some states, such as California, used override provisions to exempt major portions of spending from their limit, rendering them less effective as a constraint on spending in the long run. In Colorado, Referendum C modified the TABOR limit to eliminate 'rebasing' and the 'ratchet down effect', thus allowing the limit to rise at the rate of population growth plus inflation, independent from actual revenue and spending.

In this study we attempt to resolve these issues using a dynamic simulation model to analyze the impact of different TEL designs on state spending. We analyze the impact of TEL limits based on population growth and inflation, and limits based on personal income growth. These different TELs are simulated with and without 'rebasing' to compare 'ratchet down effects' to cap shortfalls that occur because of insufficient revenue. The TELs are also simulated with and without a BSF. A key focus of the analysis is on budget stabilization, which is measurable in several ways. One views the growth rule as a target, so we assess differences in the ability to sustain the allowed growth in general fund spending over the business cycle. Deviations of simulated spending from the TEL limit are our measure of budget instability. Second, we compare annual changes in spending growth rates, and third, we use a Hodrick-Prescott (HP[2]) Filter to compare the TEL rules in terms of Wagner and Elder's (2005) cyclical variability of spending.[3]

3. Our Dynamic Scoring Fiscal Simulation Model

Our simulation of fiscal rules, and rule change effects includes dynamic scoring through the marginal tax rates (MTR: 6.12 for a 6.12% MTR) generated by Skidmore et al (2011), and by using Poulson and Kaplan's (2008) link between personal income and marginal tax rate changes. We simulated 4 spending growth rate (TEL is a rate expressed in decimal form; i.e 0.02 for 2%) caps: a.) Population plus Inflation; b.) Population plus Inflation x 1.2; c.) Most recent annual growth rate for personal income; and d.) Most recent ten-year average annual personal income growth rate. For each TEL version, we compared the effects with a BSF set up to keep spending growing at the spending growth cap (as much as storing of high revenue growth year surpluses would allow) to a zero BSF scenario. We capped the BSF account balance at ten percent of general fund spending.

After computing population plus inflation rates, and allowing for data availability lags[4], we computed each state's revised spending for 1994 onward, with the annually adjusted cap that can ratchet down. When the TEL cap amount is less than simulation-revised revenue, or less than revised revenue plus the amount available, $aBSF_t$, from the BSF:

$$RSPEND_t = (RSPEND_{t-1} \times (1 + TEL_t)) \quad (1a)$$

With the Steady Growth (SG) cap that does not ratchet down:

$$RSPEND_t = (RSPEND_0 \times (1 + TEL_t)^1 \times \ldots \times (1 + TEL)^t) \quad (1b)$$

Otherwise: $RSPEND_t = RREV_t + aBSF_t$ (1c)

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[2] http://en.wikipedia.org/wiki/Hodrick%E2%80%93Prescott_filter

[3] Since Wagner and Elder's (2005) two filters (HP and BP) produced similar results, we apply only the former.

[4] Fiscal year N budget making must rely on the calendar year N-2 population estimate, and the May, N-1 CPI.

With: $RSPEND_t$ = revised General Fund (GF) spending in fiscal year t
TEL_t = the spending growth rate cap for fiscal year t as a decimal
BSF_t = fiscal year t budget stabilization fund account (BSF) balance
$RREV_t$ = year t General Fund revenue revised via dynamic scoring
a = a policy-based coefficient indicating what share of the BSF balance can be spent in one year. a = 1.0 in all of our simulations.

A cap 'shortfall' occurs when: $RSPEND_t < (RSPEND_{t-1} \times (1 + TEL_t))$. Then:

$$SHORTFALL_t = RSPEND_t - (RSPEND_{t-1} \times (1 + TEL_t)) \quad (2)$$

$SHORTFALL_t \leq 0$. Shortfalls occur only after depletion of the BSF. The shortfall rate (SHFALLRATE) for year t is:

$$SHFALLRATE_t = SHORTFALL_t/RREV_t \quad (3)$$

Shortfalls reduce the RSPEND base for subsequent years creating the so-called ratchet-down effect (Poulson, 2009; Kioko, 2011). The year t ratchet-down effect is: $1 - (RSPEND_t/(RSPENDMAX_t))$. $RSPENDMAX_t$ is the spending level in year t if there had been no shortfalls prior to year t, or in year t. BSF outlays eliminate, reduce, or delay the ratchet-down effects of recessions.

We estimated a First Year (t=0) BSF account balance by applying the TEL cap to five previous years of spending data,[5] and allocating the net difference between actual and simulated spending to the BSF. When cap level expenditure is greater than revenue $\{(RSPEND_{t-1} \times (1 + TEL_t)) > RREV_t\}$, we debited the BSF as follows:

$$BSFDEBIT = (RSPEND_{t-1} \times (1 + TEL_t)) - RREV_t), \text{ or } aBSF_t, \text{ whichever is less.} \quad (4)$$

When cap level expenditure is less than revenue $\{(RSPEND_{t-1} \times (1 + TEL_t)) < RREV_t\}$, we deposited funds into the BSF as follows:

$$BSFDEPOSIT = (REV_t - RPSEND_t) \text{ or } ((RSPEND_t \times 0.1) - BSF_{t-1}), \text{ whichever is less.} \quad (5)$$

