Long-Term Fiscal Sustainability in Major Economies

Alan J Auerbach
University of California, Berkeley
July 2011

This paper was prepared for the tenth BIS Annual Conference, Fiscal Policy and its Implications for Monetary and Financial Stability, June 23-24, 2011, Lucerne, Switzerland. I am grateful to John Mondragon for research assistance and to my discussants, Pier Carlo Padoan and Ray Barrell, and other conference participants for comments on an earlier draft.

I. Introduction

As the world economy slowly recovers from the very deep and widespread recession of recent years, many countries confront very serious fiscal imbalances. How much time they have to deal with these imbalances is a central question, the salience of which can only have been increased by the ongoing fiscal crisis and bailout in Greece and the immediate fiscal adjustments being discussed or already undertaken in several other countries.

There is little doubt that much of the current attention to fiscal imbalances is attributable to the rapid increases in debt-GDP ratios arising from the recession, either directly through the automatic tax and spending responses to slow growth, or indirectly through the countercyclical discretionary fiscal measures undertaken. Table 1 shows the evolution of net general government debt-GDP ratios for several leading economics in recent years, starting in 2007, just as the worldwide recession began.

For many countries, debt-GDP ratios have increased and are projected to continue increasing sharply under current economic and policy trajectories. While the increases are large for countries that have been generally discussed as confronting fiscal crises, in particular Greece, Ireland, Portugal and Spain, they are substantial as well for all of the G-7 countries except for Germany, with Japan, the United Kingdom and the United States all being projected to roughly double their debt-GDP ratios over this short period, a very large change in peacetime. Indeed, the U.K. government has already implemented a serious austerity program aimed at altering its trajectory, and there has been an increased intensity of discussion, if not yet action, in the United States.

These short-term trajectories clearly are attention-getting. For some countries, such as Greece, there is little need to look beyond them to know that a large and immediate fiscal

adjustment is needed. But debt-GDP ratios alone typically do not tell us how long countries have before they must make fiscal adjustments or how large these adjustments need to be. Some countries, for example Italy and Japan, have maintained high debt-GDP ratios for some time. Also, for countries not necessarily facing any short-run crisis, these projections may provide an inadequate picture of underlying fiscal imbalances. This is because the factors contributing to short-term debt accumulation differ substantially from those that will affect debt accumulation over the longer term, after the next few years, factors that have little to do with the business cycle and the rate of economic recovery, and much more to do with demographic change and the associated changes in government spending and tax collections.

Thus, policy measures that attack long-term imbalances, such as reforms of unfunded public pensions or gradual modifications of systems of public health care provision, may have little impact on short-term fiscal measures, and measures that attack the rate of debt accumulation over the next several years may have little impact on longer-term fiscal imbalances.

It is difficult to know when any particular country might encounter a fiscal crisis, given short-term and long-term fiscal projections for them and anticipated policy responses. Fiscal projections aside, a country's political environment and fiscal institutions matter, too, for they provide a reading of the ease or difficulty with which needed adjustments can occur. Most of the discussion in this paper will be about the measurement of fiscal imbalances and the size of necessary adjustments, rather than about the strength fiscal institutions in different countries. We will, however, comment on a variety of approaches that have been attempted and are currently being discussed for facilitating necessary fiscal adjustments.

Although this paper is about the fiscal situations and prospects for developed economies around the world, we begin with a more detailed case study of the United States, a convenient choice because of the importance of the U.S. economy and because of the availability of detailed projections. While circumstances differ from country to country, the tools of analysis will be similar, and many of the issues that will arise in the analysis of the U.S. situation will carry over to most other leading economies, given the underlying similarities of their fiscal systems and demographic trends.

II. Case Study: the U.S. Fiscal Future

For the United States, standard budget projections are available from the Congressional Budget Office (CBO) over a ten-year budget window beginning in the current fiscal year. The CBO projections are heavily cited and relied upon, but in interpreting them one immediately confronts a key issue relating generally to budget projections. While these projections naturally depend on economic forecasts, they also depend on one's interpretation of "current" policy. By convention, CBO interprets current policy as current law, even if current law calls for large policy changes through the expiration or introduction of tax or spending provisions, and even if these legislated changes are not likely to occur, given the likely political environment.

Figure 1, taken from Auerbach and Gale (2011), shows three potential trajectories for the U.S. debt-GDP ratio over the next decade based on the most recent CBO forecasts: the CBO forecast itself, this forecast adjusted to conform to policy as laid out by the Obama administration, and the CBO forecast adjusted by the assumption that current provisions, rather

than current law, is maintained, i.e., in particular that tax cuts from the Bush period in the previous decade will not expire as scheduled.[1]

All of the measures show deficits shrinking sharply relative to GDP through the recovery, but CBO's baseline shows a steeper drop through 2015 and a slower increase in the deficit as a share of GDP after 2015**,** while the extended policy and administration policy scenarios show more rapid increases in the deficit as a share of GDP over the last six years of the projection, ending the period at 6.5 percent and 4.9 percent of GDP, respectively.

These differences in time paths for the deficit turn into substantial differences in terminal values for the debt-GDP ratio, as shown in Figure 2. Under the CBO baseline, the debt rises to 75.6 percent by 2021, rising rapidly at first to about 75.1 percent of GDP in 2013 and then flattening out over the decade. In contrast, under the extended policy scenario, the debt-GDP ratio rises steadily, and exceeds 97 percent by 2021. The administration budget shows debt-to GDP reaching 87.4 percent in 2021. This very large range of possible outcomes under three interpretations of "current policy" after just ten years would be compounded by uncertainty regarding relevant economic variables, in particular the rate of interest and the rate of economic growth.

As a frame of reference for these debt-GDP ratios, note that the highest value in history – 109 percent – occurred in 1946, after a massive debt accumulation during World War II. In 1946, peacetime and a large drop in government spending loomed, quite unlike the situation that is likely to prevail in 2021. Thus, under the most pessimistic of these three scenarios (from the point of view of fiscal adjustment), the United States will be on the verge of passing its highest

[1] All of these projections are for the U.S. federal government only, in contrast to those in Table 1, which include all levels of government. Including states would make the picture worse for the United States, in particular over the longer term when large unfunded pension commitments loom (Novy-Marx and Rauh, 2011). However, there are no available projections for the states that are based on the same economic assumptions as those used in constructing the CBO projections used here.

debt-GDP ratio within a very short period, not a trajectory that is likely to be sustainable if that point is reached.

Thus, over the very short term, the U.S. deficit will decline, and the growth of its debt-GDP ratio will slow. But by the end of the decade, deficits are likely to begin growing as a share of GDP and the debt-GDP ratio will approach levels that, for the United States, are unprecedented. The reason for this projected growth in the deficit as a share of GDP is the demographic factors that will become much more important in the next decade and thereafter. As of 2021, according to CBO projections, the three key entitlement programs – Medicare (old-age medical care), Medicaid (medical care for the poor, a large fraction of which also goes to the elderly to pay for long-term care), and Social Security (old age and disability pensions) – will account for nearly 12 percent of GDP and 57 percent of all non-interest federal spending, compared to 10 percent of GDP and 44 percent of non-interest spending and this fiscal year. In the coming decades, all projections are for this share of GDP to continue growing, although the rate of growth is subject to considerable uncertainty, even relative to other long-range projections.

