

Rising Government Debt: Causes and Solutions for a Decades-Old Trend

Pierre Yared

Since US government debt as a fraction of GDP reached a trough in the mid-1970s, it has been on a generally upward trajectory. As shown in Figure 1, it is now approaching levels not reached since World War II, and is projected to continue to increase significantly over the coming decade (Congressional Budget Office 2018, table 4.1). This is largely the result of a secular expansion of government spending—in particular, mandatory spending programs such as Social Security, Medicare, and Medicaid (as discussed in Blahous 2013)—with tax revenue not rising as rapidly. Between 1968 and 2017, spending on these three categories as a share of GDP increased by an average annual rate of 2.4 percent, while tax revenue as a share of GDP grew by an average annual rate of 0.16 percent (based on Congressional Budget Office 2018, tables E.1 and E.5).

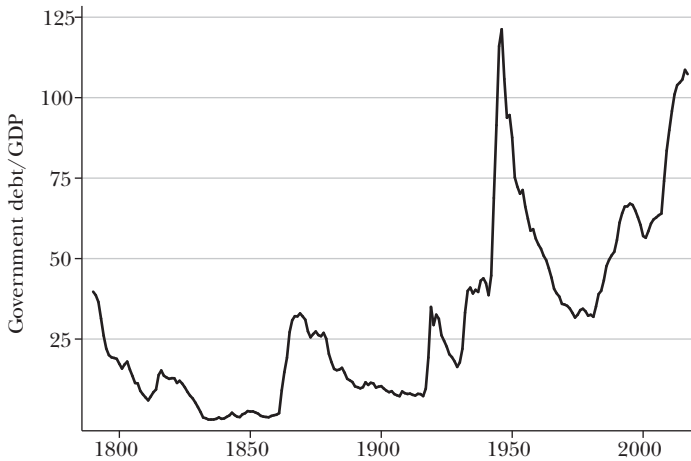
The United States is not alone. Advanced economies as a group have experienced a long-term increase in government debt to GDP, with France and Germany singled out as examples in Figure 2. The increase in government debt in most of these countries is also the result of tax revenue not keeping pace with the expansion of government spending. For example, between 1972 and 2016, central government tax revenue as a share of GDP increased in France, in Germany, and, more broadly, in the Organisation for Economic Cooperation and Development countries (based on World Bank data).

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*Figure 1***Gross Debt of the US Government***(percent)*

Source: Government debt to GDP is gross central government debt as a percentage of GDP from Reinhart and Rogoff (2011) for 1790–2010, updated for 2011–2017, with the growth rate in debt to GDP from the International Monetary Fund.

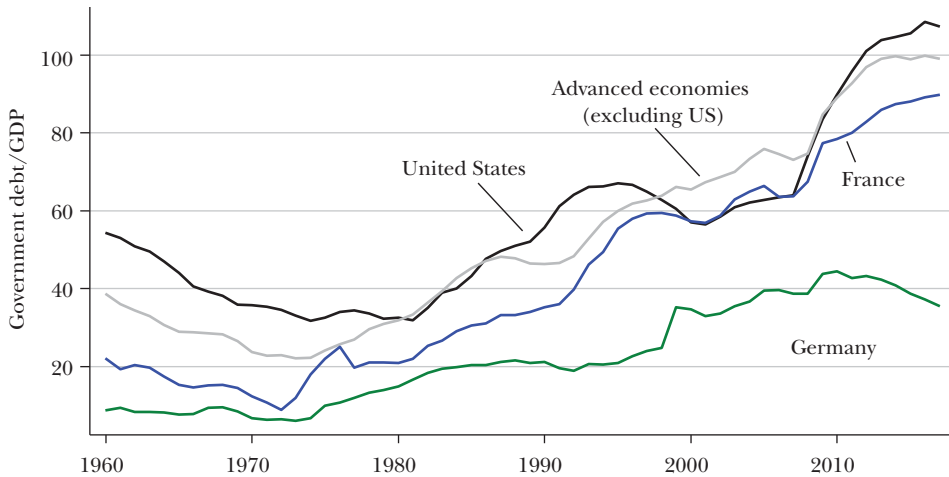
Note: I focus on gross central government debt as this measure is available for the broadest cross-section of advanced economies. But for the United States, all empirical observations in the paper are robust to replacing this gross measure with federal debt held by the public.

Large debt buildups can eventually lead to diminished economic activity, either by crowding out private capital investment or by forcing an increase in distortive taxes and a decrease in public investment to facilitate repayment.¹ Moreover, a government carrying such a high debt load may be constrained in responding to future catastrophes, such as financial crises, natural disasters, or wars (see Obstfeld 2013; Battaglini and Coate 2016; Romer and Romer 2018). In extreme cases, the result is default through explicit debt repudiation or inflation. There are many historical cases of default in advanced economies (Reinhart, Reinhart, and Rogoff 2015). The costs of default include increased stress on financial institutions, lower international financing for domestic firms, and decreased export market access (for discussion, see Borensztein and Panizza 2008; Hébert and Schreger 2017 and the references cited therein).

Has the rise in government debt over the past four decades served a socially beneficial purpose that would compensate for the risks of the added debt burden? In the first part of this article, I review normative macroeconomic theories in which government debt serves three possible functions: it can facilitate tax-smoothing, provide a safe asset, or sustain dynamic efficiency. I argue that, while the increased debt in certain periods may have been an optimal response to specific

¹For an analysis of the empirical relationship between economic growth and public debt, see Reinhart, Reinhart, and Rogoff (2012) in this journal and Eberhardt and Presbitero (2015).

Figure 2
Government Debt in Advanced Economies
 (percent)



Source: Government debt to GDP is gross central government debt as a percentage of GDP from Reinhart and Rogoff (2011) for 1960–2010, updated for 2011–2017 with the growth rate in debt to GDP from International Monetary Fund. GDP is from Feenstra, Inklaar, and Timmer (2015) for 1960–2014, and the 2014 GDP weight is assigned to 2015–2017.

Note: The sample of advanced economies is a balanced panel which includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States. The line for advanced economies (excluding the US) represents the GDP-weighted average for each observation year.

macroeconomic shocks, the broad-based long-run *trend* in debt accumulation seems inconsistent with these theories of optimal government debt policy.

I then review political economy theories of government debt. I argue that an increasingly older population, rising political polarization, and rising electoral uncertainty can explain the long-run trend in government debt across advanced economies. A resonating theme of these political economy theories is the time-inconsistency of government policy. Current governments want to be fiscally *irresponsible*, while simultaneously hoping that future governments will be fiscally *responsible*.

Thus, governments across the world have adopted fiscal rules—such as mandated deficit, spending, or revenue limits—to curtail future increases in government debt. In 2015, 92 countries had fiscal rules in place, a dramatic increase from 1990, when only seven countries had them (Lledó, Yoon, Fang, Mbaye, and Kim 2017). Fiscal rules must balance commitment not to overspend with flexibility to react to shocks. In the final part of this article, I describe some recent research on the optimal design of fiscal rules, elucidating the commitment-versus-flexibility tradeoff in theory and in practice. This discussion touches on how rules should be conditioned on public information, how they should be enforced, how they should be applied at a supranational level, whether they should feature escape clauses, and whether they should be based on fiscal policy tools or targets.

Optimal Government Debt Policy

Behind any theory of optimal government debt lurks the Ricardian equivalence proposition (Barro 1974). This proposition states that the level of government debt is irrelevant and has no effect on real economic activity because government borrowing can be undone by private actors. For example if the government cuts taxes and borrows today, the private sector anticipates a tax increase in the future by the government that needs to repay the debt. As a consequence, the private sector uses the tax cut today to save through government bonds to finance a higher future tax burden, and the government's decision to borrow more has no effect on consumption, labor, and capital investment decisions.

Ricardian equivalence requires three strong conditions that do not hold in practice. First, it assumes that raising tax revenue entails no deadweight loss, which is why the timing of revenue-raising does not directly distort consumption, labor, or capital investment decisions. Second, households and firms are assumed to be financially unconstrained and can thus borrow and lend freely at the same terms as the government. Finally, households and firms care about the level of taxes infinitely far into the future. I now turn to theories of optimal government debt that relax each of these three conditions and consider whether any of them can justify the overall pattern of rising government debt.

Tax-Smoothing: Unanticipated and Anticipated Fiscal Needs

The tax-smoothing argument is the most widely used theory of optimal government debt. If lump-sum taxes are ruled out so that raising tax revenue distorts economic decisions, whereas selling government bonds does not, then government debt allows the government to smooth the deadweight loss from raising tax revenue across time (for early examples, see Barro 1979 and Lucas and Stokey 1983; for recent examples, see Bhandari, Evans, Golosov, and Sargent 2017 and the references cited therein). However, the logic of this argument plays out differently if the fiscal needs are unanticipated versus anticipated. Let's discuss both cases.

The tax-smoothing argument suggests that a government facing unanticipated, temporary spending needs should respond optimally by increasing government debt. The logic is that financing these needs through immediate revenue-raising would be more costly for the economy in the short-term, and so it is better to issue debt to spread these costs into the future, when fiscal needs are lower.

It's easy enough to think of several unanticipated temporary fiscal needs that have caused government debt to increase across advanced economies. The global financial crisis, which started in 2007, put downward pressure on government revenues and upward pressure on the potential benefits of fiscal stimulus. In the United States, gross central government debt as a fraction of GDP increased from 64 percent in 2007 to 90 percent in 2010. During the same time frame, government debt to GDP in the euro area also increased, not only in countries heavily affected by the crisis such as Greece, Ireland, Italy, Portugal, and Spain, but also in countries less affected such as Germany and France (based on data in Reinhart and Rogoff

2011). Prior to the global financial crisis, the unanticipated wars in Afghanistan (2001–present) and Iraq (2003–2011) contributed to rising US government debt. US military spending as a fraction of GDP increased from 2.9 percent in 2000 to 3.8 percent in 2007 (based on World Bank data).