When $RREV_t > RSPEND_t$, surplus revenue may also be available for taxpayer rebates, and for deposit into other funds such as emergency preparedness funds and capital investment funds.

$$SURPLUS_t = (RREV_t - RSPEND_t) - (BSF_t - BSF_{t-1}) \quad (6)$$

Surpluses, as defined above, trigger proportional marginal tax rate reductions that depend on the relative size of the surplus, and how much of it is estimated to be non-cyclical so that surplus-driven

[5] Our General Fund expenditure data series begins five years sooner than the revenue data series.

tax rate reductions will not generate deficits in normal years. That generates personal income and tax revenue gains via dynamic scoring. So, when $SURPLUS_t > 0$, personal income growth will be:

$$GROWTH_t = (NCYC \times (SURPLUS_{t-1}/RREV_{t-1}) \times MTR_{t-1} \times RMTR) + GROWTH_{t-1} \quad (7)$$

Where: NCYC = 0.5 in our simulations. Individual states would set NCYC at the perceived non-cyclical share of the surplus or shortfall.
MTR_t = average MTR_t from Skidmore et al (2011) adjusted for MTR changes.
RMTR = growth rate increase per percentage point drop in MTR_t; from Poulson and Kaplan (2008).

If the TEL growth rule is a target rather than a limit, shortfalls, as defined above, trigger MTR increases, and personal income and tax revenue losses via dynamic scoring. To limit the scope of the analysis, we mostly examined the TEL growth rules as limits, not targets. So, in our simulations, $GROWTH_t = GROWTH_{t-1}$ in zero surplus or shortfall years. To examine the TEL rules as growth targets, when $SHORTFALL_t < 0$, which we do as a sensitivity test:

$$GROWTH_t = (NCYC \times SHFALLRATE_t \times MTR_{t-1} \times RMTR) + GROWTH_{t-1} \quad (8)$$

$$RPI_t = ((RPI_{t-1} \times (1 + ((API_t - API_{t-1})/API_{t-1})) \times (1 + GROWTH_t)) + (OCR \times SURPLUS_t) \quad (9)$$

Where: RPI_t = revised personal income in fiscal year t.
API_t = actual personal income in fiscal year t.
OCR = opportunity cost rate (0.06).

Our simulations employ a conservative estimate of six percent for the opportunity cost rate (Dahlby, 1998) for shifting resources from the private to the public sector. Consistent with Barro (1990), we assume that the opportunity cost rate applies to small changes typical of marginal transfers of resources from private to public use. So, when our TEL reduces resource transfers from the private to the public sector, personal income rises.

MTR changes directly affect tax collections (STATIC), and then the personal income change that results from the MTR changes impacts tax revenue collection (DYNAMIC).

$$RREV_t = STATIC_t + DYNAMIC_t \quad (10)$$

When $SURPLUS_t \geq 0$, the static component of the simulated tax revenues reflect underlying growth in the actual revenue, and they adjust to the MTR reduction triggered by the surplus:

$$STATIC_t = ((1 + ((AREV_t - AREV_{t-1})/AREV_{t-1})) \times RREV_{t-1}) \times (1 - (NCYC \times (SURPLUS_{t-1}/RREV_{t-1}))) \quad (11a)$$

Where: $AREV_t$ = actual revenue for fiscal year t.

The additional personal income generated by previous rebates and tax rate reductions generates additional revenue.

$$DYNAMIC_t = (RPI_t - API_t) \times ((MTR_t/100) \times (1 - (NCYC \times (SURPLUS_{t-1}/RREV_{t-1})))) \quad (11b)$$

With a TEL rule-based growth target, when $SHORTFALL_t < 0$, DYNAMIC and STATIC will reflect a MTR increase:

$$STATIC_t = ((1 + ((AREV_t - AREV_{t-1})/AREV_{t-1})) \times RREV_{t-1}) \times (1 - (NCYC \times SHFALLRATE_t)) \quad (11c)$$

$$DYNAMIC_t = (RPI_t - API_t) \times ((MTR_t/100) \times (1 - (NCYC \times SHFALLRATE_t))) \quad (11d)$$

Recall that a shortfall occurs only after the depletion of the BSF. In many years, for many states, SURPLUS and SHORTFALL equal zero, and equations (11a) and (11c) become identical; likewise for (11b) and (11d). Even when $SURPLUS_t$ and $SHORTFALL_t$ are zero, $DYNAMIC_t$ can still be non-zero because of net MTR changes prior to year t.

4. Our State Fiscal and Economic Data

For consistent annual state fiscal data we relied on the National Association of State Budget Officer's (NASBO.org[6]) General Fund Revenue data which start with Fiscal Year 1998. We focused on General Fund revenue and spending, as defined by NASBO, to facilitate comparisons, and because other revenues are typically earmarked.

Data problems forced us to exclude Alaska and New Mexico, which eliminated the need to assess whether Alaska should be excluded, which is common, because of its unique revenue mix. We used population estimates from the Census Bureau, price index data (CPI) from the US Department of Labor, and personal income data from the Bureau of Economic Analysis.

[6] We used the NASBO general fund revenue numbers that do not include federal funds.