The key source of this uncertainty has to do not with demographic change itself but with the evolution of health care spending. As of 2060, for example, the most optimistic public forecasts for Medicare spending (from the official forecast of the Medicare Trustees, 2011) put that spending at 6.1 percent of GDP (compared to 3.7 percent now), to a large extent reflecting the assumption that the 2010 U.S. health care reform will reduce costs as called for in the legislation. On the other hand, CBO's most recent (CBO, 2011) forecast is for Medicare spending to hit 9.9 percent of GDP in 2060. Even under the most optimistic assumptions regarding Medicare, however, projected federal spending on Medicare, Medicaid and Social

Security will approach 17 percent of GDP in 2060, absorbing over 6 percent of GDP more than today. This is a very large increase, given that federal revenues over the past several decades have been relatively stable at around 18-19 percent of GDP.

One method of measuring a country's fiscal imbalance that takes longer-term commitments into account is the *fiscal gap* associated with them, typically expressed as a share of GDP. As defined, for example, in Auerbach (1994, 1997), a fiscal gap over a horizon from the current period, *t*, through a terminal period, *T*, would equal the required increase in the primary surplus relative to those projected under current policy that would be needed to maintain the debt-GDP ratio at its current value, or

$$(1) \qquad \Delta = \frac{B_{t-1} - (1+r)^{-(T-t)} B_{t-1} \frac{Y_{T+1}}{Yt} + \sum_{s=t}^{T} (1+r)^{-(s-t+1)} D_s}{\sum_{s=t}^{T} (1+r)^{-(s-t+1)} Y_s}$$

where B_{t-1} is the outstanding debt at the end of year *t*-1 (the beginning of year *t*), D_t is the primary deficit in year *t*, Y_t is GDP in year *t*, and *r* is the relevant interest rate. Based on a range of recent economic and fiscal projections and interpretations of what "current policy" is, Auerbach and Gale (2011) estimate a federal-government fiscal gap for the United States at between 4 and 10 percent of GDP over the infinite horizon (i.e., for $T \to \infty$), and between 3 and 6 percent through 2060.[2] The estimates are bleaker over the longer horizon because spending on the key programs already discussed is projected to continue growing as a share of GDP after 2060. Thus, extending the horizon adds to the fiscal gap calculation years with progressively larger projected primary deficits relative to GDP, increasing the required average annual adjustment.

[2] These estimates start with one of the three ten-year scenarios already discussed and incorporate available longer-term projections for the expenses and dedicated taxes for Medicare, Medicaid and Social Security, assuming that other components of the primary surplus remain constant at 2021 shares of GDP.

One key assumption incorporated in these fiscal gap calculations is that the interest rate on government debt and the rate of economic growth follow a trajectory consistent with recent experience. In particular, the calculations incorporate the long-term forecasts for the yield on government bonds and the growth rate of the economy made by the Trustees of the Social Security System (2011) in its own calculations of fiscal sustainability. The difference between these two rates – a key number in the dynamics of debt accumulation – is just over 1 percentage point over the long term. This means that the primary surplus needed in any given year, as a share of GDP, to prevent the debt-GDP ratio from growing equals about 1 percent of the net debt-GDP ratio, or less than 1 percent of GDP in the present circumstances for the United States.

If, however, debt accumulation contributes to slower economic growth and also to skepticism about a country's ability to service its debt, the gap between interest and growth rates might rise rapidly and in turn make a sustainable fiscal path much harder to achieve. As already mentioned, the U.S. debt-GDP ratio will pass its postwar high in just over ten years under one characterization of current policy, even with very favorable assumptions about growth and interest rates, so an alternative trajectory of even faster debt accumulation is certainly possible if no credible action is taken over this period to address the U.S. fiscal imbalance. This would make some sort of fiscal crisis more likely in the short run, although it is of course very difficult to predict the timing.

In summary, the United States faces a deficit trajectory over the next decade that should improve as economic recovery continues. As a consequence of several years of large deficits, however, the debt-GDP ratio is likely by the end of the decade to approach historically unprecedented levels, suggesting the need for significant fiscal adjustment by that time. Moreover, the picture in the following decades is still bleaker because of the growth in pension

and health care costs associated with population aging and trends in health care spending. While this growth is a "future" problem in terms of when the spending will actually occur, it is a current problem not only in terms of the need for government adjustment planning, but also from a market perspective to the extent that financial markets recognize these implicit liabilities as making U.S. fiscal policy less sustainable.

One question regarding these projections is what they imply about the possible adjustment process. A key issue involves when fiscal consolidation should begin, in light of the relatively weak economic recovery that is occurring. Views and policies differ at present. For example, while the United Kingdom has embarked on a policy of large, immediate spending cuts, the United States' most recent major action, at the end of 2010, was an extension and expansion of tax cuts.

There have been many contributions to the literature over recent decades arguing that fiscal consolidations might be expansionary if undertaken by countries facing high debt levels and fiscal imbalances (e.g., Perotti, 1999), particularly if these adjustments take the form of reductions in government spending rather than tax increases (e.g., Ardagna, 2004). Even so, the exact timing that consolidations should follow is unclear, and the issue of how to deal with looming entitlement programs is not really informed by the existing literature, which has concentrated on adjustments to current taxes and spending, that is, changes in explicit liabilities rather than implicit ones.

For example, what would be the economic effects of a policy that puts in place gradual reductions in public pensions and health care spending but that has little impact on short-run deficits or accumulation of explicit debt? Regardless of other consolidation measures taken in the short run, such adjustments will ultimately be much more significant in achieving fiscal

sustainability in the longer run. Therefore, following the logic that describes when fiscal contractions might be expansionary, they should have such an impact if they are credible. But if changes are scheduled to take place gradually over time, how credible will they be today, and what elements of reform can contribute to this credibility? Is it necessary to establish credibility, as seems to be the argument currently by some in the United States, to combine these reforms with other, immediate spending reductions, even if such immediate reductions contribute little to the attainment of long-run balance?

Finally, just as the coming fiscal consolidations will have a different focus than past consolidations, the tools of adjustment will differ. In particular, and of special importance concerning the potential interactions of monetary and fiscal policies, the role of potential inflation is much less significant now than in the past. This is because it is not the existing stock of nominal debt that makes the U.S. fiscal gap so large, but rather the projected growth of entitlement spending programs described above. All of these programs represent real commitments, not nominal ones, either through direct indexing, as in the case of old age pensions, or through commitments to provide real goods and services, as in health care programs. These implicit liabilities swamp the existing stock of nominal debt.

For example, the current unfunded liability of the U.S. social security system is $17.9 trillion (Social Security Trustees, 2011, p. 14), which is nearly double the publicly held stock of national debt, which itself includes some debt that is indexed and other debt that is short-term and hence not very susceptible to erosion through rapid price increases. Further, this implicit liability for social security pales in comparison to what one would calculate for the Medicare and Medicaid programs using a similar methodology, given the more rapid projected growth in these programs. Even under the most favorable estimates cited above in relation to the U.S. fiscal gap,

Medicare's unfunded liability is nearly $40 trillion.[3] It would be considerably higher under other projections.

Thus, regardless of whether inflation is seen as an attractive policy option to deal with fiscal imbalances, and whether or not the looming imbalances might lead to inflation (either through induced monetary policy responses or some other mechanism) if they are not addressed through significant changes in tax or spending policies, inflation can in the end play only a very minor role in addressing the long-run fiscal imbalance. This is a very firm conclusion for the United States, but it is clearly relevant for other countries as well, given their spending patterns and demographic characteristics.