But while unanticipated temporary fiscal needs resulting from the global financial crisis and war can explain some of the increase in US debt in certain periods, they cannot explain either the long-term trend in government debt since the mid-1970s across advanced economies or the projected rise in the future.

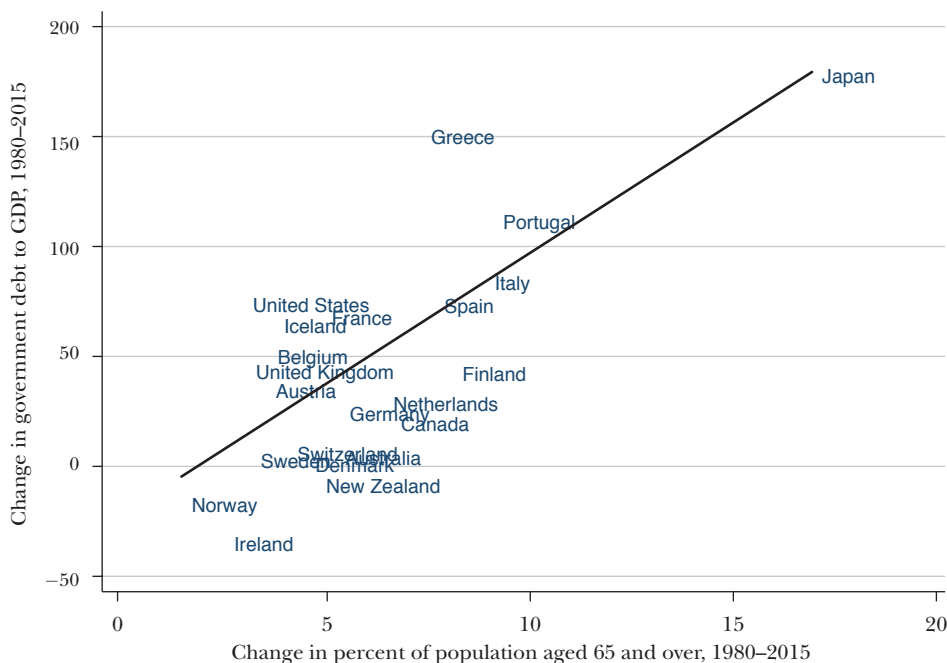
Can a combination of tax-smoothing theory and anticipated fiscal needs explain the long-term trend in public debt? The difficulty here is that, according to tax-smoothing theory, a government facing rising future fiscal pressures should pay down a larger portion of the debt in the present so as to alleviate forecasted fiscal strain.

Across advanced economies, the reduction in fertility rates and the extension of life spans have increased the elderly population, which in turn is leading to a long-term rise in fiscal pressures. In the sample of advanced economies used for Figure 2, the share of the population aged 65 and older has doubled, rising from 9.3 percent in 1960 to 18.5 percent in 2015 (based on data from the United Nations). Government spending on programs to assist the elderly have risen accordingly. Between 1980 and 2015, cash benefits to the elderly as a fraction of GDP across the OECD increased from 4.6 percent to 6.6 percent (as reported in the OECD “Social Expenditure Database”). In the United States, Social Security spending as a fraction of GDP increased from 2.6 percent in 1968 to 4.9 percent in 2017, while Medicare spending as a fraction of GDP during that time increased from 0.6 percent to 3.7 percent (Congressional Budget Office 2018, table E.5). This increase in mandatory spending was anticipated by historical US government forecasts which, on average, predicted larger increases than were realized (Congressional Budget Office 2017, table 2).

Rising government spending driven by promised payments to the elderly is likely to continue. These future commitments dwarf on-balance-sheet government debt. Hamilton (2014, table 5) estimates that in 2012, future Social Security and Medicare obligations were 4.8 times the size of on-balance-sheet debt. The European Central Bank (Lojsch, Rodríguez-Vives, and Slavík 2011, tables 4 and 11) estimates that in 2007, future pension entitlements in the euro area were five times the size of on-balance-sheet debt.

In the face of these well-anticipated demographic changes, tax-smoothing theory would have prescribed a general decumulation—not accumulation—of government debt during the past several decades. Moreover, tax-smoothing theory would have predicted lower debt accumulation in countries anticipating greater strain due to an aging population. Nevertheless, the cross-sectional data illustrated in Figure 3 shows the opposite: countries experiencing a greater increase in population aging, such as Japan, have accumulated more debt as a percentage of GDP than those experiencing a lower demographic strain, such as Canada. In sum, the long-term secular trend in government debt accumulation in the United States and across advanced economies cannot reflect an optimal policy response to either unanticipated or anticipated fiscal needs.

Figure 3

Change in Government Debt and Change in Elderly Population*(percentage point change)*

Source: See Figure 2 for the government debt to GDP data source. Percent of population aged 65 and over is from the United Nations.

Note: The sample represents advanced economies, and is the same as for Figure 2. The regression represented by the fitted line yields a coefficient of 11.85 (standard error = 2.38), $N = 22$, and $R^2 = 0.55$.

Safe Asset Provision

A second theory of optimal government debt considers the role of public debt when the private sector cannot borrow or lend freely at the same terms as the government (for early examples, see Woodford 1990; Aiyagari and McGrattan 1998; Holmström and Tirole 1998; for recent examples, see Azzimonti and Yared forthcoming and the references cited therein). This theory builds on the fact that governments can borrow more cheaply than the private sector. As a result, when the government issues bonds, it slackens financial constraints on borrowers who now receive additional resources from the government (through tax cuts or government loans). In addition, the safe asset provision theory suggests that if financial constraints become tighter, an optimal policy response increases public debt to counteract the shrinking supply of safe assets for creditors, while simultaneously providing more liquidity to increasingly constrained borrowers. The safe asset role of optimal debt arises in various contexts: in the aftermath of the global financial crisis, during financial deregulation, under changing income risk, and during rising cross-border capital flows. I now examine whether these

considerations in the context of the safe asset provision theory can justify the observed long-term trend in government debt in advanced economies.²

For example, the safe asset provision theory can certainly offer a justification for the increase in public debt in response to the global financial crisis. However, in the previous decades from 1980 and 2007, financial conditions did not tighten, but in general loosened through a global process of financial deregulation (for discussion, see Philippon and Reshef 2012). This deregulation came hand in hand with an increase in private sector leverage. The US economy, for example, saw household debt as a percent of income rise from 62 percent in 1980 to 123 percent in 2007 (Ahn, Batty, and Meisenzahl 2018). The safe asset provision theory suggests that such a relaxation of financial constraints should have been met with a decrease, as opposed to an increase, in public debt.

The safe asset provision theory also suggests that public debt should increase in response to rising income risk, because households and businesses facing greater income risk develop a stronger precautionary motive to save, driving down interest rates. The optimal policy response increases the supply of public debt to satisfy the increased demand for safe assets, as Azzimonti, de Francisco, and Quadrini (2014) illustrate in a quantitative model.

But evidence from US administrative data suggests that household income risk actually *declined* in the decades after 1980 (for example, Sabelhaus and Song 2010; Guvenen, Ozkhan, and Song 2014), while business-level analyses of trends in risk have found mixed results (for example, Comin and Philippon 2005; Davis, Haltiwanger, Jarmin, and Miranda 2006 and the references cited therein). From this perspective, the safe asset provision theory thus offers little support for an increase in public debt.

The safe asset provision theory also applies in the context of the dramatic expansion of cross-border flows in the last four decades, a response to the reduction of international barriers in trade and finance. This trend accelerated in the aftermath of the Asian financial crisis of 1997 and the introduction of China into the World Trade Organization in 2001, when many nations began substantially increasing their US dollar reserves. The ensuing large capital inflows into advanced economies—a phenomenon known as the “global saving glut”—led to a deterioration of net foreign asset position for some advanced economies and to a decline in global interest rates (Bernanke 2005). For example, between 1995 and 2015, US net foreign assets decreased from –5 percent of GDP to –42 percent of GDP (based on data from Lane and Milesi-Ferretti 2018).

²For this discussion, I am implicitly considering the implications for an economy with heterogeneous households consisting of borrowers and lenders. An alternative approach considers hand-to-mouth homogeneous households in an open economy. Because the government’s objective in this case is to smooth private consumption over time through taxes and transfers matched with fluctuating government borrowing from abroad, the analysis of this environment is isomorphic to a tax-smoothing framework. For further discussion on the isomorphism between tax-smoothing and consumption-smoothing frameworks, see Barro (1979) and Aiyagari, Marcet, Sargent, and Seppälä (2002).

From the perspective of safe asset provision theory, the optimal policy response to greater globalization and capital inflows is ambiguous. These phenomena should reduce the cost of public borrowing for two reasons: 1) an increase in asset demand by foreigners reduces interest rates and the cost of issuing public debt; and 2) globalization expands the market for safe assets, thereby reducing the marginal interest rate response to additional public debt issuance. But on the other side, additional borrowing by the domestic private sector (in response to lower interest rates) means that domestic borrowers suffer more from marginal interest rate increases induced by higher public debt.³

Beyond this theoretical ambiguity, there are other reasons that the long-term trend in public debt across advanced economies does not appear to be an optimal policy response to globalization. First, government debt in advanced economies had been on an upward trajectory well before the onset of the global saving glut in the late 1990s, as shown earlier. Second, prior to the late 1990s, the degree of cross-border public debt holdings had been relatively stable, suggesting that the globalization of public debt markets was limited up until that point. For example, in the case of the United States, the fraction of government debt that was held by foreigners remained around 15 to 20 percent between 1980 and 1995 and increased significantly thereafter, reaching 46 percent in 2009 (Aizenman and Marion 2011, figure 7). Finally, the safe asset provision theory would predict that, all else fixed, smaller countries respond to globalization by increasing public debt proportionately more than larger countries, because globalization decreases the interest rate response to debt issuance by more for small countries. However, the relationship between country size and debt issuance for advanced economies during this period is actually positive: in the advanced economy sample from Figure 2, the change in debt to GDP from 1980 to 2017 has a correlation of 0.41 with (the log of) 1980 GDP. Two large economies with especially large increases in their public debt-to-GDP ratios over this time are the United States and Japan.