5. Findings

In each of our four TEL rule simulations we initiate the TEL in Fiscal Year 1994, the second year for which we have General Fund expenditure data. As noted above, the 1994-1998 net surplus is the 1998 year-end balance for the Budget Stabilization Fund (BSF). The annual General Fund revenue data begin in 1998, so the comparisons in our tables begin, for selected years, with 1999.

We displayed the 1999, 2003, 2008, 2010, and 2013 effects because 1999 and 2008 were high growth years in most states, 2003 and 2010 were recession troughs, and 2013 is the last year for which NASBO data are available. With Alaska and New Mexico excluded, 48 is the maximum possible number of states meeting a certain criterion. Underlying the findings in each table are the default values specified above; the BSF account balance capped at 10% of General Fund spending, an opportunity cost rate for marginal expenditure or rebate of funds raised by existing taxes of six percent, and BSF rules that specify that 100% of funds available for deposit, up to the account balance cap, go into the BSF, and 100% of BSF funds are available, each year, for keeping spending growing at the cap level. After we present the results based on those parameter values and rules, we explain the sensitivity of our findings to changes in some of them.[7]

Frequency and Scope of Ratchet-Down Effects

We start by specifying the scope of the ratchet-down effect for each TEL growth rule when the spending limit arises from the spending of the previous year. That is, Table 1 indicates how many states manage to keep spending growth at the limit every year if they enact across-the-board marginal tax rate (MTR) reductions equal to 50% (NCYC) of a surplus' (as defined above) share of General Fund revenue. So, for example, by 2013, even with a BSF containing up to 10% of General Fund revenue, only five states sustain spending growth at Population + Inflation through the '911 recession (FY2003 trough), and the Great Recession (FY 2010 trough).

[7] Space constraints preclude discussion of all of the actual and possible sensitivity analysis findings.

Table 1: # of States without Ratchet-Down Effects

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+infl	45	26	23	6	5
(Pop+infl)x1.2	44	21	18	4	3
One-Yr ΔPI	35	9	5	0	0
Ten-Yr Avg ΔPI	47	10	4	0	0

With the Pop+Infl TEL basis, eliminating the BSF ratchets down four more states. Without a BSF, only Arkansas sustains MTR cuts equal to half of any surplus and keeps spending growth at Pop+Infl throughout 1999-2013. If surpluses trigger just rebates rather than MTR cuts, twenty-eight states sustain spending growth at population plus inflation throughout 1999-2013. Figure 1 and 2, further below, will describe how the degree of ratchet-down varies, for each TEL growth rule, with NCYC; the parameter that links MTR cuts and surplus size.

For the personal income growth-based TELs, MTR cuts with NCYC at 0.5 cause every state to see ratchet-down effects by 2013. Even with a rebates-only policy for surpluses, only seven states keep up with the most recent personal income change, and only four states can sustain spending growth at the most recent ten-year average annual change in personal income. Nearly 80% of the states fell off the personal income growth pace by the '911 recession. Volatility of revenue more than differences between average allowed spending growth rates explain the ratchet-down effect differences between the pop+infl and personal income TELs. Over the 1999-2013 simulation period and the 48 states, the average personal income growth rate (4.9%) is only 1.6 percentage points above the average pop+infl sum (3.3%).

Comparison of Table 1 and 2 indicates the effect on the number of states falling short of steady growth (SG) at the cap when the cap can ratchet-down (Table 1) when spending is not at the cap level, and when it does not (Table 2) ratchet-down. The differences indicate the effect of allowing catch-up, which means using revenue from high growth year to regain a growth cap after falling short of the cap level in previous years. For example, with the Pop+Infl TEL, by 2013 only five states have avoided a ratchet-down (steady growth in General Fund spending at population plus inflation). With the SG cap, fourteen states are at the spending level consistent with spending growth at Population + Inflation every year since TEL implementation.