III. Fiscal Imbalances around the World

Having laid out many of the issues relevant to evaluating fiscal prospects, let us consider estimates for a wide range of countries. Figure 3 presents estimates of fiscal gaps for the same twenty countries appearing in Table 1, based on recent data and IMF projections. Like the figures in Table 1, these are for general government at all levels. To form these estimates, we start with actual 2010 levels of net publicly held debt and GDP, and then add projections for primary surpluses as a share of GDP through 2016 from IMF (2011). For years after 2016, it is necessary to make some assumptions as to the further evolution of primary surpluses, and we take an approach similar to that used above for the U.S. calculations, separating "normal" components from those related to aging and health.

[3] According to the 2011 Medicare Trustees Report, over the infinite horizon general revenue contributions – funding from sources over and above the programs' dedicated revenues – of $22.4 trillion will be needed to cover expenses for Medicare Part B (supplementary medical insurance; see Table III.C15) and another $16.1 trillion will be needed to cover Medicare Part D (prescription drug insurance; see Table III.C23). According to these same projections, the remaining component of Medicare, Part A (hospital insurance; see Table III.B11) will be roughly in balance over the infinite horizon due to the declines in the growth rate of health care spending attributed to enforcement of the reductions in reimbursement rates as called for by the 2010 health care legislation.

For shares of GDP accounted for by revenues and non-interest spending in areas excluding health care and public pensions, we set values equal to the average of these shares over the period 2002-2007, an assumption intended to provide over the longer run a stable estimate of recent, pre-crisis revenue and spending fundamentals. For the remaining components, we incorporate recent projections from the IMF (2010a, b). For our initial calculations, we assume a real discount rate of 3 percent and a real GDP growth rate of 2 percent. (From the nature of these calculations, the levels of the real interest and growth rates matter little, with the gap between them being the key factor.) Given the absence of very long-run projections such as those that exist for the United States, we limit our fiscal gap estimates to a 50-year horizon.[4]

Figure 3 displays the resulting fiscal gap estimates, with the first bar for each country representing the baseline estimates. The U.S. estimate is just above the top of the range for those cited above, reflecting both relatively pessimistic projections for health care and the inclusion of sub-national levels of government in the calculations. Indeed, fiscal gaps for the United States are among the highest in the figure, likely because health care spending is so much larger a share of GDP than in most other countries.[5] But two other members of the G-7, Japan and the United Kingdom, also have fiscal gaps around 8 percent of GDP. Given recent events, it is perhaps not very surprising that the fiscal gap in Greece is an outlier among the estimates. But for the other "at risk" countries, Ireland, Portugal and Spain, the results are less consistent. The projected gap

[4] Because the IMF projections are available only through 2050, we assume smooth growth of all components with GDP thereafter.

Further details regarding these calculations are available upon request.

[5] It is true that public share of health care spending is lower in the United States than elsewhere, but as the public component in the United States is heavily concentrated among the elderly, this component will grow faster over time as the population ages.

for Portugal is indeed quite high, but those for Ireland and Spain, while by no means insignificant, do not stand out among the other developed economies displayed in the figure.

An explanation for this apparently weak relationship between current debt and fiscal conditions and estimates of the long-run fiscal gap comes from inspection of expression (1). If one assumes that achievement of a sustainable path means that a country must maintain a constant debt-GDP ratio, then a portion of debt service is provided by debt growth, since debt is allowed to grow at the same rate as GDP. Thus, the added fiscal burden of debt service is determined by the difference between the interest rate and the growth rate, and will not be especially high unless one assumes a large gap between the two rates, an issue to which we return shortly. Another way of demonstrating this point is by considering how much of the fiscal gap is due to debt service, and how much is due to future primary surpluses. The second bar for each country in Figure 3 displays fiscal gaps under the assumption of no initial debt, showing that future primary surpluses, rather than initial debt, are typically much more important as a determinant of the fiscal gaps.

Of course, an alternative view might be that maintaining current debt-GDP ratios is not an adequate objective for fiscal sustainability, for countries that have very high debt-GDP ratios may not be able to maintain them. It is hard to know what objective to use in place of this, although the IMF (2010a) has considered fiscal adjustments needed for countries to achieve net debt-GDP ratios of .45, which for many countries would require additional fiscal resources to achieve. The third bar for each country in Figure 3 shows fiscal gaps for this alternative assumption regarding terminal debt-GDP ratios. For most countries, this does indeed add to the measured fiscal gaps, but again the quantitative impact is relatively small, in this instance because the period of adjustment is assumed to be so long.

The last set of calculations in Figure 3 illustrates how important the implicit liabilities are that are associated with health care spending and pension growth. The fourth bar for each country shows what the fiscal gap would be if there were no increase relative to GDP in spending on health care or pensions after 2016. For all countries, this assumption reduces the estimated fiscal gaps, and for many (Australia, Belgium, Canada, Denmark, Finland, and New Zealand) it eliminates the gap entirely. That is, for these countries, more than 100 percent of the estimated fiscal gap can be attributed to growth in these expenditures. For most other countries, this adjustment eliminates more than half of the initially estimated fiscal gap, meaning that these factors account for a larger share of the fiscal gap than the need to service initial liabilities, the importance of which we have already considered, or other sources of ongoing primary imbalances.

While it is unrealistic to imagine that spending on pensions and health care spending could remain constant as a share of GDP as populations grow older and health care technology continues to evolve, not all projections of future expenditures are as pessimistic as those of the IMF. For example, recent projections of long-term spending growth by the European Commission (2009) show slower growth in health care spending, with the result that estimated fiscal gaps are smaller. If we incorporate these alternative projections using a similar methodology to that used for the IMF projections, we obtain the results shown in Figure 4, for the two main variants of the EC projections.[6]

Even under the most optimistic assumptions, however, several European countries must face substantial adjustments, with all countries except Denmark, Finland, Norway and Sweden facing gaps of 2 percent of GDP or more, all but Greece in the range of 2-5 percent of GDP.

[6] The only differences in methodology are (1) the EC estimates also project education spending over the long term, and we include these as well as pension and health care spending projections; and (2) the EC estimates go through 2060, so no extrapolation is needed.

While these gaps are lower than those based on the IMF projections, they are certainly not small. Thus, like Cecchetti et. al. (2010), we conclude that the need for fiscal adjustment is widespread and significant.

It is important to emphasize once again that, regardless of the long-term projections on which they are based, current debt-GDP ratios don't provide a full picture of a country's fiscal situation. A simple regression of the baseline fiscal gaps in Figure 3 on 2010 net debt-GDP ratios does yield an impressive adjusted R^2 of .63, but this drops to .26 once the two outliers, Norway and Greece, are excluded from the estimation.

Figure 5 presents a scatter plot of fiscal gaps versus debt-GDP ratios for this subsample of countries, showing the fitted regression line and with countries having the largest residuals labeled. According to this simple relationship, Italy and Sweden have better long-run prospects than their debt-GDP ratios alone indicate, and the Netherlands, Portugal, the United Kingdom and the United States have worse prospects. Including the most recent deficit-GDP ratio as a second explanatory variable adds little power to this regression, with a t-statistic of 0.5 and a fall in the adjusted R^2. This last result makes sense, as current deficits to some extent reflect cyclical conditions that do not play an important role in long-run projections, and on the other hand do not incorporate the impact on future spending of aging and health care trends, which the fiscal gap calculations are designed to capture. As shown in Figure 3, the projected growth of spending in these areas accounts for all or most of the fiscal gaps in most countries.

As discussed above, the ability of a country to sustain a given path of revenues and spending depends on the degree to which markets expect it to be able to do so. That is, if interest rates rise because of perceived risk of default, then this will increase debt service costs and make it more difficult for the country to avoid default. We have ignored this issue thus far in

calculating fiscal gaps, essentially assuming that debt accumulation and the expectation of future primary deficits does not affect the interest rate or the rate of economic growth. In particular for countries already considered as being at risk, this assumption might greatly understate the difficulty of achieving sustainability.