Dynamic Efficiency

A final theory, less explored in the research literature, considers the role of public debt when the private sector does not internalize the effect of fiscal policy infinitely far into the future (for example, Diamond 1965; Blanchard 1985). In such an environment, older households do not face the future tax cost of issuing government debt today, because any taxes will be repaid by future generations. As a consequence, an increase in government debt tilts the lifetime consumption profile towards older generations, while also increasing interest rates and crowding out capital investment. Under some conditions, the possibility of a bubble in

³The three channels highlighted here, together with an ambiguous optimal policy response, emerge if one extends the two-period model of Azzimonti and Yared (2017) by introducing foreign asset demand (details available upon request). Azzimonti, de Francisco, and Quadrini (2014) also illustrate the second channel in a model with symmetric countries individually choosing policy. Another approach to this question additionally considers the risk of default and inflation by the government (for example, see Farhi and Maggiori 2018).

government debt arises, whereby one generation is willing to hold government debt purely because future generations are also expected to do so.

From this perspective, if an economy is dynamically inefficient and has overaccumulated capital, increasing government debt can be optimal. Inefficient capital overaccumulation can emerge in equilibrium when agents have finite horizons, in which case a bubble in government debt can improve welfare (for discussion, see Tirole 1985). However, there is no evidence of capital overaccumulation in the United States or advanced economies in the post-World War II period (Abel, Mankiw, Summers, and Zeckhauser 1989).⁴

Political Economy Forces behind Rising Government Debt

The absence of a clear normative reason for the trend in government debt across advanced economies suggests that political forces are behind this pattern. In this section, I review political economy theories of government debt, with a focus on rational theories driven by political self-interest. I argue that, over the past four decades, changes in specific political factors can explain the long-run trajectory of government debt.⁵

In theoretical terms, the political factors that I describe imply that a government behaves similarly to an agent with present-biased and dynamically inconsistent preferences, which economists often analyze using a hyperbolic discounting model (for example, Laibson 1997). In the context of fiscal policy, quasi-hyperbolic preferences imply that the government at a given date t weighs periods $\{t, t+1, t+2, \dots\}$ according to discount factors $\{1, \beta\delta, \beta\delta^2, \dots\}$, for some time preference factor $\delta \in (0, 1)$ and present bias $\beta \in (0, 1)$. This creates a familiar problem of dynamic inconsistency. Consider the weight the government assigns to date $t+2$ relative to date $t+1$. From the perspective of date t , this weight is $(\beta\delta^2)/(\beta\delta) = \delta$, but from the perspective of date $t+1$, this weight is $\beta\delta < \delta$. Thus, a government subject to present bias will always want to apply the discount factor δ to future time periods, in line with what is socially optimal. However, when those time periods actually arrive and become the present, the present bias β becomes relevant. The government becomes like a person who always wants to start exercising or eating healthier tomorrow, but never wants to start today.

In fiscal policy, any political factor that amplifies the present bias results in larger deficits (from higher spending or lower taxes) and changes the long-term trend in government debt. In addition, a government with this kind of present bias

⁴Geerolf (2018) reaches the same result when applying the methodology of Abel, Mankiw, Summers, and Zeckhauser (1989) to more recent US data. Using a different methodology and data, however, this work finds less-strong evidence in favor of dynamic efficiency.

⁵In contrast to rational theories, “fiscal illusion” theory emphasizes voters’ behavioral biases and their potential inability to understand the long-term costs of deficits (for example, Buchanan and Wagner 1977). This theory does not lead voters to demand commitment devices, such as the fiscal rules discussed in the next section. Moreover, it is not clear whether the time-series and cross-country patterns in behavioral biases—to the extent these could be measured—would explain the empirical evidence on public debt.

will recognize that it would like to be more patient in the future, but will probably be unable to do so, and thus will be interested in implementing fiscal rules as a commitment device (as discussed in the next main section of this paper). Examples of fiscal policy applications that make use of quasi-hyperbolic preferences include Aguiar and Amador (2011) and Halac and Yared (2014, 2018a, 2019).

In the next subsections, I describe several political factors that provide a microfoundation for the present bias and the dynamic inconsistency of government preferences. I document how these factors have evolved and offer an explanation for the long-run trend in government debt. I focus here on long-run considerations and ignore variation in present bias over the political business cycle. For a starting point in that literature, see Ales, Maziero, and Yared (2014, and the references cited therein).⁶

Aging and Heterogeneous Discounting

Households differ in how much they weigh the present relative to the future. These differences can be the result of demographics, with older households caring less about the future than younger households. This is consistent with survey evidence on intergenerational differences in policy preferences, with younger households placing a larger value on fiscal responsibility than older households (Parker 2012; Wolter, Hansen, Campbell, and Ansolabehere 2013). In a political environment in which policy is chosen sequentially without commitment, as is common in a representative democracy that has not imposed long-term fiscal rules on itself, this heterogeneity implies a present bias together with dynamically inconsistent preferences for the government.

Conceptually, heterogeneity in discount rates means that impatient households wield disproportionate influence in policymaking in the present period. If commitment were possible, impatient households would agree in advance to allow the patient households to have more political influence in the future, because those households value the future more. However, nothing can stop impatient households from also deciding to influence policy when later time periods become the present. Jackson and Yariv (2014, 2015) formalize this idea and show that with any heterogeneity in preferences, every nondictatorial aggregation method that respects unanimity must be time-inconsistent; moreover, any such method that is time-separable must lead to a present bias.

This theory suggests that the greater fraction of old impatient households relative to young patient households, the more shortsighted is the government, the larger

⁶Alesina and Passalacqua (2016) offer a survey of the literature on the political economy of public debt. Even in the absence of the long-run forces that I describe, government debt can deviate from the normative benchmark if a government is benevolent but lacks commitment to the path of interest rates or to repaying debt (for a starting point in that literature, see Chari and Kehoe 1993; Debortoli, Nunes, and Yared 2017 and the references cited therein). However, whether this form of lack of commitment on its own leads to debt that is higher or lower than is optimal is ambiguous and depends on various economic considerations. For this reason, I focus on how lack of commitment combined with additional political factors leads to excessive debt.

are government deficits, and the faster is government debt accumulation. Arguments along these lines emerge in the models of Cukierman and Meltzer (1989) and Tabellini (1991).⁷ This theory explains the long-term trend in government debt in advanced economies as a result of an aging population. In addition, this theory is consistent with the cross-country trends displayed earlier in Figure 3, where government debt has grown faster in countries experiencing a larger increase in the elderly population.

Tragedy of the Commons

Shortsighted policymaking can also result from a version of the tragedy of the commons in which political parties acting independently engage in excessive targeted government spending since they do not internalize the shared financing costs of government debt. Weingast, Shepsle, and Johnsen (1981) take this approach in a static fiscal framework, while Velasco (2000) offers an example of this approach in a dynamic framework.

As an illustration, consider N symmetric parties that can make targeted deficit-financed spending appropriations to their constituencies in the present, simultaneously and without coordinating. Then each party fails to internalize the total cost of additional debt because the burden of this debt is shared equally across parties in the future; from the party's perspective, the cost of one additional unit of debt due to targeted spending is $1/N$ of the total cost. The result is excessive spending and government debt accumulation, which would be alleviated if parties jointly committed in advance to limiting borrowing. This lack of coordination leads the government to be present-biased and time-inconsistent in its fiscal policy. Moreover, this present bias is amplified when there is greater disagreement in spending priorities across political parties (Hertzberg 2016).⁸

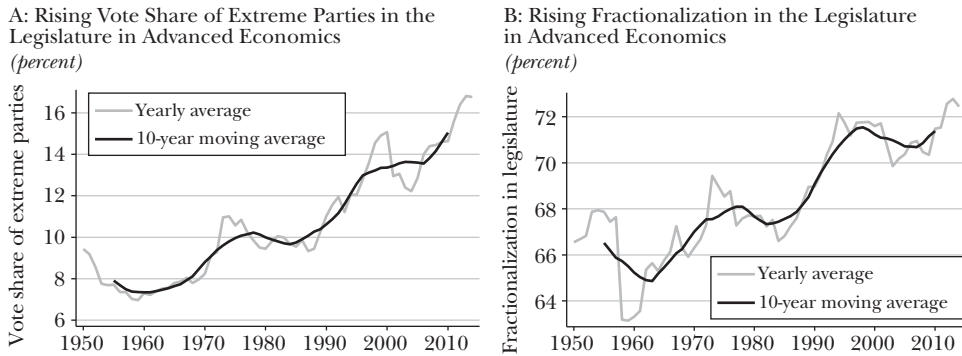
Even in the absence of domestic political disagreement, a related coordination problem can emerge across countries, particularly if these countries are highly integrated financially, as in the euro area. Individual countries may fail to internalize the impact of their borrowing decisions on the shared interest rates, inflation rates, or probability of financial contagion. Azzimonti, de Francisco, and Quadrini (2014) discuss excessive borrowing in the context of shared interest rates, as do we in Halac and Yared (2018a), while Beetsma and Uhlig (1999), Chari and Kehoe (2007), and Aguiar, Amador, Farhi, and Gopinath (2015) do so in the context of shared inflation rates. Either way, the result is inefficiently high public debt accumulation across countries. These mechanisms also apply to subnational governments that can issue their own debt (Dovis and Kirpalani 2017).

The tragedy of the commons predicts that countries with a large number of constituencies or deep disagreements in fiscal priorities across constituencies will

⁷Song, Storesletten, and Zilibotti (2012) show that this present bias can be mitigated if current generations care more about future generations than future generations care about current generations.