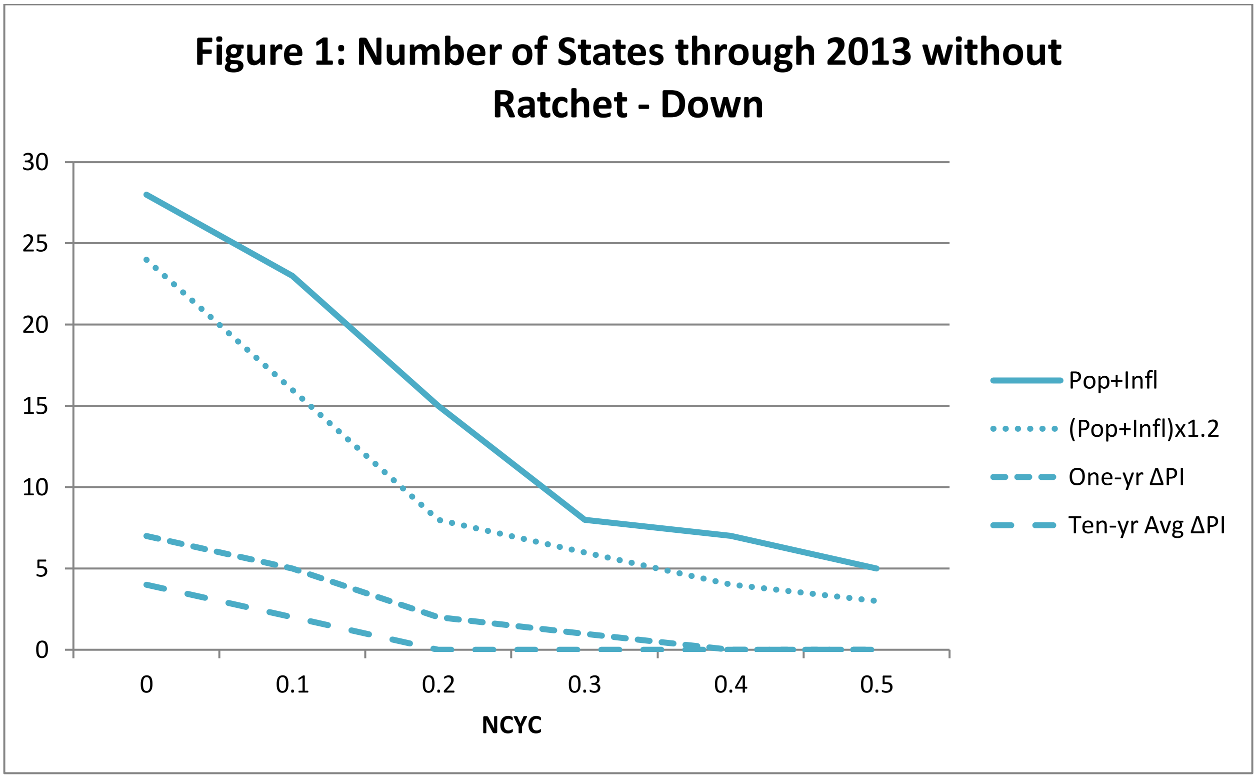
Table 2: # of States at the Steady Cap Growth Limit

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+infl	45	29	37	7	14
(Pop+infl)x1.2	44	24	33	5	13
One-Yr ΔPI	35	10	11	0	3
Ten-Yr Avg ΔPI	47	10	10	1	1

So, without the ratchet-down of the spending limit, nine states (14-5) catch-up to the Pop+Infl, SG path. Another 34 do not, though the 2013 Tables 3 and 4 differences indicate some partial catch-up.

For the personal income growth TELs, the ones in row 4 of Table 2 indicate that one state was able to catch-up in the middle of the Great Recession to the path specified by the ten-year average, and stay there through 2013. Three states regained the bumpier most recent personal income expenditure growth rate path by 2013. Figure 1 indicates the degree to which the surplus response parameter (NCYC) impacts the number of 2013 no-ratchet-down outcomes. For the Pop+Infl TELs, the NCYC effect is significant through NCYC=0.2, and small for NCYC $\geq$ 0.3. For the Personal Income TELs, the NCYC effect is small, throughout, with nearly all of the states seeing ratchet-down effects for any surplus-based MTR reduction protocol (NCYC).

Tables 3 and 4 indicate the average size of the cumulative shortfall for the states that fell short of the spending limit at least once in previous years for the TEL, when based on the previous year's spending (Table 3) and the previous year's limit (Table 4). For example, the average 2010 cumulative ratchet-down effect for the 42 (48 minus the 6 in Table 1) states unable to sustain expenditure growth at the Pop+Infl limit every year through 2010 was 16.9% (Table 3).



Ratchet-Down vs. Shortfall from a Steady Growth Path

The opportunity to catch-up does not assure significant catch-up to an un-rebased growth path. With Tables 3 and 4, we compare ratchet-down to shortfall from the un-ratcheted SG cap.

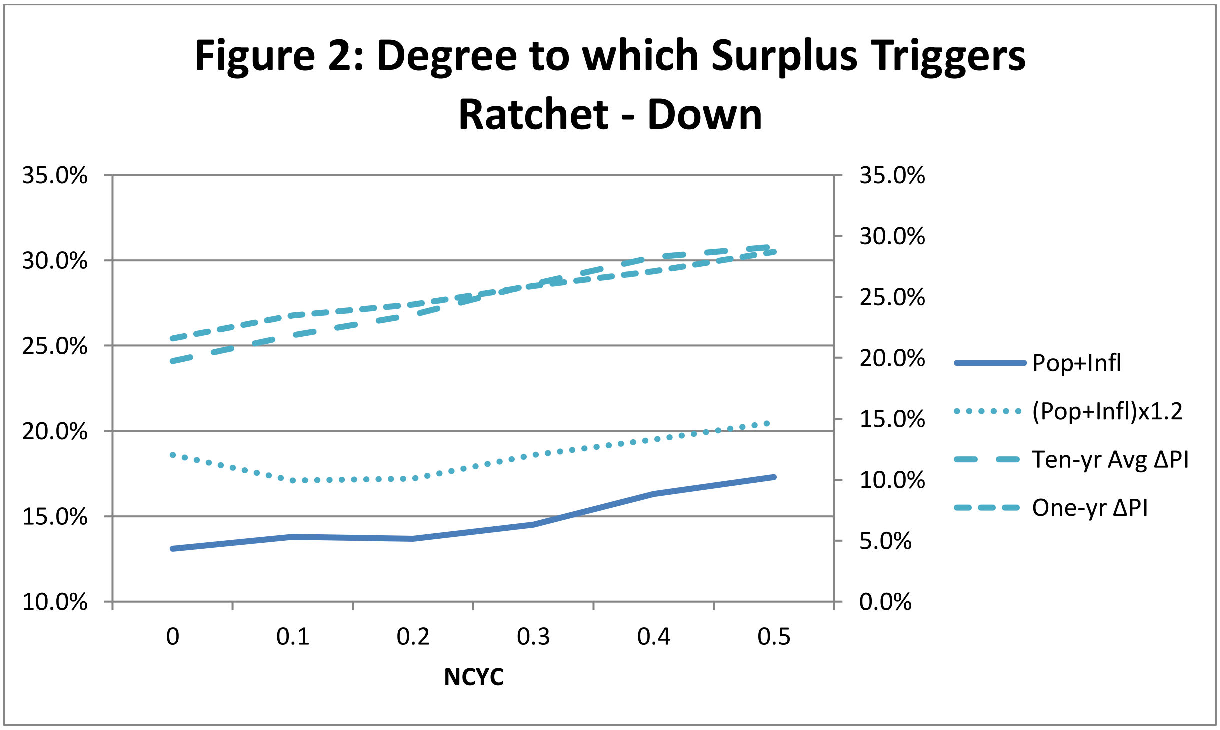
Table 3: Scope of Ratchet-Down Effects of an Annually Re-Based Cap