To assess the importance of this issue, we calculate fiscal gaps using estimates of actual real interest and growth rates, rather than the assumed rates of 3 percent and 2 percent used thus far. In particular, for each country, we use the real growth rate projected by the IMF for 2016; to approximate the real interest rate, we subtract from the current 10-year benchmark government bond yield the projected inflation rate for 2016. For all four "at risk" European countries – Greece, Ireland, Portugal, and Spain – this change in assumptions increases the gap between the real interest and growth rates above the 1 percentage point assumed thus far. As shown in Figure 6, these alternative assumptions do indeed raise the estimated fiscal gaps for all four countries, with the smallest impact being on Spain, for which the gap rises by just over 0.1 percentage points, and the largest impact being on Greece, for which the increase is nearly 4 percentage points. The leading factors behind these large differences in impact are the real interest rates and initial debt-GDP ratios for the respective countries. Greece is already facing a higher borrowing rate than the other countries, and also has a much higher initial debt that must be serviced, relative to GDP.[7]

[7] It is actually possible for the fiscal gaps to decline with an increase in the real interest rate, if the initial debt-GDP ratio is not too high and if, as is the case here, projected primary deficits grow over time as a share of GDP.

A higher interest rate increases the cost of debt service, but it also provides a higher rate of return on the funds that must be accumulated over the medium term to provide for large future primary deficits. Thus, if most of the fiscal gap comes from future primary deficits, the second effect can outweigh the first. This is not only a theoretical possibility; Auerbach and Gale (2009) estimated that, as of 2009, a prolonged period of very low government borrowing rates would actually have increased the U.S. fiscal gap slightly, when calculated over the infinite horizon.

Even if a higher interest rate did result in a lower fiscal gap, however, this conclusion is based on the inherent assumption of immediate fiscal adjustment. With a delay before adjustment begins, more debt would accumulate and make the extra burden of servicing the existing debt a more important component of the fiscal gap.

In summary, most leading economies face sizable fiscal gaps, even when optimistic assumptions are made regarding the growth of pension and health care spending, and even if one ignores the possible negative impact that debt accumulation and an unstable fiscal trajectory can have on the cost of servicing a country's growing liabilities. Some countries for which the need for fiscal adjustment is not simply a future consideration already face a more challenging task because of higher borrowing rates. One element affecting the speed with which a fiscal crisis might occur is the sensitivity of borrowing rates to a country's fiscal position, an issue to which we now turn.

IV. Explaining CDS Spreads and Interest Rate Differentials

What determines a country's borrowing rate? Tables 2 and 3 present a preliminary exploration. In Table 2, the dependent variable is the credit default swap (CDS) spread on sovereign debt, averaged over the third quarter of 2010, which as a measure of default risk should be reflected in yields. The initial sample includes all countries considered above except Canada, for which we do not have data from our source (Datastream).

The first three columns of Table 2 include one explanatory variable each, respectively the baseline fiscal gap as calculated above, the budget surplus relative to GDP, and the net debt relative to GDP. Each of these variables' coefficients has the predicted sign, with all three relationships being significant or nearly so. Including all explanatory variables at the same time, in column (4), leaves only the fiscal gap as marginally significant, suggesting that forward-looking considerations may be important.

One factor that many have suggested may affect a country's ability to maintain a high debt-GDP ratio is the share of its debt held domestically. For example, Japan's debt-GDP ratios have historically been high relative to other countries and yet this has been seen as a more

limited problem because such a large share of Japan's national debt is held internally. As Figure 7 shows, shares of gross debt held externally among the countries examined here vary enormously, with virtually all of Japan's debt held internally and virtually all of Finland's held abroad. Does this variation influence default risk? Column (5) repeats the regression in the previous column, but in this case all fiscal variables are interacted with the fraction of debt held externally.[8] Indeed, the equation's explanatory power, as measured by the adjusted R^2, increases substantially, and the coefficients of all three fiscal variables increase in significance, with the fiscal gap still having the strongest impact.

Given the small sample size with which we are working, however, this result as well as others should be viewed only as suggestive. For example, excluding the two outliers identified earlier, Norway and Greece, leads to the results in the last two columns of the table, in which the impact of the fiscal gap is substantially reduced and the budget surplus becomes more significant in its impact.

Table 3 repeats the same regressions, but with the dependent variable equal to the benchmark 10-year yield relative to Germany. Because there are many other factors that can explain yield differentials, notably exchange rate risk and expected movements in exchange rates, we limit our consideration to those countries (other than Germany) in our sample that are also members of the Euro area.

Even in this small sample, and even when Greece is excluded (columns (6) and (7)), the budget surplus exerts a strong force on the yield spread; the other coefficients have the predicted sign but are insignificant, which is not entirely surprising given the small sample size. Given the units in which the variables are measured (with the budget surplus being expressed as a percent

[8] The results in this column and column (7) are for a sample that omits New Zealand, for which we lack data on external debt holdings comparable to those used for the other countries.

of GDP), an increase of 1 percent of GDP in the budget surplus is estimated to reduce a country's borrowing cost by 17 basis points, or by 30 basis points times the share of debt held externally, which, at the sample average value of external debt, translates into 16 basis points per 1 percent of GDP increase in the budget surplus. Thus, the convergence of interest rates that prevailed in the Euro area prior to the fiscal crisis seems no longer present; the circumstances in individual countries now do matter.

V. Further Risks from Cross-Border Exposure and Contagion

Leading up to the Greek bailout and since then, much of the support for intervention was based on the potential exposure of financial institutions in other Euro area countries, which led to concerns that a serious disruption in Greece could lead to disruptions elsewhere.

There is little doubt that cross-border exposure is a relevant consideration. How one should measure this exposure is not obvious. As a start, one might wish to look at all of a country's liabilities, both public and private, that financial institutions hold because of the very real possibility that private distress will lead to public bailouts within the country – thus making private obligations public – and also because a severe financial crisis arising from a sovereign default would also have major repercussions for the country's private borrowers.

Figure 8 shows the exposure at the end of 2010 of financial institutions in a subset of the countries analyzed above to the liabilities (public plus private) in the four key "at risk" countries, Greece, Ireland, Portugal and Spain. The holdings are expressed as a share of GDP in the creditor countries. The figure reveals that several countries in Europe have important exposure to at least one of the countries in financial distress, with geographic proximity playing some role. For example, institutions in Portugal have considerable exposure to Spain and those in Spain

have considerable exposure to Portugal, while on the other hand U.S. institutions have relatively little exposure to any of the problem countries.

Note that, although exposure to Greece was one justification offered for the Greek bailout, this exposure is generally far less significant than exposure to the other three countries, particularly Ireland and, especially, Spain. Finally, the exposure of institutions in the problem countries themselves is considerable, particularly in Ireland and Portugal; Portugal's exposure to Spain equals nearly 12 percent of Portuguese GDP, and Ireland's exposure to Spain equals 7 percent of Irish GDP.