⁸Hertzberg (2016) captures disagreement as the relative weight placed on targeted-transfers versus mutually beneficial public goods. This work establishes an equivalence result which, under certain assumptions on preferences, links the intertemporal behavior of multiple time-consistent agents suffering from the tragedy of the commons with that of a single time-inconsistent agent with quasi-hyperbolic preferences.

Figure 4

Polarization and Fractionalization in the Legislature in Advanced Economies

Source: Measures on the y-axis come from Funke, Schularick, and Trebesch (2016).

Note: The sample represents a balanced panel of advanced economies used for Figure 2 with available vote share and fractionalization data. The sample excludes Greece, Iceland, New Zealand, Portugal, and Spain, for which data is not available for all years. For Figure 4A, the measure is the percent of the popular vote for extreme parties on the far right or the far left for the most recent election in the lower legislature. For Figure 4B, the fractionalization measure represents the probability that two members of the lower legislature are from different political parties.

incur larger government deficits, resulting in faster government debt accumulation. This prediction is consistent with empirical work that has found that larger deficits are associated with countries with more ministers, with greater ideological polarization in the executive, and with a proportional (as opposed to majoritarian) election system (for evidence, see Woo 2003; Persson and Tabellini 2004; Crivelli, Gupta, Mulas-Granados, and Correa-Caro 2016).

Through the lens of this theory, the long-term trend in government debt in advanced economies is a result of the increase in political polarization and fragmentation across these economies. Evidence on this rise in polarization in the United States comes from many sources. The Partisan Conflict Index of Azzimonti (2018), which is based on the number of newspaper articles reporting political disagreement in a given month, shows an increase in partisan conflict in the United States since the late 1960s. This trend is consistent with evidence from other advanced economies, which have witnessed a declining influence of centrist political parties. Figure 4A shows that across advanced economies, the share of the legislative vote going to parties of the extreme left or extreme right has been on the rise since the 1960s. Figure 4B calculates the probability that any two members of the legislature are from different political parties, and by this measure finds a pattern of increasing political fractionalization in legislatures since the 1960s in advanced economies.

Political Turnover

A large literature focuses on political turnover as an explanation for rising government debt; early examples include Persson and Svensson (1989) and Alesina and Tabellini (1990), while more recent examples include Battaglini and Coate

(2008) and Yared (2010). In this case, present bias results from the interaction of two factors: 1) the *temporary* concentration of political authority in one political party, which derives additional benefits from spending while in power by boosting its popularity, concentrating government resources on preferred initiatives, or increasing wasteful rents; and 2) the inability of parties to make binding (intertemporal) commitments to one another.

Conceptually, the realization (or threat) of political turnover causes the current government to be impatient, since the party holding power recognizes that it may not have the opportunity to benefit from spending in the future.⁹ This present bias is more severe if the temporary benefits from spending and rent-seeking while in office are large, if there are more parties competing for power, if only a subset of parties can make decisions at any time (as in Battaglini and Coate 2008), or if there is more political risk. In addition to overweighing the present relative to the future, government preferences are dynamically inconsistent; that is, the party presently in power would prefer that future governments be fiscally responsible, but future governments cannot commit to future policy. In this sense, the combination of lack of commitment together with political risk causes the government to be present-biased and time-inconsistent. Aguiar and Amador (2011) offer a formal analysis along these lines.

This theory predicts that countries with more rent-seeking, political fragmentation, or political risk will incur larger government deficits, resulting in faster government debt accumulation. These predictions are in line with empirical cross-country studies on the determinants of government deficits (for example, Drazen 2000; Alt and Lassen 2016).

This theory can explain the long-term trend in government debt in advanced economies as a result of rising political uncertainty for parties in power. The margin of victory in US presidential elections has been in decline since the mid-1980s, as shown in Figure 5A, suggesting that elections have become closer and less predictable. Similarly, analysis of US congressional elections has documented a declining incumbency advantage since the mid-1980s (for example, Jacobson 2015). This trend is consistent with the evidence from advanced economies in Figure 5B, which displays a decline in the average popular vote margin in legislative elections for the governing party or coalition.

Assessment

Political economy theories of government debt can qualitatively explain the long-term trend in government debt accumulation across advanced economies. Nevertheless, these theories leave several unanswered questions for future research.

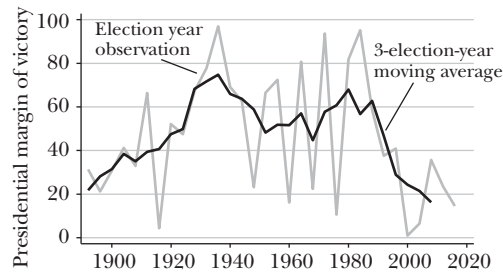
⁹Persson and Svensson (1989) and Müller, Storesletten, and Zilibotti (2016) argue that the present bias may be more severe if the current party in power leans to the right and puts higher relative weight on tax cuts versus government spending increases.

Figure 5

Declining Margin of Victory in Elections

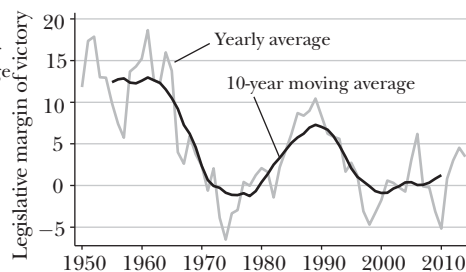
A: Declining Margin of Victory in US Presidential Elections

(percent)



B: Declining Margin of Victory in Legislative Elections in Advanced Economies

(percent)



Source: Electoral margin of victory for presidential elections is from US Electoral College. Margin of victory for the most recent election in the lower legislature is from Funke, Schularick, and Trebesch (2016).

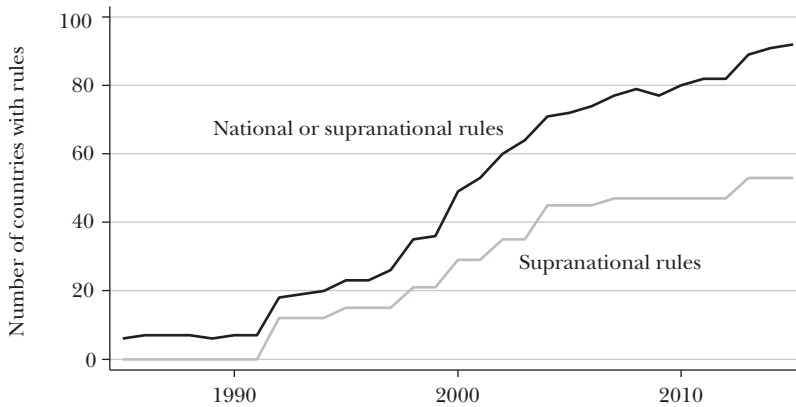
Note: For the US presidential margin of victory (Figure 5A), the measure is the difference in electoral votes received by the winner and the runner-up as a percentage of the sum of votes received by the winner and the runner-up. For the legislative margin of victory in advanced economies (Figure 5B), the margin is the difference between popular votes received by the legislators in the governing party or governing coalition and the votes received by those in the opposition party or coalition, as a percentage of the sum of votes received by the two groups. The sample for Figure 5B represents a balanced panel of the advanced economies from Figure 2 with available margin of victory data. The sample excludes Finland, Greece, Iceland, New Zealand, Portugal, and Spain, for which data is not available for all years.

First, it is unclear whether certain political economy models can quantitatively match the time-series and cross-sectional patterns in advanced economy government debt. Second, political economy theories do not explain why polarization and electoral uncertainty have increased in advanced economies, nor how this development may have been caused by certain economic trends or policies. For example, McCarty, Poole, and Rosenthal (2006) argue that polarization and income inequality reinforce each other, and Baker, Bloom, Canes-Wrone, Davis, and Rodden (2014) provide evidence that higher government spending, taxes, and polarization have contributed to increased policy-related economic uncertainty in the United States. Finally, current political economy theories do not directly address the change in the composition of government spending, which has become increasingly concentrated in old-age government assistance programs. A plausible explanation is that increasingly competitive political parties both change the composition of government spending and increase government debt in their efforts to appeal to an aging constituency.

Fiscal Rules to Constrain Rising Debt

Every political explanation for rising debt discussed in the previous section is based on time-inconsistency in government preferences. Current governments want

Figure 6
Number of Countries with Fiscal Rules



Source: Data is from the International Monetary Fund.

Note: A country is classified as having a fiscal rule if it is subject to an expenditure rule, a revenue rule, a budget balance rule, or a debt rule.

to be fiscally *irresponsible*, while simultaneously hoping that future governments be fiscally *responsible*. Thus, governments across the world have sought to adopt fiscal rules—such as mandated deficit, spending, or revenue limits—to restrict future fiscal policy and curtail the increase in government debt. Figure 6 illustrates the growing number of countries that have imposed fiscal rules. For a complete description of the fiscal rule adopted in each country see Lledó et al. (2017).

Fiscal rules have been adopted at the subnational, national, and supranational levels. In some countries, such rules have been an effective force. For example, in Switzerland the ratio of government debt to GDP rose from 13 percent in 1990 to 29 percent in 2003, but after a fiscal rule was adopted that year, the Swiss debt-to-GDP ratio declined back to 20 percent of GDP by 2016 (based on World Bank data; see Pfeil and Feld 2016 for a discussion). In contrast, the United States is currently subject to national-level spending caps passed in the Budget Control Act of 2011, which were subsequently increased by Congress in 2013, 2015, and 2018. These caps do not apply to most mandatory spending items underlying the growth in debt (Capretta 2014). For a broader discussion of the effectiveness of national and supranational rules at reducing debt, see Wyplosz (2012) and Eyraud, Debrun, Hodge, Lledó, and Pattillo (2018). For analysis of subnational rules, see Primo (2007, and the references therein) for the US experience, and Grembi, Nannicini, and Troiano (2016) for the case of Italy.