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+infl	2.1%	9.4%	10.0%	16.9%	17.3%
(Pop+infl)x1.2	2.3%	10.3%	11.5%	20.1%	20.5%
One-Yr ΔPI	5.4%	12.8%	14.3%	28.5%	28.7%
Ten-Yr Avg ΔPI	2.9%	14.3%	16.4%	30.8%	32.0%

Table 4: Average Shortfall from SG Cap

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+infl	2.1%	10.3%	7.2%	14.5%	10.8%
(Pop+infl)x1.2	2.5%	10.9%	11.4%	17.3%	15.8%
One-Yr ΔPI	5.4%	12.3%	16.4%	28.1%	24.7%
Ten-Yr Avg ΔPI	2.9%	14.1%	15.6%	32.0%	28.7%

We can see from the small differences between Personal Income-based TEL SG shortfalls and ratchet-down with rebasing that the Personal Income-based TELs are not binding very often. And even more so with the Personal Income TELs than the Pop+Infl TELs, an annually re-based limit qualifies as a long-term state government rollback strategy. The shortfall from a TEL-rule based ceiling rises over time, significantly; reaching an average of nearly 1/3 in 15 years with the ten-year average Personal Income growth limit, and just over half that with the Pop+Infl limit. Figure 2 indicates the degree to which the average size of ratchet-down effects depends on NCYC; actually not a lot even as NCYC change impacts the number of 2013 ratchet-down cases.



The SG Cap only reduces average spending shortfall below the Pop+Infl caps by about 1/3, which is 4.7 to 6.5 percentage points. The catch-up effect is smaller for the Personal Income TELs; 3.3 to 4.0 percentage points, which for the larger shortfalls is a drop of only 10-14%. And 27 (1-yr ΔPI) to 35 (10-yr avg ΔPI) states spend less than 80% of the SG cap level (Table 5). Even with the least demanding Pop+Infl expansion path, seven states fail to regain 80% of the limit in 2013. That's only four more states regaining it than in the depths of the Great Recession.

Table 5: # of States Spending Below 80% of the SG Cap

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+infl	0	2	0	11	7
(Pop+infl)x1.2	0	3	2	15	12
One-Yr ΔPI	0	8	15	34	27
Ten-Yr Avg ΔPI	0	12	11	39	35

Rebased vs. Steady Growth Cap Expenditure Effects

Table 6 compares the Annually Re-Based Cap and SG Cap, General Fund expenditure effects; an average six to ten percent increase with SG vs. Annually Re-Based.

Table 6: Spending Level Effects

TEL Cap Basis	FY2013 Avg (SG GF Sim ÷ Ann GF Sim)	FY2013 #SG > (1.1xAnn)
Pop+infl	110%	19
(Pop+infl)x1.2	110%	20
One-Yr ΔPI	108%	14
Ten-Yr Avg ΔPI	106%	11

Tax Burden Comparison

Table 7 describes the cumulative MTR rollback effects of lowering MTR, across-the-board, each time there is a surplus; approximately 14% to 24% depending upon the TEL cap basis. There is quite a bit of variability around the average.

Dynamic Scoring Effects

With dynamic scoring, those MTR reductions, and rebates of remaining surpluses yield the average annual personal income gains shown in Table 8.

Some Sensitivity Analysis of Key Parameters

In part to illustrate additional avenues of useful investigation, we briefly examine two more issues; one is the significance of the BSF account balance cap parameter already discussed somewhat, and second is the issue of seeing TEL rules as targets or ceilings. We already looked at one version of the effect of having no BSF versus our default (most likely real-world) parameter value of a BSF with an account balance ceiling of ten percent of annual General Fund spending.