One possible explanation for this large cross-border exposure to countries at risk might be a perception that these countries' sovereign liabilities are effectively convertible into more stable sovereign issues with the Euro area, an explanation that is consistent with the low yield spreads that prevailed prior to the crisis. But yield spreads have diverged, and any perceptions of convertibility have likely changed as well, in spite of the Greek bailout. Some indication of responses to this change in regime comes from Figure 9, which displays the change in cross-border exposure during the last quarter of 2010. The figure shows a general pattern of reductions in exposure, with the changes in Ireland being particularly striking. Thus, while in the short run contagion may remain a serious concern, the change in regime that has been occurring may lessen this concern as time passes.[9]

[9] Since cross-border holdings are measured in dollars, at least some of the measured decline in exposure could be due to depreciation of the dollar relative to the Euro, in which much of these holdings are denominated. One can estimate an upper bound for this effect by assuming that all holdings are Euro-based. This adjustment does scale down but generally does not eliminate the largest apparent reductions in exposure shown in Figure 9. Also, some of the reductions may reflect shifts in assets from financial companies covered by the calculations to other entities that are excluded.

VI. Can Fiscal Rules Help?

Given the large fiscal adjustments that most leading economies must undertake, an important question is whether some sort of fiscal rules or institutions can help. The experience in the Euro area to date under the Stability and Growth Pact (SGP) is not especially encouraging. In the past its targets for annual deficits and debt of 3 percent and 60 percent of GDP, respectively, were seen as too rigid to deal with country-specific issues, with the natural result that they were frequently violated without significant consequences for the countries that transgressed. This led to modifications in 2005 intended to make the SGP more flexible and hence also more credible. On the other hand, the SGP failed to prevent the debt crisis in Greece, a failure that some have attributed to the fiscal rules and associated enforcement mechanism being too weak. This episode has led recently to the formulation of measures that would increase surveillance and sanctions, to give the SGP more bite.

The U.S. federal budget experience under various rules is also somewhat clouded. Although there is some evidence that the rules under different regimes over the past several decades had effects on certain aspects of government behavior, not all of these effects were positive (for example, limiting countercyclical fiscal responses or even producing procyclical ones). Further, the endogeneity of the regimes' adoptions makes determination of their effects on overall indebtedness and fiscal sustainability difficult from an econometric perspective (Auerbach 2008). The problem, in short, is that it is difficult to distinguish between the rules having an independent impact and the rules' adoption simply signaling an increased commitment to budget control.

One lesson that may be drawn from these experiences is that it is very difficult to design workable budget rules, given the complexity of fiscal policy and the difficulty of adjusting for

cyclical conditions. Moreover, focusing just on debt and current and near-term deficits, as budget rules typically have, is becoming increasingly inadequate, even when these aggregates are measured honestly and not distorted by financial engineering and misreporting. This is because the size and strength of long-term spending commitments that drive fiscal gaps also need to be taken into account.

But the construction of long-term projections and the assessment of long-term commitments require considerable judgment and assumptions, as the differences between the IMF and EC projections for Europe considered in Figure 4 illustrate. Estimates will vary considerably, for example, on the basis of what one assumes about future excess cost growth in health care spending, retirement behavior and longevity. The considerable uncertainty associated with such projections puts pressure on the mechanism of budget rules, which need transparency and simplicity in order to be credible. Thus, improving budget rules of the traditional variety seems to be an extremely challenging objective. It is for this reason that an alternative mechanism might work better, in particular the establishment of a more independent entity to assess and identify weaknesses in fiscal performance.

There has been an important trend toward the creation of such independent entities for fiscal evaluation, including the Swedish Economic Policy Council, established in 2008, and the U.K.'s Office of Budget Responsibility, established just last year.[10] Such entities can assess complicated situations in a way that fiscal rules simply cannot. As is the case in the United Kingdom, the fiscal entity can also be given the power to lay out the economic and fiscal projections on which the government's policy evaluations must be based.

[10] See Calmfors (2010) for further discussion.

Some individuals have even suggested that independent fiscal authorities could potentially be granted the power to determine fiscal aggregates in much the same way that independent monetary authorities set monetary aggregates.[11] This further step is not very plausible, though, given the differences between monetary and fiscal policy. It is hard to believe that small, independent bodies can be legally empowered to force countries to change fiscal policies, given the political elements of fiscal policy determination; nor is it even clear how such a scheme would be implemented, given how limited an indicator of a country's fiscal trajectory its current debt is. For example, an annual deficit of a given amount could be consistent with very different underlying fiscal policies depending on the composition of taxes and spending, marginal tax rates, the allocation of fiscal burdens among generations, and the implied path of future deficits.

Thus, fiscal policy councils should be viewed as having the potential to serve an important auditing role, rather than to directly constrain or determine fiscal policy. This limitation of what can be expected from fiscal policy councils is more superficial than real in comparison to what budget rules can do, if such rules apply in theory but not in practice. Further, more than simple budget rules, independent fiscal entities can expose gaps in logic and provide additional support and pressure for needed changes in fiscal policy that may require implementation over a period of years. This is still a relatively new mechanism, the design of which continues to evolve, but it may well play a much more important role than explicit fiscal rules in helping countries undertake the large and complicated fiscal adjustments that they now face.

[11] See Wyplosz (2008).

VII. The Path Forward

Most of the world's major developed countries face a need for large fiscal adjustments. The recent world recession and financial crisis appears to have led to much greater focus on this need because of the large deficits that many countries have run during period and the resulting sharp increase in debt-GDP ratios. For some countries, the need for fiscal adjustment is imminent or already under way. For others, there is an uncertain amount of time for delay, at least in terms of the willingness of financial markets to accept additional debt. But the willingness of markets to continue to purchase additional debt is not an argument for delay, given the large adjustments that are needed, in particular to pension and health care programs for which abrupt changes may be difficult and socially damaging.

In the current environment, it is useful to identify three sources of fiscal imbalances, each of which must be dealt with in its own way. The first source is cyclical, attributable to both the automatic reductions in taxes and increases in spending that the recession brought and the countercyclical discretionary measures that governments adopted. The second source of fiscal imbalances is ongoing structural primary misalignments between revenues and spending that would exist in the short run even at full employment. The final source of fiscal imbalances is pension and health spending, which are projected to grow rapidly for most countries in the growing decades due to aging populations and continued excess cost growth in health care spending.

Cyclical deficits, if they are really just cyclical, are a minor fiscal problem, although their importance is sometimes magnified by the political process, which has an unfortunate tendency to focus on short-run economic developments. Though they are large when expressed on an annual basis, the deficits of the past few years have contributed little to countries' long-run fiscal

problems, simply because they are temporary. The fiscal imbalances that will remain in the short term even after recovery are of more serious concern. Traditionally, these two sources of deficits have been the focus of policy, but the third source that now looms over the longer term is of much greater significance, both in terms of its size and its breadth, affecting countries that otherwise appear to have their fiscal affairs in order.

The "demographic and health" deficits that for many countries constitute the bulk of their fiscal imbalances present a number of challenges to the formulation and implementation of fiscal adjustments. First, standard budget control rules and other related mechanisms do not integrate longer-term adjustments in such "implicit" liabilities and so exert less pressure for undertaking these adjustments. Second, there is enormous uncertainty about the magnitude of these implicit liabilities, in particular because of the inherent difficulty of projecting health care costs. This makes the politics of adjustment more difficult, even though increased uncertainty about future costs should, in principle, lead to even more budget stringency to avoid outcomes that are socially very costly.[12] Finally, because of life-cycle planning decisions with respect to labor supply and saving, cuts to old-age entitlement programs should be phased in over time, making it necessary for adjustments to be put in place far in advance of their full impact.