In this section, I describe research on the optimal design of fiscal rules. I begin with the fundamental tradeoff of fiscal rules between commitment and flexibility. My discussion then touches on how fiscal rules should be conditioned on public information, how they should be enforced, how they should be applied at a supranational level, whether they should feature escape clauses, and whether they should be based on fiscal policy tools or targets.

Commitment versus Flexibility

Fiscal rules entail a fundamental tradeoff. On the one hand, rules provide commitment to counteract the present bias in policymaking; on the other hand, there is a cost of reduced flexibility because fiscal rules cannot spell out policy prescriptions for every possible shock or contingency, and so some discretion may be optimal. This commitment-versus-flexibility tradeoff is familiar in macroeconomics. For example, it also arises in discussions of monetary policy rules (for an early example, see Rogoff 1985; for recent examples, see Kocherlakota 2016 and the references cited therein). It also arises in principal-agent theory in the study of delegation (for an early example, see Holmström 1977; for recent examples, see Amador and Bagwell 2013 and the references cited therein).

There are two approaches to the theoretical analysis of this tradeoff. One approach restricts the structure of a fiscal rule to a form used in practice—such as a deficit limit—and evaluates the stringency of an optimal rule (for examples, see Azzi-monti, Battaglini, and Coate 2016; Halac and Yared 2018a and the references cited therein). The other approach does not restrict the structure of a fiscal rule and uses mechanism design to characterize simultaneously the structure and the stringency of an optimal rule (for example, Amador, Werning, and Angeletos 2006; Halac and Yared 2014, 2016, 2018b, 2019). This second approach distinguishes between fiscally relevant information on which a fiscal rule can explicitly depend—such as the level of public debt or GDP—and relevant information on which a fiscal rule cannot explicitly depend—such as the depth of a financial crisis or the wartime needs of the military. This latter type of information can be thought of as the government's *private information*. Such information may be observable but not contractible, or it may be literally private information. The latter case arises, for example, if the exact cost of public goods is only known to the government, or if the government has superior information about the aggregate preferences of heterogeneous citizens (as in Sleet 2004; Piguillem and Schneider 2016). In any case, an optimal fiscal rule then is represented as a policy prescription that maximizes social welfare subject to the government's private information and degree of present bias.

The advantage of the first approach is that it can be used to assess real world rules and evaluate the costs and benefits of partial reform in a framework that incorporates a rich set of macroeconomic and political forces. The advantage of the second approach is that it can be used to evaluate the costs and benefits of global—as opposed to partial—reform. This second approach also elucidates how other considerations, on top of private information and present bias, may contribute to the determination of an optimal rule. These two approaches complement each other and provide useful lessons for the optimal design of fiscal rules.¹⁰

In the next subsections, I discuss what the tradeoff between commitment and flexibility implies for various features of fiscal rules in theory and in practice.

¹⁰The difference between these two approaches is analogous to that between the Ramsey and Mirrlees approaches to optimal taxation, a distinction discussed by Mankiw, Weinzierl, and Yagan (2009) in this journal.

Conditioning on Information

An optimal fiscal rule relies on fiscally relevant information that is observable and contractible, like the level of debt and GDP. Because not all fiscally relevant information can be easily observed and verified, this rule may allow some discretion. Amador, Werning, and Angeletos (2006) show that, under certain assumptions on the distribution of private information and the government's preferences, the optimal rule takes a simple threshold form, such as the deficit, spending, or revenue limits observed in practice. (Without these assumptions, an optimal rule is more complex and can involve multiple policy thresholds.) In general, the optimal threshold is tighter the smaller is the volatility of the government's private information and the more severe is the government's present bias, as in both cases the value of commitment is increased relative to the value of flexibility.

Setting optimal fiscal thresholds is challenging. First, there are practical questions regarding implementation. Recent research has been devoted to examining which macroeconomic measures should be used to set a threshold, how to weigh the relative importance of these measures, and how to set the numerical targets so as to afford sufficient flexibility while simultaneously preventing excessive debt growth. For example, Azzimonti, Battaglini, and Coate (2016) analyze the short- and long-term costs and benefits of adopting a balanced budget amendment in the United States. Alfaro and Kanczuk (2016) compare the performance of a debt-independent deficit limit to a pure debt limit for Brazil. Eyraud, Baum, Hodge, Jarmuzek, Kim, Mbaye, and Türe (2018) offer a general discussion of the challenges in calibrating fiscal rules.

Second, there are questions regarding the dynamic determination of optimal fiscal rules when some fiscally relevant information is not contractible. In Halac and Yared (2014), we show that if the government's private information is persistent over time, an optimal fiscal rule should condition on the extent to which past policies agreed with fiscal targets, even if this measure is irrelevant for optimal policy determination. This implies fiscal thresholds that change in response to past policy decisions, unlike the thresholds that would be optimal when the government's private information is independent over time. How to incorporate such considerations into real-world fiscal rules in a practical way is an interesting area for future research.

Enforcement

According to the International Monetary Fund, governments comply with their fiscal rules only about half of the time (Eyraud, Debrun, Hodge, Lledó, and Pattillo 2018). Violation of fiscal rules can trigger either a formal or informal enforcement mechanism. For example, in the European Union, an Excessive Deficit Procedure—a sequence of costly fiscal adjustments and potential sanctions—is set in motion when a rule is breached (as described in Lledó et al. 2017, p. 81). In Chile, penalties for fiscal rule violation have been informal. In Halac and Yared (2017), we describe an episode in 2009 in which breach of the fiscal rule by the Chilean administration was informally punished by the next administration, which continued to ignore the rule. This example highlights a potential self-enforcement mechanism: a current

government may follow the fiscal rule because it does not wish to set a precedent of rule abandonment to be followed by future governments.

How should fiscal rules be structured under limited enforcement? In Halac and Yared (2019), we explore a commitment-versus-flexibility framework where punishments for rule violation are limited and socially costly. We show that under some conditions, the optimal rule is a maximally enforced threshold—namely a deficit, spending, or revenue limit that triggers the largest feasible penalty whenever violated. Whereas graduated punishments would be less socially costly, they would also induce less fiscal discipline. Furthermore, we show that fiscal thresholds that are never violated by the government may be suboptimal. This is the case if extreme shocks to the economy are sufficiently rare and a lax fiscal rule achieves little discipline. Tightening the rule so that it is violated under extreme shocks is then beneficial; as the expected cost of punishment following violation is small relative to the gain in fiscal discipline in normal times.

There are several issues to take into account when considering punishments for breaking fiscal rules. First, whether or not rules have been broken might be unclear. There are numerous examples of how governments can use creative accounting to circumvent rules. Frankel and Schreger (2013) describe how euro-area governments use overoptimistic growth forecasts to comply with fiscal rules. Many US states compensate government employees with future pension payments, which increases off-balance-sheet entitlement liabilities not subject to fiscal rules (Bouton, Lizzeri, and Persico 2016). In 2016, President Dilma Rousseff of Brazil was impeached for illegally using state-run banks to pay government expenses and bypass the fiscal responsibility law (Leahy 2016). Given this transparency problem, many countries have established independent fiscal councils to assess and monitor compliance with fiscal rules (Debrun et al. 2013).

A second issue to consider is the credibility of punishments. As an example, the Excessive Deficit Procedure against France and Germany in 2003 was stalled by disagreement between the European Commission and the European Council; consequently, French and German deficits persisted without penalty (as discussed in Gros, Mayer, and Ubide 2004). In Halac and Yared (2019), we argue that in the absence of institutionalized penalties, the temporary abandonment of rules combined with overspending—as in the Chilean case previously described—can serve as its own deterrent for breaking a fiscal rule. Unlike sanctions that are harmful to all parties, a punishment in the form of future rule abandonment and overspending may be credible, as it benefits the recipients of this overspending.

A third issue is the response of the private sector to the violation of rules, which can also serve as a form of punishment. For example, Eyraud, Debrun, Hodge, Lledó, and Patillo (2018) find that the violation of fiscal rules is associated with a significant increase in interest rate spreads for sovereign borrowing. Such an increase in financing costs immediately penalizes a government for breaching a rule. This idea can be formalized in a model of government debt and default which features multiple equilibria resulting from self-fulfilling market expectations (as in Calvo 1988).

Coordinated Rules

More than half of the countries with fiscal rules are subject to rules that apply at a supranational level: examples include the European Union's Stability and Growth Pact, the West African Economic and Monetary Union, the Central African Economic and Monetary Community, and the Eastern Caribbean Currency Union. Among European countries under EU fiscal rules, more than a dozen also have additional rules at the national level. For example, Germany is constrained by its own constitutionally mandated "debt brake," which imposes a tighter limit on the government's structural deficit than the EU Stability and Growth Pact (Truger and Will 2013).

The main argument for imposing rules at a supranational level relates to the tragedy of the commons argument presented earlier. Individual countries in an integrated economic region do not internalize the impact of their borrowing decisions on the shared interest rates, inflation rates, or probability of financial contagion. Supranational fiscal rules can limit this externality.

However, supranational fiscal rules come with numerous challenges. First, the imposition of uniform thresholds for multiple countries under a supranational rule may be inappropriate if countries are likely to differ in the level or volatility of their fiscal needs or in the severity of their government's present bias. Hatchondo, Martinez, and Roch (2017) argue that conditioning thresholds on market signals, like the interest spread on sovereign borrowing, allows supranational rules to be tailored more effectively to individual countries.