Table 7: Average Cumulative MTR Reduction

TEL Cap Basis	FY1999-2013 Cum MTR Cut
Pop+Infl	
Annually Adjusted	23.7%
SG	19.5%
(Pop+Infl)x1.2	
Annually Adjusted	19.7%
SG	14.8%
One-Yr ΔPI	
Annually Adjusted	18.8%
SG	12.9%
Ten-Yr Avg ΔPI	
Annually Adjusted	16.6%
SG	13.8%

Table 8: Dynamic Scoring Income Effects of MTR Reduction and Rebates

TEL Cap Basis	2013 Dynamic Scoring Income Effect
Pop+infl	
Annual Adjusted	0.46%
SG	0.38%
(Pop+infl)x1.2	
Annual Adjusted	0.37%
SG	0.28%

One-Yr ΔPI	
Annual Adjusted	0.36%
SG	0.23%
Ten-Yr Avg ΔPI	
Annual Adjusted	0.32%
SG	0.25%

Holcombe and Sobel (1997) recommend a BSF account balance of three times the worst ever gap between revenue from one year to the next; much higher than 10% for most states. That basis would yield BSF account level caps that would vary widely among the states, so for simplicity and in the spirit of the Holcombe and Sobel (1997) recommendation to greatly increase BSF deposits, we compare our ratchet-down findings with the ten percent BSF limit to fiscal outcomes with a twenty-five percent BSF limit. For easy comparison, the second value in each cell of Table 9 is the Table 1 state count avoiding ratchet-down that arose from the 10% BSF limit.

Table 9: Ratchet-Down Count with BSFs capped at 25% vs. 10%

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+Infl	45	33 / 26	31 / 23	23 / 6	14 / 5
(Pop+Infl)x1.2	44	32 / 21	29 / 18	18 / 4	8 / 3
One-Yr ΔPI	35	20 / 9	15 / 5	3 / 0	2 / 0
Ten-Yr Avg ΔPI	47	24 / 10	11 / 4	5 / 0	2 / 0

Raising the BSF account balance cap has noteworthy effects, but even with the low Pop+ Infl, growth path the rise to 14 un-ratcheted states, still leaves another 34 with average ratchet-down of 15.1% (Table 10). The larger BSF allows two states to keep up with the personal income TELs. The two values in each Table 10 cell compare the ratchet down level for states with ratchet-down to the outcome of allowing catch-up with the BSF capped at 10% of General Fund spending. So, the comparisons in Table 10 describe the differences between improved keep-up by retaining more high growth year revenues in the BSF and potential catch-up by allowing more expenditure growth from

Table 10: % Cap Shortfall with BSF Limit at 25% vs. 10% with Catch-up

TEL Cap Basis	FY1999	FY2003	FY2008	FY2010	FY2013
Pop+Infl	2.1%	8.7 / 10.3	10.2 / 7.2	13.2 / 14.5	15.1 / 10.8
(Pop+Infl)x1.2	2.3%	12.7 / 10.9	13.4 / 11.4	15.8 / 17.3	18.2 / 15.8
One-Yr ΔPI	5.4%	15.0 / 12.3	14.7 / 16.4	22.4 / 28.1	23.7 / 24.7
Ten-Yr Avg ΔPI	2.9%	16.5 / 14.1	15.5 / 15.6	25.5 / 32.2	28.8 / 28.7

slow to fast economic growth years. Keep-up with the larger BSF and catch-up with a SG TEL have very similar SG cap shortfall outcomes, for states with shortfalls, especially for the personal income TELs. The former (larger BSF for improved keep-up) has the advantage of much less budget instability (less fiscal stress), but large BSF account balances create rentseeking risks.

Table 11 describes the MTR change differences between TELs seen as limits vs. seen as targets. The latter perspective means that non-cyclical (NCYC) shortfalls trigger MTR increases.

Table 11: Net MTR Decline by 2013 with TEL as Limit vs. Target

TEL Cap Basis	TEL as Limit FY1999-2013 Cum MTR Cut	TEL as Target FY1999-2013 Cum MTR Cut
Pop+infl		
Annually Adjusted	23.7%	20.0%
SG	19.5%	15.7%
(Pop+infl)x1.2		
Annually Adjusted	19.7%	14.7%
SG	14.8%	9.0%
One-Yr ΔPI		
Annually Adjusted	18.8%	13.9%
SG	12.9%	7.5%
Ten-Yr Avg ΔPI		
Annually Adjusted	16.6%	15.6%
SG	13.8%	13.7%

The 'target' perspective yields three to five percentage point smaller MTR reductions with the Pop+Infl TELs. The difference between the two personal income TELs is the most interesting aspect of Table 11. The smoother ten-year average path prompts fewer tax increases, so that the 1999-2013 net MTR change is significantly larger; barely lower MTR for the 'target' perspective. The difference between 'limit' and 'target' is much larger for the bumpier one-year personal income TEL; comparable to the five percentage point change seen with the (Pop+Infl)x1.2 TEL.