There is no simple formula for adjustment, because countries vary with respect to the severity of their imbalances, the composition of their imbalances among the different sources just discussed, and their fiscal capacity to absorb additional tax increases rather than relying on reductions in spending. The United States, for example, has a low tax-GDP ratio relative to many other countries considered here, and has no national-level consumption tax. As a consequence, there has been much discussion of introducing a value added tax to help deal with

[12] The reasoning is discussed in Auerbach and Hassett (2007).

the U.S. fiscal imbalance.[13] More generally, tax reform via broadening of tax bases, both for direct and indirect taxes, is an attractive option as an alternative to increases in marginal tax rates, although continuing pressure through international tax competition makes substantial increases in revenues from some sources, notably the corporate income tax, an unlikely option.

Given their importance as a source of fiscal gaps, reform of pension and health care systems is clearly a central agenda item for most countries. But some countries have already introduced pension reforms in recent years, the effects of which are already included in the fiscal gaps reported here; and health care reform is a more complex issue, dealing as it does not simply with a system of taxes and transfers but also with the structure of a very large and complex series of markets and the incentives associated with their operations. The United States is not a typical country in the area of health care, given its relatively high reliance on the private sector and the large share of its GDP devoted to overall health care spending, but the recent U.S. debate still provides some suggestion of the difficulties that health care reform will face elsewhere. It should also be kept in mind as pension and health care reform are considered that, given the rapidly aging populations in many countries, an objective of holding spending constant as a share of GDP would translate into large per capita reductions in age-based spending.

Although the recent literature on fiscal consolidations has focused especially on tax increases versus expenditure reductions, it is important that reform plans go beyond this distinction in several dimensions.

First, tax increases can take a variety of forms, and structural reforms can involve considerably smaller increases in deadweight loss than increases in marginal tax rates. For some countries there is little choice, given how high their tax wedges already are, but this is an

[13] See, for example, IMF (2010a).

important consideration even where marginal tax rates are lower. Second, expenditure reductions vary considerably in their character and permanence. Reductions in discretionary spending may help address short-run fiscal problems, but they can play only a limited role in overcoming fiscal imbalances that reflect growing age-based entitlement expenditures. Third, the line between tax increases and expenditure reductions is not well-defined, so attention should be paid to the ultimate effects of policies, not whether they are labeled as changes in taxes or changes in spending. For example, elimination of tax expenditures through the tax reform process is little different from reductions in direct spending. There is no logical reason why a cut in tax expenditures should have a different impact on an economy than a comparable cut in direct spending. Finally, the distributional effects of policies are important, not simply in the standard static dimension but also on a generational basis. Particularly when so much public spending and public spending growth is associated with age-based programs, alternative polices with similar effects on annual budgets can have enormously different effects on the intergenerational fiscal burden, for example an immediate increase in dedicated payroll taxes versus an immediate reduction in public pension benefits. Generational accounting illuminates these differences in a way that fiscal gap calculations alone cannot, and the widespread use of this technique (e.g., Auerbach, Kotlikoff and Leibfritz, 1999) makes it a standard tool available for evaluating fiscal reform programs.

Finally, political considerations will of course loom large in the fiscal reform process. Their role can be influenced through the design of fiscal rules and alternative institutions such as independent fiscal councils, as discussed above. But, as also discussed, fiscal gaps that are attributable to large implicit liabilities are not easy to deal with through traditional budget control mechanisms that focus on explicit debt and short-term deficits. Indeed, policies to deal

immediately with long-term fiscal gaps could over the short term run result in large explicit budget surpluses (in order to accommodate longer-term spending growth), and the ability of the political process to sustain such surpluses is certainly questionable.[14] New approaches to budget control, and perhaps even to the standard methods of budget measurement, may be required to sustain such policies.

[14] An illustration of this problem comes from the United States, which adopted large tax cuts in 2001 largely in reaction to the federal budget surpluses that then prevailed. The rhetoric at the time stressed that these cuts were needed to return money rightfully due to taxpayers and to avoid the elimination of the national debt (which would have presented a new challenge for the conduct of monetary policy), even though fiscal gap calculations at the time, even before the tax cuts were adopted, showed a positive fiscal imbalance. See Auerbach and Gale (2001).

References

Ardagna, Silvia, 2004, "Fiscal Stabilizations: When Do They Work and Why?" *European Economic Review* 48(5), 1047-1074.

Auerbach, Alan J., 1994, "The U.S. Fiscal Problem: Where We Are, How We Got Here, and Where We're Going," in S. Fischer and J. Rotemberg, eds., *NBER Macroeconomics Annual* 9, pp. 141-175.

Auerbach, Alan J., 1997, "Quantifying the Current U.S. Fiscal Imbalance," *National Tax Journal* 50(3), September, pp. 387-398.

Auerbach, Alan J., 2008, "Federal Budget Rules: The U.S. Experience," *Swedish Economic Policy Review* 15, pp. 57-82.

Auerbach, Alan J., and William G. Gale, 2001, "Tax Cuts and the Budget," *Tax Notes*, March 26, pp. 1869-1882.

Auerbach, Alan J., and William G. Gale, 2009, "The Economic Crisis and the Fiscal Crisis: 2009 and Beyond," *Tax Notes*, October 5, pp. 101-130.

Auerbach, Alan J., and William G. Gale, 2011, "Tempting Fate: The Federal Budget Outlook," June 30.

Auerbach, Alan J., and Kevin Hassett, 2007, "Optimal Long-Run Fiscal Policy: Constraints, Preferences and the Resolution of Uncertainty," *Journal of Economic Dynamics and Control* 31(5), May, pp. 1451-1472.

Auerbach, Alan J., Laurence Kotlikoff, and Willi Leibfritz, editors, 1999, *Generational Accounting Around the World*, Chicago: University of Chicago Press.

Board of Trustees, Federal Hospital Insurance and Federal Supplemental Medical Insurance Trust Funds, 2011, *The 2011 Annual Report of the Board of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds.* Federal Hospital Insurance and Federal Supplemental Medical Insurance Trust Funds, Washington, DC, May 13.

Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, 2011. *The 2011 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds ,Washington, DC., May 13.

Calmfors, Lars, 2010, "The Role of Independent Fiscal Policy Institutions, Rapport till Finanspolitiska rådet 2010/9.

Cecchetti, Stephen G., M. S. Mohanty, and Fabrizio Zampolli, 2010, "The Future of Public Debt: Prospects and Implications," BIS Working Paper No. 300, March.

Congressional Budget Office, 2011, *The Long-Term Budget Outlook*. Congressional Budget Office, Washington, DC, June.

European Commission, 2009, *Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060).*

International Monetary Fund, 2010a, "From Stimulus to Consolidation: Revenue and Expenditure Policies in Advanced and Emerging Economies," Fiscal Affairs Department, April 30.

International Monetary Fund, 2010b, "Macro-Fiscal Implications of Health Care Reform in Advanced and Emerging Economies," Fiscal Affairs Department, December 28.

International Monetary Fund, 2011, *World Economic Outlook*, April.

Novy-Marx, Robert, and Joshua Rauh, 2011, "Public Pension Promises: How Big Are They and What Are They Worth?" *Journal of Finance*, forthcoming.

Perotti, Roberto, 1999, "Fiscal Policy in Good Times and Bad," *Quarterly Journal of Economics* 114(4), 1399-1436.

Wyplosz, Charles, 2008, "Fiscal Policy Councils: Unlovable or Just Unloved?" *Swedish Economic Policy Review* 15, pp. 173-192.