Second, the design of rules at a supranational level must account for the disciplining effect of interest rates (Halac and Yared 2018a). Excessively tight supranational rules not only reduce flexibility, but they promote fiscal irresponsibility by reducing regional interest rates and governments' cost of funding. For example, Fernández-Villaverde, Garicano, and Santos (2013) argue in this journal that the drop in interest rates that followed European integration led to the abandonment of reforms and institutional deterioration in the peripheral European countries. In addition, countries that complement supranational rules with more stringent rules at the national level—as in the case of Germany in the European Union—exert an externality by driving down regional interest rates and reducing fiscal discipline in other countries. In Halac and Yared (2018a), we show that when this interest rate externality and the resultant international imbalances are large enough, supranational rules must be made more stringent to reduce imbalances.¹¹

Finally, whether supranational rules are easier or harder to enforce than national rules is an open theoretical and empirical question. On one hand, the international economic system provides more tools for sanctioning, and the supranational sanctioning authority may be less subject to domestic political pressures. On the other hand, the enforcement of supranational rules faces a collective action

¹¹The same logic can also justify rules that limit current account surpluses (and indirectly budget surpluses), such as the Macroeconomic Imbalance Procedure in the European Union (European Commission 2016, table 3.2).

problem, and disagreement over whether enforcement should occur may be an impediment, as in the case described previously concerning the enforcement of the European Union's Excessive Deficit Procedure in 2003.

Escape Clauses

Many governments' fiscal rules feature an escape clause that allows violating the rule under exceptional circumstances (Lledó et al. 2017). Triggering an escape clause typically involves a review process, which culminates in a final decision by an independent fiscal council, a legislature, or citizens via a referendum. In Switzerland, for example, the government can deviate from a fiscal rule with a legislative supermajority in the cases of natural disaster, severe recession, or changes in accounting method.

The cost of triggering an escape clause deters governments from using them too frequently. Moreover, because these costs largely involve a facilitation of information gathering to promote efficient fiscal policy, escape clauses are useful even in the presence of perfect rule enforcement.

In Halac and Yared (2016), we study fiscal rules that make use of escape clauses in a commitment-versus-flexibility framework; Coate and Milton (2017) also study this. These papers find that introducing escape clause provisions is generally optimal if (privately observed) fiscal shocks are sufficiently volatile, the government's present bias is sufficiently severe, and the resource cost of triggering an escape clause is sufficiently low. In such a situation, a rule with an escape clause dominates a pure threshold rule by allowing for more flexibility in response to extreme economic conditions.

In practice, the use of escape clause provisions can be challenging. The interpretation of events in which escape clauses can be triggered is subjective, and the political deliberation surrounding an appropriate fiscal response can be uncertain and induce delay. As an example, Primo (2007) discusses the problems in implementing escape clauses in the fiscal rules of US states. Whether these costs can outweigh the benefits of using escape clauses is an open empirical question.

Instrument-Based and Target-Based Rules

How should fiscal rules be applied? Should the government face constraints directly on instruments of policy, such as spending, or should the fiscal rule concern targets of policy, such as deficits? Which instruments and targets ought to be addressed?

In practice, fiscal rules can constrain different instruments of policy, such as specific categories of government spending or tax rates. Different instruments may call for different thresholds, as the associated commitment-versus-flexibility tradeoff may not be the same (as Galperti 2019 explains in the context of personal budgeting). For instance, due to volatile geopolitical conditions, military spending needs may be less forecastable than other spending needs, and may thus demand more flexibility. Capital spending is another category where allowing increased flexibility may be optimal, as the benefits of capital spending accrue well into the future and are thus subject to a less-severe present bias. Thus, many countries have "golden

rules,” which limit spending net of a government’s capital expenditure. Poterba (1995) and Bassetto and Sargent (2006) address the benefits of a “golden rule” in the context of US states.

Overall, the evidence suggests that rules that distinguish across categories are indeed associated with better fiscal and macroeconomic outcomes (for discussion, see Eyraud, Lledó, Dudine, and Peralta 2018). Moreover, it can be optimal to set multiple layers of rules, for example specifying a fiscal threshold for individual categories of taxes and spending as well as on the total level of taxes and spending in the form of a (forecasted) deficit rule. Multiple-layer rules are particularly beneficial when there are complementarities across different fiscal instruments.

Similar principles apply to the analysis of target-based rules, which identify targets for outcomes of policy, such as the deficit-to-GDP ratio. A target-based rule specifies an economic goal, while giving the government greater instrument discretion to respond to changing macroeconomic conditions. However, given the risk of macroeconomic surprises, a government may be penalized for rule breach despite its best efforts. Therefore, an optimal target threshold should be tight enough that it induces the government to rein in its present bias, but not so tight that it is excessively prone to violations due to macroeconomic surprises.

In Halac and Yared (2018b), we develop a theoretical framework to compare these different classes of rules, using an extended delegation setting that incorporates a noisy observable outcome. We show that target-based rules dominate instrument-based rules if the government is sufficiently well informed, so that instrument discretion is beneficial and punishment due to macroeconomic surprises is relatively unlikely. We also show how a simple hybrid rule—which allows for an instrument threshold that is relaxed whenever a target threshold is satisfied—would do better than either of these two classes. Bohn and Inman (1996) analyze fiscal rules of US states and find that target-based rules, in the form of end-of-the-year fiscal requirements, perform better than instrument-based rules, in the form of beginning-of-the-year fiscal requirements.

Concluding Remarks

Over the past four decades, government debt as a fraction of GDP has been on an upward trajectory in advanced economies, and the US government debt to GDP is approaching levels not reached since World War II. This paper has argued that political economy theories can explain this long-run trend as resulting from an aging population, rising political polarization, and rising electoral uncertainty.

Many countries have adopted fiscal rules to rein in growing debts. Most of these rules were recently introduced, and time will tell whether they lead to sustainable government finances and to a reversal of this decades-old trend. Their success depends, in part, on whether they appropriately balance the tradeoff between commitment and flexibility underpinning these rules, and whether they address other challenges that I have highlighted, such as enforceability.

This discussion suggests several interesting questions for future research. First, while I have focused on fiscal rules as a solution to growing debts, the introduction of fiscal rules should be combined with additional reforms to budgetary procedures. How specific procedural rules, such as voting or amendment rules, complement or thwart the effect of fiscal rules is an important issue to consider; for example, Capretta (2014) suggests reforms to the US budget process that would allow Congress to change entitlement policy more easily. Second, a government's deficit bias is not constant, because it evolves over time in response to factors such as changing polarization and electoral uncertainty. Understanding how these underlying political forces are impacted by fiscal policy and by the introduction of fiscal rules is important for governments contemplating rule adoption. Finally, the introduction and implementation of fiscal rules requires a level of political consensus and stability, which often occurs when the need for a fiscal rule is less salient. How to take advantage of the occasions to adopt and improve fiscal rules when they arise, rather than letting them pass and missing the opportunity, is critical for limiting the growth of government debt.

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References

- Abel, Andrew B., N. Gregory Mankiw, Lawrence H. Summers, and Richard J. Zeckhauser. 1989. "Assessing Dynamic Efficiency: Theory and Evidence." *Review of Economic Studies* 56(1): 1–20.
- Aguiar, Mark, and Manuel Amador. 2011. "Growth in the Shadow of Expropriation." *Quarterly Journal of Economics* 126(2): 651–97.
- Aguiar, Mark, Manuel Amador, Emmanuel Farhi, and Gita Gopinath. 2015. "Coordination and Crisis in Monetary Unions." *Quarterly Journal of Economics* 130(4): 1727–79.
- Ahn, Michael, Michael Batty, and Ralf R. Meisenzahl. 2018. "Household Debt-to-Income Ratios in the Enhanced Financial Accounts." FEDS Notes, Board of Governors of the Federal Reserve System, January 11, 2018. <https://doi.org/10.17016/2380-7172.2138>.
- Aiyagari, Rao S., Albert Marcet, Thomas J. Sargent, and Juha Seppälä. 2002. "Optimal Taxation without State-Contingent Debt." *Journal of Political Economy* 110(6): 1220–54.
- Aiyagari, Rao S., and Ellen R. McGrattan. 1998. "The Optimum Quantity of Debt." *Journal of Monetary Economics* 42(3): 447–69.
- Aizenman, Joshua, and Nancy Marion. 2011. "Using Inflation to Erode the US Public Debt." *Journal of Macroeconomics* 33(4): 524–41.
- Ales, Laurence, Pricila Maziero, and Pierre Yared. 2014. "A Theory of Political and Economic Cycles." *Journal of Economic Theory* 153: 224–51.
- Alesina, Alberto, and Andrea Passalacqua. 2016. "The Political Economy of Government