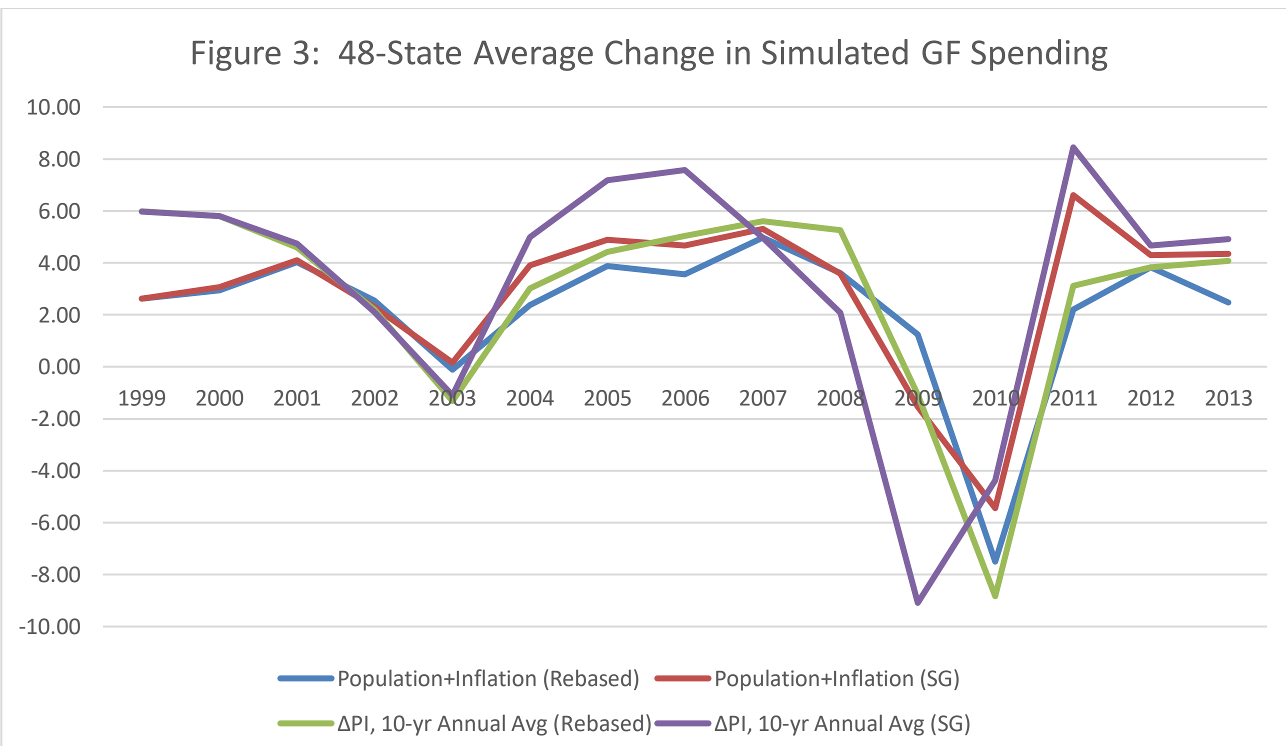
6. Summary and Concluding Remarks

Most of the TEL literature addresses TEL impact on state spending growth. The consensus in recent research is that TELs can be an effective constraint on spending depending upon how well the TEL rules are designed and enforced; our average 2013 simulated spending is eleven to twenty-two percent spending below the actual spending of 2013 (Merrifield and Poulson, 2014b).

More recent research has focused on TEL impact on budget stabilization over the business cycle. In this study we use a dynamic simulation model to explore the impact of TELs on state spending over the business cycle. Budget stabilization is defined as a steady growth in state spending at the TEL limit, and budget instability is measured by deviations in simulated spending from the TEL limit during periods of recession. The analysis suggests that TELs can be effective in stabilizing spending over the business cycle depending upon how well the TEL rules are designed. We should emphasize that the assumption in this analysis is that the TEL rules are binding; we do not assess how well the rules are implemented in a given political setting, although we refer to the experience of states with different TEL rules to illustrate our findings.

One set of TEL rules concerns the definition of the TEL limit. We explore the impact on state spending of TELs linked to population growth and inflation, and TEL rules based on personal income growth. We also explore these limits when they set a maximum limit on spending, and when they target spending. Ceteris paribus, the analysis reveals that TELs linked to population growth and inflation are accompanied by greater budget stability compared to TELs based on personal income growth. This should not come as a surprise given the fact that TEL limits based on population growth and inflation are more stringent constraints on spending compared to TEL limits based on personal income growth.

TEL cap rebasing is a significant budget stability determinant. With annual rebasing, actual spending is much closer to the cap amount, but there is the potential for permanent ratchet-down effects. With the ratchet-immune, non-rebased SG cap on spending, there are wider swings in the simulated spending. With an SG cap, legislators permit some slack between actual spending and the cap amount, knowing it will not reduce the cap in following years. Because of the slack issue that our simulations don't capture, steady growth in the TEL cap amount, especially with personal income TELs, will more produce more budget instability, but at about a 6-10% higher long-term expenditure level (Table 6), than a rebased, ratchet-down-vulnerable TEL cap, by a larger margin than our simulations indicate (Figure 3). The SG lines are slightly more high highs and low lows.



The standard deviation of the annual spending changes ranges from 2.95% with the annually rebased population plus inflation TEL to 4.78 with a Steady Growth Cap at the 10-yr annual average change in personal income. Using the Hodrick-Prescott (HP) Filter to separate trend from ups and downs yields the same finding. Annually rebased TELs yield less cyclical variability in spending. The cyclical component of actual spending averages eleven percent of spending. With the annually rebased Pop+Infl TEL, the cyclical component of the simulated spending is three percent. With the ratchet-immune, SG Pop+Infl cap, the cyclical component rises to 4.7%; 56.7% more than with rebasing, but still less than half the average cyclical variability of actual spending. With the annually rebased 10-yr average change in personal income TEL, the cyclical component of the simulated spending is 5.8%. With the ratchet-immune SG personal income cap, the cyclical component rises to 7.4%; 27.6% more than with rebasing; about 1/3 less than the average cyclical variability of actual spending.