Table 1. General Government Net Debt-GDP Ratios
(Recent and Projected)

Country	2007	2010	2013	2016
Australia	-7.3	5.5	7.6	5.3
Austria	39.8	49.8	51.5	50.9
Belgium	73.3	81.5	83.9	86.5
Canada	22.9	32.2	36.3	33.0
Denmark	-3.8	0.9	8.1	6.0
Finland	-72.6	-56.8	-45.6	-36.6
France	54.1	74.6	80.6	77.0
Germany	50.1	53.8	53.9	52.6
Greece	105.1	142.0	157.0	145.5
Ireland	12.2	69.4	110.3	103.5
Italy	87.3	99.6	100.2	98.9
Japan	81.5	117.5	142.4	163.9
Netherlands	21.6	27.5	33.5	34.1
New Zealand	-5.7	4.6	14.7	11.7
Norway	-142.5	-156.4	-170.5	-186.0
Portugal	58.1	79.1	93.3	102.3
Spain	26.5	48.8	58.5	64.6
Sweden	-17.1	-14.6	-13.7	-16.3
United Kingdom	38.2	69.4	79.5	73.5
United States	42.6	64.8	79.3	85.7

Source: IMF, World Economic Outlook Database, April 2011

Table 2. CDS Regressions

Dependent Variable: Average 2010, 3rd quarter CDS spread

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-0.83	71.47	80.69	-8.55	-10.97	27.49	14.80
	(0.01)	(1.28)	(1.74)	(0.13)	(0.21)	(0.69)	(0.47)
Fiscal Gap	32.00			23.69	40.90	-2.49	4.77
	(3.04)			(1.83)	(2.34)	(0.34)	(0.46)
Surplus/GDP		-10.31		-3.54	-7.38	-9.21	-15.51
		(1.87)		(0.58)	(0.82)	(3.24)	(3.74)
Net Debt/GDP			1.48	0.52	1.64	0.42	1.06
			(2.44)	(0.65)	(1.41)	(0.96)	(1.65)
Adj. R-squared	0.315	0.122	0.217	0.293	0.486	0.439	0.596
N. Obs.	19	19	19	19	18	17	16
Outliers Excluded?	No	No	No	No	No	Yes	Yes
Interaction with External Debt Share?	No	No	No	No	Yes	No	Yes

Table 3. Yield Differential Regressions

Dependent Variable: Average 2010, 3rd quarter Benchmark Yield, Relative to Germany

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.0058	-0.0051	0.0045	-0.0104	-0.0114	-0.0122	-0.0118
	(0.62)	(1.65)	(0.54)	(2.38)	(2.19)	(1.82)	(1.49)
Fiscal Gap	0.0008			0.0009	0.0012	0.0012	0.0013
	(0.56)			(1.48)	(1.17)	(1.12)	(0.71)
Surplus/GDP		-0.0017		-0.0017	-0.0030	-0.0017	-0.0030
		(6.75)		(6.84)	(6.12)	(6.30)	(5.59)
Net Debt/GDP			0.00009	0.00002	0.00004	0.00003	0.00004
			(0.88)	(0.41)	(0.55)	(0.53)	(0.44)
Adj. R-Squared	-0.083	0.832	-0.026	0.847	0.809	0.836	0.789
N. Obs.	10	10	10	10	10	9	9
Outliers Excluded?	No	No	No	No	No	Yes	Yes
Interaction with External Debt Share?	No	No	No	No	Yes	No	Yes