- Debt." Chap. 33 in *Handbook of Macroeconomics*, vol. 2, edited by John B. Taylor and Harald Uhlig. Amsterdam: Elsevier.
- Alesina, Alberto, and Guido Tabellini.** 1990. "A Positive Theory of Fiscal Deficits and Government Debt." *Review of Economic Studies* 57(3): 403–414.
- Alfaro, Laura, and Fabio Kanczuk.** 2016. "Fiscal Rules and Sovereign Default." NBER Working Paper 23370.
- Alt, James E., and David Dreyer Lassen.** 2006. "Transparency, Political Polarization, and Political Budget Cycles in OECD Countries." *American Journal of Political Science* 50(3): 530–50.
- Amador, Manuel, and Kyle Bagwell.** 2013. "The Theory of Optimal Delegation with an Application to Tariff Caps." *Econometrica* 81(4): 1541–99.
- Amador, Manuel, Iván Werning, and George-Marios Angeletos.** 2006. "Commitment vs. Flexibility." *Econometrica* 74(2): 365–96.
- Azzimonti, Marina.** 2018. "Partisan Conflict and Private Investment." *Journal of Monetary Economics* 93: 114–31.
- Azzimonti, Marina, Marco Battaglini, and Stephen Coate.** 2016. "The Costs and Benefits of Balanced Budget Rules: Lessons from a Political Economy Model of Fiscal Policy." *Journal of Public Economics* 136: 45–61.
- Azzimonti, Marina, Eva de Francisco, and Vincenzo Quadrini.** 2014. "Financial Globalization, Inequality, and the Rising Public Debt." *American Economic Review* 104(8): 2267–2302.
- Azzimonti, Marina, and Pierre Yared.** 2017. "A Note on Optimal Fiscal Policy in an Economy with Private Borrowing Limits." *Economics Letters* 151: 62–65.
- Azzimonti, Marina, and Pierre Yared.** Forthcoming. "The Optimal Public and Private Provision of Safe Assets." *Journal of Monetary Economics*.
- Baker, Scott R., Nicholas Bloom, Brandice Canes-Wrone, Steven J. Davis, and Jonathan Rodden.** 2014. "Why Has US Policy Uncertainty Risen Since 1960?" *American Economic Review* 104(5): 56–60.
- Barro, Robert J.** 1974. "Are Government Bonds Net Wealth?" *Journal of Political Economy*, 82(6): 1095–1117.
- Barro, Robert J.** 1979. "On the Determination of the Public Debt." *Journal of Political Economy* 87(5): 940–971.
- Bassetto, Marco, and Thomas J. Sargent.** 2006. "Politics and Efficiency of Separating Capital and Ordinary Government Budgets." *Quarterly Journal of Economics* 121(4): 1167–1210.
- Battaglini, Marco, and Stephen Coate.** 2008. "A Dynamic Theory of Public Spending, Taxation, and Debt." *American Economic Review* 98(1): 201–236.
- Battaglini, Marco, and Stephen Coate.** 2016. "A Political Economy Theory of Fiscal Policy and Unemployment." *Journal of the European Economic Association* 14(2): 303–337.
- Beetsma, Roel, and Harald Uhlig.** 1999. "An Analysis of the Stability and Growth Pact." *Economic Journal* 109(458): 546–71.
- Bernanke, Ben S.** 2005. "The Global Saving Glut and the U.S. Current Account Deficit." Remarks at the Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia, March 10, 2015. <https://www.federalreserve.gov/boarddocs/speeches/2005/200503102/>.
- Bhandari, Anmol, David Evans, Mikhail Golosov, and Thomas J. Sargent.** 2017. "Fiscal Policy and Debt Management with Incomplete Markets." *Quarterly Journal of Economics* 132(2): 617–63.
- Blahous, Charles P.** 2013. "Why We Have Federal Deficits: The Policy Decisions that Created Them." Research Paper, Mercatus Center, George Mason University. <https://www.mercatus.org/publication/why-we-have-federal-deficits-policy-decisions-created-them>.
- Blanchard, Olivier J.** 1985. "Debt, Deficits, and Finite Horizons." *Journal of Political Economy* 93(2): 223–47.
- Bohn, Henning, and Robert P. Inman.** 1996. "Balanced-Budget Rules and Public Deficits: Evidence from the U.S. States." *Carnegie-Rochester Conference Series on Public Policy* 45: 13–76.
- Borensztein, Eduardo, and Ugo Panizza.** 2008. "The Costs of Sovereign Default." *International Monetary Fund Staff Papers* 56(4): 683–741.
- Bouton, Laurent, Alessandro Lizzeri, and Nicola Persico.** 2016. "The Political Economy of Debt and Entitlements." NBER Working Paper 22570.
- Buchanan, James M., and Richard E. Wagner.** 1977. *Democracy in Deficit: The Political Legacy of Lord Keynes*. New York: Academic Press.
- Calvo, Guillermo A.** 1998. "Servicing the Public Debt: Role of Expectations." *American Economic Review* 78(4): 647–61.
- Capretta, James C.** 2014. "Reforming the Budget Process." *National Affairs* 21(Fall): 64–80.
- Chari, V. V., and Patrick J. Kehoe.** 1993. "Sustainable Plans and Mutual Default." *Review of Economic Studies* 60(1): 175–95.
- Chari, V. V., and Patrick J. Kehoe.** 2007. "On the Need for Fiscal Constraints in a Monetary Union." *Journal of Monetary Economics* 54(8): 2399–2408.
- Coate, Stephen, and Ross Milton.** 2017. "Optimal Fiscal Limits with Overrides." <http://rossmilton.com/optfiscim17.pdf>.
- Comin, Diego, and Thomas Philippon.** 2005. "The Rise in Firm-Level Volatility: Causes and Consequences." *NBER Macroeconomics Annual* 20: 167–201.

- Congressional Budget Office.** 2017. "An Evaluation of CBO's Past Outlay Projections." November. www.cbo.gov/publication/53328.
- Congressional Budget Office.** 2018. "The Budget and Economic Outlook: 2018 to 2028." April. www.cbo.gov/publication/53651.
- Crivelli, Ernesto, Sanjeev Gupta, Carlos Mulas-Granados, and Carolina Correa-Caro.** 2016. "Fragmented Politics and Public Debt." IMF Working Paper 16-190.
- Cukierman, Alex, and Allan H. Meltzer.** 1989. "A Political Theory of Government Debt and Deficits in a Neo-Ricardian Framework." *American Economic Review* 79(4): 713–32.
- Davis, Steven J., John Haltiwanger, Ron Jarmin, and Javier Miranda.** 2006. "Volatility and Dispersion in Business Growth Rates: Publicly Traded Versus Privately Held Firms." *NBER Macroeconomics Annual* 21: 107–179.
- Debortoli, Davide, Ricardo Nunes, and Pierre Yared.** 2017. "Optimal Time-Consistent Government Debt Maturity." *Quarterly Journal of Economics* 132(1): 55–102.
- Debrun, Xavier, Tidiane Kinda, Teresa Curristine, Luc Eyraud, Jason Harris, and Johann Seiwald.** 2013. "The Functions and Impact of Fiscal Councils." IMF Policy Paper, July 16.
- Diamond, Peter A.** 1965. "National Debt in Neoclassical Growth Model." *American Economic Review* 55(5): 1126–50.
- Dovis, Alessandro, and Rishabh Kirpalani.** 2017. "Fiscal Rules, Bailouts, and Reputation in Federal Governments." NBER Working Paper 23942.
- Drazen, Allan.** 2000. "The Political Business Cycle after 25 Years." *NBER Macroeconomics Annual* 15: 75–117.
- Eberhardt, Markus, and Andrea F. Presbitero.** 2015. "Public Debt and Growth: Heterogeneity and Non-Linearity." *Journal of International Economics* 97: 45–58.
- European Commission.** 2016. "The Macroeconomic Imbalance Procedure: Rationale, Process, Application: A Compendium." European Commission Institutional Working Paper 039. https://ec.europa.eu/info/sites/info/files/file_import/ip039_en_2.pdf.
- Eyraud, Luc, Anja Baum, Andrew Hodge, Mariusz Jarmuzek, Young Kim, Samba Mbaye, and Elif Türe.** 2018. "How to Calibrate Fiscal Rules: A Primer." How-To Notes, March, Fiscal Affairs Department, International Monetary Fund.
- Eyraud, Luc, Xavier Debrun, Andrew Hodge, Victor Lledó, and Catherine Pattillo.** 2018. "Second-Generation Fiscal Rules: Balancing Simplicity, Flexibility, and Enforceability." International Monetary Fund Staff Discussion Note 18-04.
- Eyraud, Luc, Victor Duarte Lledó, Paolo Dudine, and Adrian Peralta.** 2018. "How to Select Fiscal Rules: A Primer." How-To Notes, March, Fiscal Affairs Department, International Monetary Fund.
- Farhi, Emmanuel, and Matteo Maggiori.** 2018. "A Model of the International Monetary System." *Quarterly Journal of Economics* 133(1): 295–355.
- Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer.** 2015. "The Next Generation of the Penn World Table." *American Economic Review* 105(10): 3150–82. The Database. Penn World Table version 9.0, <https://www.ggd.net/pwt/> (accessed June 6, 2018).
- Fernández-Villaverde, Jesús, Luis Garicano, and Tano Santos.** 2013. "Political Credit Cycles: The Case of the Eurozone." *Journal of Economic Perspectives* 27(3): 145–66.
- Frankel, Jeffrey, and Jesse Schreger.** 2013. "Over-Optimistic Official Forecasts and Fiscal Rules in the Eurozone." *Review of World Economics* 149(2): 247–72.
- Funke, Manuel, Moritz Schularick, and Christoph Trebesch.** 2016. "Going to Extremes: Politics after Financial Crises, 1870–2014." *European Economic Review* 88: 227–60.
- Galperti, Simone.** 2019. "A Theory of Personal Budgeting." *Theoretical Economics* 14: 173–210.
- Geerolf, François.** 2018. "Reassessing Dynamic Efficiency." <https://fgeerolf.github.io/r-g.pdf>.
- Grembi, Veronica, Tommaso Nannicini, and Ugo Troiano.** 2016. "Do Fiscal Rules Matter?" *American Economic Journal: Applied Economics* 8(3): 1–30.
- Gros, Daniel, Thomas Mayer, and Angel Ubide.** 2004. "The Nine Lives of the Stability and Growth Pact: A Special Report of the CEPS Macroeconomic Policy Group." Centre for European Policy Studies Paperpacks. <https://www.ceps.eu/publications/nine-lives-stability-pact>.
- Güvenen, Fatih, Serdar Ozkhan, and Jae Song.** 2014. "The Nature of Countercyclical Income Risk." *Journal of Political Economy* 122(3): 621–60.
- Halac, Marina, and Pierre Yared.** 2014. "Fiscal Rules and Discretion under Persistent Shocks." *Econometrica* 82(5): 1557–1614.
- Halac, Marina, and Pierre Yared.** 2016. "Commitment vs. Flexibility with Costly Verification." NBER Working Paper 22936.
- Halac, Marina, and Pierre Yared.** 2017. "Fiscal Rules and Discretion under Self-Enforcement." NBER Working Paper 23919.
- Halac, Marina, and Pierre Yared.** 2018a. "Fiscal Rules and Discretion in a World Economy." *American Economic Review* 108(8): 2305–34.
- Halac, Marina and Pierre Yared.** 2018b. "Instrument-Based vs. Target-Based Rules." NBER

Working Paper 24496.

Halac, Marina, and Pierre Yared. 2019. "Fiscal Rules and Discretion under Limited-Enforcement." NBER Working Paper 25463.