Through 2006, Colorado's TEL (1992 TABOR Amendment) was a good example of a stringent, rebased TEL. The TABOR rules kept state spending in Colorado well below revenue growth in the 1990s, resulting in the rebate of surplus revenue to taxpayers. Then the '911 Recession' yielded a sharp decline in revenue, but, the budget shortfall was significantly less than that which would have occurred in the absence of the TABOR limit. In contrast, California has a similar TEL limit, but one that is not 'rebased'. Even before California weakened its TEL limit by exempting major parts of state spending from the limit, there were broad swings between years when the spending limit was binding and years when revenue availability is the binding constraint. Neither California nor Colorado had a BSF to smooth spending.

There is a growing consensus in this literature that when TELs are linked to a well-designed BSF this can improve budget stabilization over the business cycle. A major criticism of the TABOR Amendment is the absence of a BSF. It is possible that with a BSF Colorado could have offset the revenue shortfall that occurred during the '911 Recession'. Our simulations show that if Colorado's legislators would have been more conservative than our simulation, and not lowered tax rates a total of 15% in 1999-2001 (half the surpluses of those years; NCYC = 0.5), or with a larger BSF account limit, the BSF would have smoothed spending growth during the full '911 recession. With those 1999-2001 tax cuts, the BSF was only large enough to avoid cuts in 2002. By exhausting the BSF, simulated spending grew in 2002 (actual spending fell nearly 4%), but by less than the cap. With the BSF at zero for 2003, simulated spending fell by more than actual spending. The actual 'ratchet-down effect' of the TABOR limit yielded a referendum to eliminate the 'rebasing' of the TABOR limit and the ratchet down effect of that 'rebasing'. The resulting modifications of the TABOR Amendment weakened it both in constraining spending in the long run, and in stabilizing the budget over the business cycle.

If a TEL is linked to a BSF, the effectiveness of this TEL/BSF combination in stabilizing budgets over the business cycle depends upon the BSF rules for deposit and withdrawal. If these rules allow for much or all of the BSF funds to be expended in the initial years of a recession the result could be a 'cliff effect', i.e. triggering a sharp decrease in spending during the later years of the recession. This is especially true when the TEL limit is 'rebased' resulting in a 'ratchet down effect'. In that case, the use of the BSF funds to offset revenue shortfall boosts expenditures in the initial years of the recession, possibly above the TEL limit, then when the TEL limit is 'rebased' and ratcheted down in subsequent years the exhaustion of BSF funds requires a discontinuous reduction in spending to that lower level of revenues.

Most states have chosen a TEL limit based on personal income growth because this is a less stringent limit compared to TELs based on population growth plus inflation. Our analysis suggests that TELs based on personal income growth are likely to be less effective in stabilizing spending over the business cycle. A well designed TEL based on population growth and inflation can be more effective in stabilizing the budget as well as constraining the growth in spending. To achieve greater budget stability, the TEL rules should provide for ‘rebasing’ the limit when there is a revenue shortfall. ‘Rebasing’ the limit will result in a ‘ratchet down effect’ on the limit in subsequent years. To minimize the ‘ratchet down effect,’ the TEL should be linked to a BSF large enough to make up for two to three years of slow revenue growth, but small enough to avoid some of the rentseeking problems likely generated by large BSF account balances. That optimal BSF account balance cap likely exceeds the ten percent BSF cap used in our simulations, but is likely smaller than the 25% cap used in our sensitivity test, and varies from state to state. Rules for deposit and withdrawal of BSF funds should be designed to offset revenue shortfalls over the entire business cycle, not just during the initial years of a recession, in order to avoid the ‘cliff effect’.

REFERENCES

Kioko, Sharon N. 2011. “Structure of State-Level Tax and Expenditure Limits.” *Public Budgeting & Finance* 31:2, 43-79.

Merrifield, J. and Monson, D., 2011. Simulation of a constitutional spending limit for a conservative state: with dynamic adjustment and sensitivity analysis. *Public Budgeting and Finance* 31 (3), 1-25.

Merrifield J. and Poulson, B., 2014a. “State fiscal policies for budget stabilization and economic growth: a dynamic scoring analysis.” *Cato Journal*, 34 (1):47-81.

Merrifield J. and Poulson, B., 2014b. “The New Economics of Tax and Expenditure Limits.” Paper presented to the Western Economic Association meetings, Denver Colorado, June 2014.

Primo, D.M. 2006. “Stop Us Before We Spend Again: Institutional Constraints On Government Spending.” *Economics & Politics* 18:3, 269–312.

Schunk, D. and Woodward, D., 2005. Spending stabilization rules: a solution to recurring state budget crises. *Public Budgeting and Finance* 25 (4), 105-124.

Wagner, G.A. and Elder, E.M. 2005. “The Role of Budget Stabilization Funds in Smoothing Government Expenditures Over the Business Cycle.” *Public Finance Review* 33:4, 439-465.

Waisanen, B., 2010. *State tax and expenditure limits-2010*. National Conference of State Legislatures, Washington D.C.

Zycher B., 2013. *State and local spending: Do tax and expenditure limits work?* American Enterprise Institute, May.