Hamilton, James D. 2014. "Off-Balance-Sheet Federal Liabilities." *Cato Papers on Public Policy* 3: 1–40.

Hatchondo, Juan Carlos, Leonardo Martínez, and Francisco Roch. 2017. "Fiscal Rules and the Sovereign Default Premium." <https://drive.google.com/file/d/0B28k8Kom2VDBZzhGQnFLeVFCLUE/view>.

Hébert, Benjamin, and Jesse Schreger. 2017. "The Costs of Sovereign Default: Evidence from Argentina." *American Economic Review* 107(10): 3119–45.

Hertzberg, Andrew. 2016. "Time-Consistent Individuals, Time-Inconsistent Households." https://www0.gsb.columbia.edu/faculty/ahertzberg/papers/HH_Paper_Sept_2016_v9.pdf.

Holmström, Bengt. 1977. "On Incentives and Control in Organizations." PhD dissertation, Stanford University.

Holmström, Bengt, and Jean Tirole. 1998. "Private and Public Supply of Liquidity." *Journal of Political Economy* 106(1): 1–40

International Monetary Fund. No date. "Central Government Debt." https://www.imf.org/external/datamapper/CG_DEBT_GDP@GDD/CHN/FRA/DEU/ITA/JPN/GBR/USA (accessed January 15, 2019).

International Monetary Fund. No date. "Fiscal Rule Dataset." International Monetary Fund Fiscal Affairs Department. <http://www.imf.org/external/datamapper/fiscalrules/map/map.htm> (accessed June 6, 2018).

Jackson, Matthew O., and Leeat Yariv. 2014. "Present Bias and Collective Dynamic Choice in the Lab." *American Economic Review* 104(12): 4184–04.

Jackson, Matthew O., and Leeat Yariv. 2015. "Collective Dynamic Choice: The Necessity of Time Inconsistency." *American Economic Journal: Microeconomics* 7(4): 159–178.

Jacobson, Gary C. 2015. "It's Nothing Personal: The Decline of the Incumbency Advantage in US House Elections." *Journal of Politics* 77(3): 861–73.

Kocherlakota, Narayana. 2016. "Rules versus Discretion: A Reconsideration." *Brookings Paper on Economic Activity*, Fall.

Laibson, David. 1997. "Golden Eggs and Hyperbolic Discounting." *Quarterly Journal of Economics* 112(2): 443–478.

Lane, Philip R., and Gian Maria Milesi-Ferretti. 2018. "The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis." *IMF Economic*

Review 66(1): 189–222. <https://link.springer.com/article/10.1057%2Fs41308-017-0048-y> (accessed January 21, 2019).

Leahy, Joe. 2016. "What Is Brazil's President Dilma Rousseff Accused Of?" *Financial Times*, May 12.

Lledó, Victor, Sungwook Yoon, Xiangming Fang, Smaba Mbaye, and Young Kim. 2017. "Fiscal Rules at a Glance." March. International Monetary Fund Background Paper. <https://www.imf.org/external/datamapper/fiscalrules/Fiscal%20Rules%20at%20a%20Glance%20-%20Background%20Paper.pdf>.

Lojusch, Dagmar Hartwig, Marta Rodríguez-Vives, and Michal Slavík. 2011. "The Size and Composition of Government Debt in the Euro Area." ECB Occasional Paper 132, European Central Bank.

Lucas Jr., Robert E., and Nancy L. Stokey. 1983. "Optimal Fiscal and Monetary Policy in an Economy without Capital." *Journal of Monetary Economics* 12(1): 55–93.

Mankiw, N. Gregory, Matthew Weinzierl, and Danny Yagan. 2009. "Optimal Taxation in Theory and in Practice." *Journal of Economic Perspectives* 23(4): 147–74.

McCarty, Nolan, Keith T. Poole, and Howard Rosenthal. 2006. *Polarized America: The Dance of Ideology and Unequal Riches*. Cambridge: MIT Press.

Müller, Andreas, Kjetil Storeletten, and Fabrizio Zilibotti. 2016. "The Political Color of Fiscal Responsibility." *Journal of the European Economic Association* 14(1): 252–302.

Obstfeld, Maurice. 2013. "On Keeping Your Powder Dry: Fiscal Foundations of Financial and Price Stability." *Monetary and Economic Studies* 31: 25–37.

Organisation for Economic Cooperation and Development. No date. "Social Expenditure Database." <http://www.oecd.org/social/expenditure.htm> (accessed January 9, 2019).

Persson, Torsten, and Lars E.O. Svensson. 1989. "Why a Stubborn Conservative Would Run a Deficit: Policy with Time-Inconsistent Preferences." *Quarterly Journal of Economics* 104(2): 325–45.

Persson, Torsten, and Guido Tabellini. 2004. "Constitutional Rules and Fiscal Policy Outcomes." *American Economic Review* 94(1): 25–45.

Pew Research Center. 2012. "The Big Generation Gap at the Polls Is Echoed in Attitudes on Budget Tradeoffs: But Public Sees Only Modest Conflict between Young and Old." Washington, DC: Pew Research Center. http://assets.pewresearch.org/wp-content/uploads/sites/3/2012/12/FINAL_policies_report.pdf.

Pfeil, Christian F., and Lars P. Feld. 2016. "Does the Swiss Debt Brake Induce Sound Federal

- Finances? A Synthetic Control Analysis." CESIFO Working Paper 6044. https://www.cesifo-group.de/DocDL/cesifo1_wp6044.pdf.
- Philippon, Thomas, and Ariell Reshef.** 2012. "Wages and Human Capital in the U.S. Finance Industry: 1909–2006." *Quarterly Journal of Economics* 127(4): 1551–1609.
- Phiguillem, Facundo, and Anderson Schneider.** 2016. "Coordination, Efficiency and Policy Discretion." EIEF Working Papers Series 1306, Einaudi Institute of Economics and Finance.
- Poterba, James M.** 1995. "Capital Budgets, Borrowing Rules, and State Capital Spending." *Journal of Public Economics* 56(2): 165–187.
- Primo, David M.** 2007. *Rules and Restraints: Government Spending and the Design of Institutions*. University of Chicago Press.
- Reinhart, Carmen M., Vincent Reinhart, and Kenneth Rogoff.** 2012. "Public Debt Overhangs: Advanced-Economy Episodes since 1800." *Journal of Economic Perspectives* 26(3): 69–86.
- Reinhart, Carmen M., Vincent Reinhart, and Kenneth Rogoff.** 2015. "Dealing with Debt." *Journal of International Economics* 96(1): S43–S55.
- Reinhart, Carmen M. and Kenneth S. Rogoff.** 2011. "From Financial Crash to Debt Crisis." *American Economic Review* 101(5): 1676–1706.
- Rogoff, Kenneth.** 1985. "The Optimal Degree of Commitment to an Intermediate Monetary Target." *Quarterly Journal of Economics* (10094): 1169–89.
- Romer, Christina D., and David H. Romer.** 2018. "Why Some Times Are Different: Macroeconomic Policy and the Aftermath of Financial Crises." *Economica* 85(337): 1–40.
- Sabelhaus, John, and Jae Song.** 2010. "The Great Moderation in Micro Labor Earnings." *Journal of Monetary Economics* 57(4): 391–403.
- Sleet, Christopher.** 2004. "Optimal Taxation with Private Government Information." *Review of Economic Studies* 71(4): 1217–39.
- Song, Zheng, Kjetil Storesletten, and Fabrizio Zilibotti.** 2012. "Rotten Parents and Disciplined Children: A Political-Economic Theory of Public Expenditure and Debt." *Econometrica* 80(6): 2785–2803.
- Tabellini, Guido.** 1991. "The Politics of Inter-generational Redistribution." *Journal of Political Economy* 99(2): 335–57.
- Tirole, Jean.** 1985. "Asset Bubbles and Overlapping Generations." *Econometrica* 53(6): 1499–1528.
- Truger, Achim, and Henner Will.** 2013. "The German 'Debt Brake': A Shining Example for European Fiscal Policy?" *Revue de l'OFCE*, no. 127, pp 153–88.
- US Electoral College.** No date. "Historical Election Results." National Archives and Records Administration of U.S. Electoral College. <https://www.archives.gov/federal-register/electoral-college/votes/index.html> (accessed June 6, 2018).
- United Nations.** 2017. No date. "World Population Prospects 2017." United Nations Population Division. <https://population.un.org/wpp/Download/Standard/Population/> (accessed January 9, 2019).
- Velasco, Andrés.** 2000. "Debts and Deficits with Fragmented Fiscal Policymaking." *Journal of Public Economics* 76(1): 105–25.
- Weingast, Barry R., Kenneth A. Shepsle, and Christopher Johnsen.** 1981. "The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics." *Journal of Political Economy* 89(4): 642–64.
- Wolter, Kirk, Mark Hansen, Andrea Campbell, and Stephen Ansolabehere.** 2013. "2012 NORC Presidential Election Study: Americans' Views on Entitlement Reform and Health Care." http://www.norc.org/PDFs/NORC_Inauguration%20Report-FINAL.pdf.
- Woo, Jaejoon.** 2003. "Economic, Political, and Institutional Determinants of Public Deficits." *Journal of Public Economics* 87(3–4): 387–426.
- Woodford, Michael.** 1990. "Public Debt as Private Liquidity." *American Economic Review* 80(2): 382–88.
- World Bank.** No date. "World Development Indicators." <https://data.worldbank.org/products/wdi> (accessed January 21, 2019).
- Wyplosz, Charles.** 2012. "Fiscal Rules: Theoretical Issues and Historical Experiences." In *Fiscal Policy After the Financial Crisis*, edited by Alberto Alesina and Francesco Giavazzi, 495–529. University of Chicago Press.
- Yared, Pierre.** 2010. "Politicians, Taxes and Debt." *Review of Economic Studies* 77(2): 806–840.