Figure 1. Alternative Deficit Projections, U.S. Federal Government 2011-2021

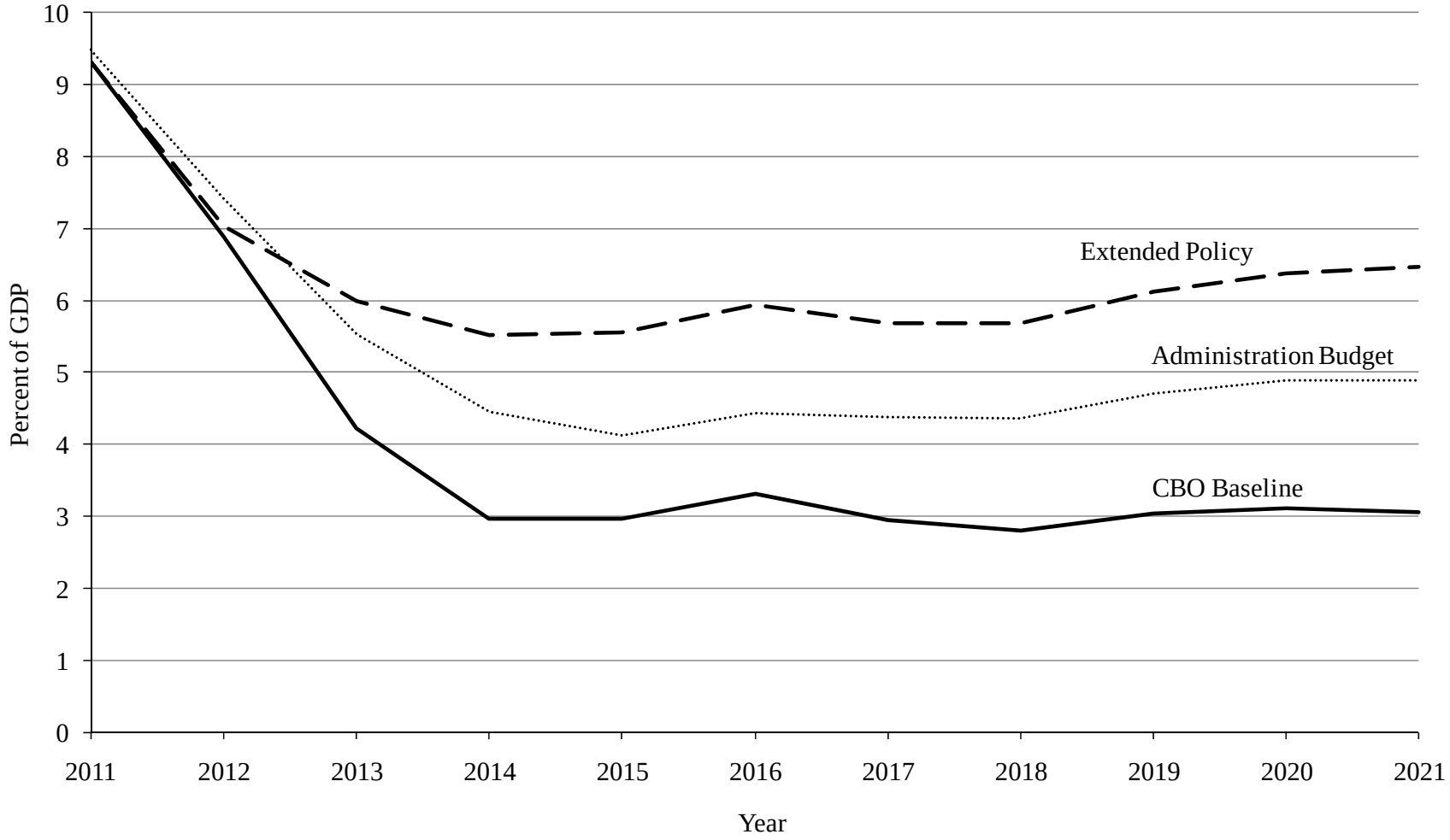


Figure 2. Alternative Debt Projections, 2011-2021

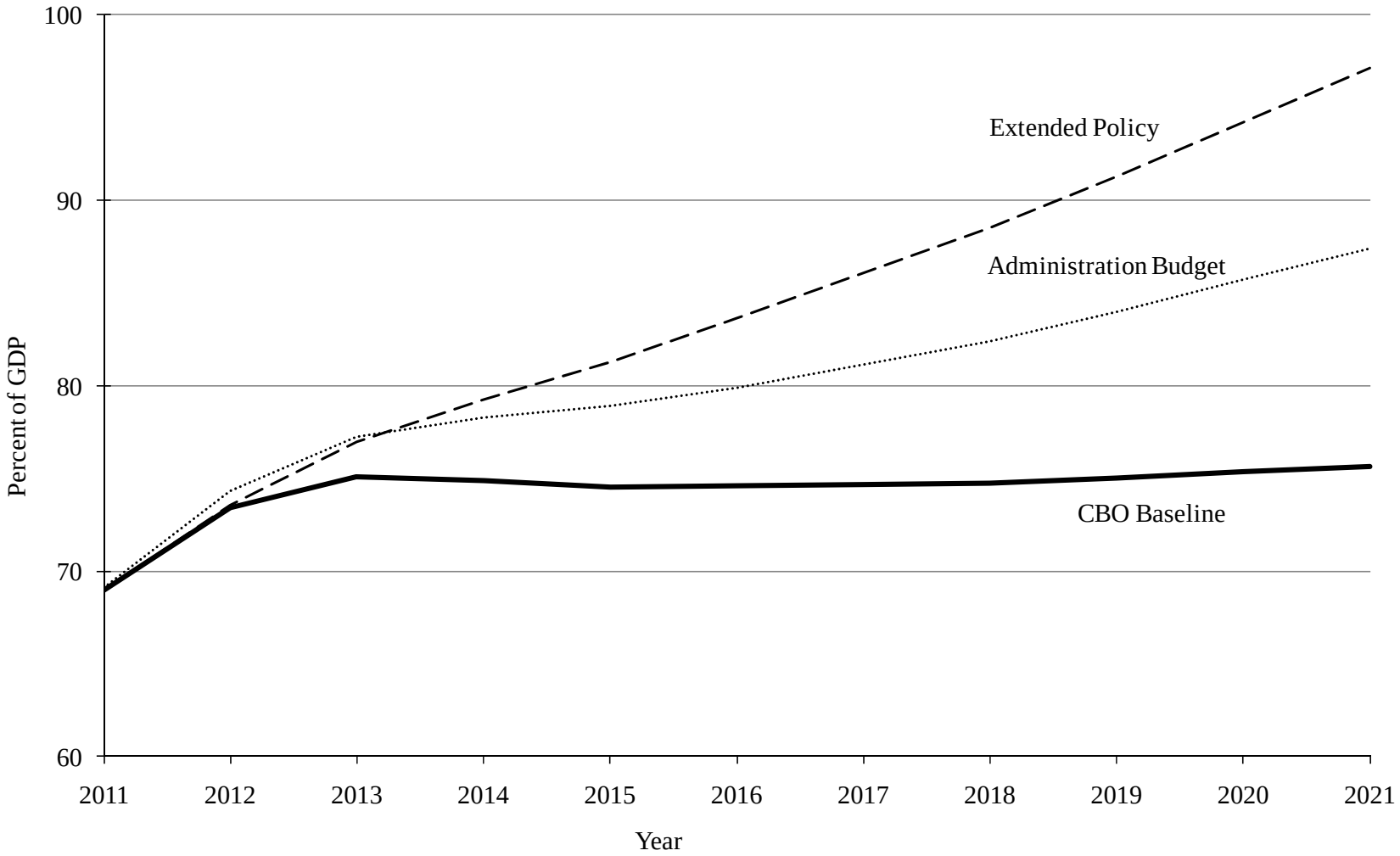


Figure 3. Fiscal Gaps through 2060

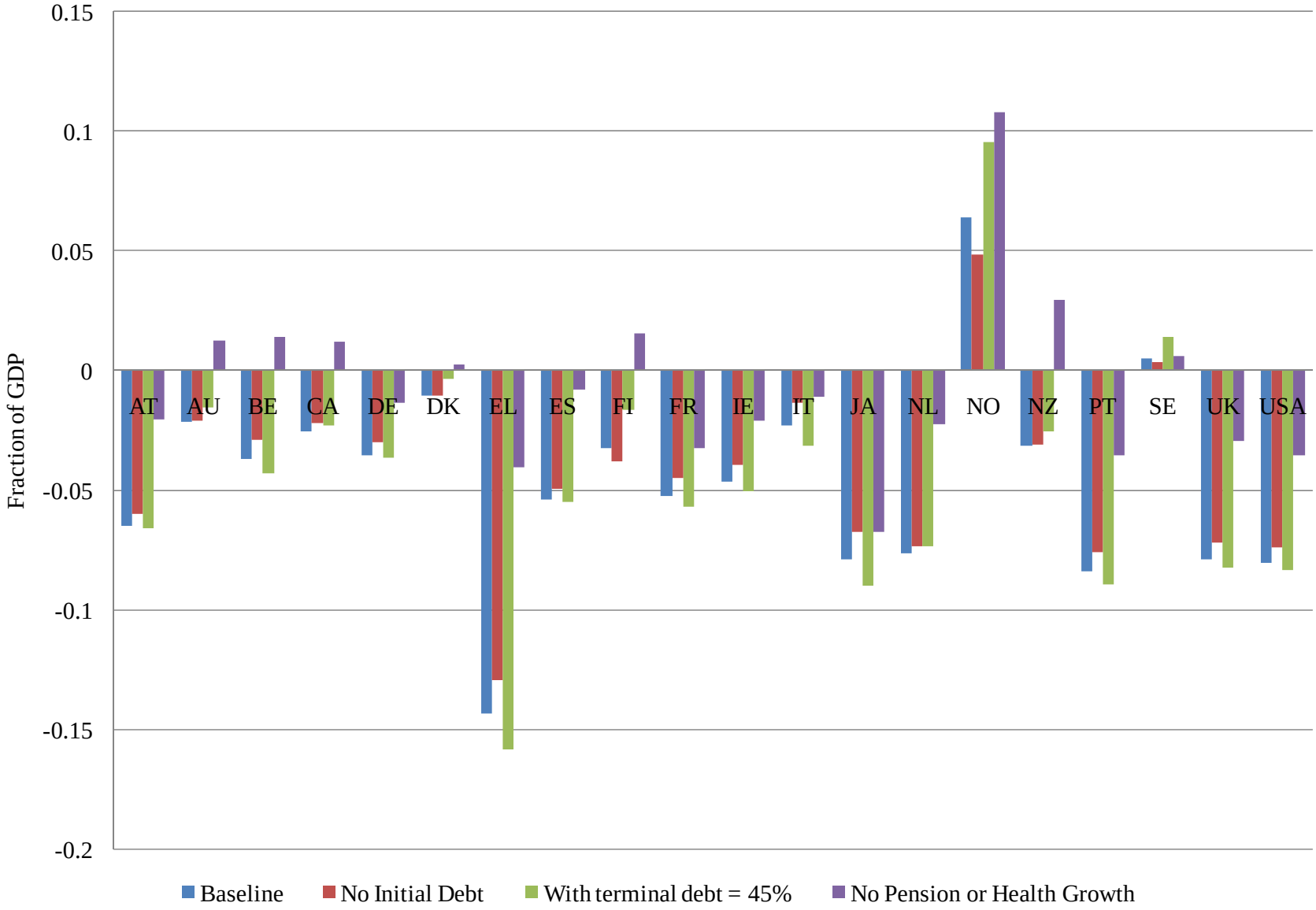


Figure 4. Fiscal Gaps through 2060, Alternative Projections

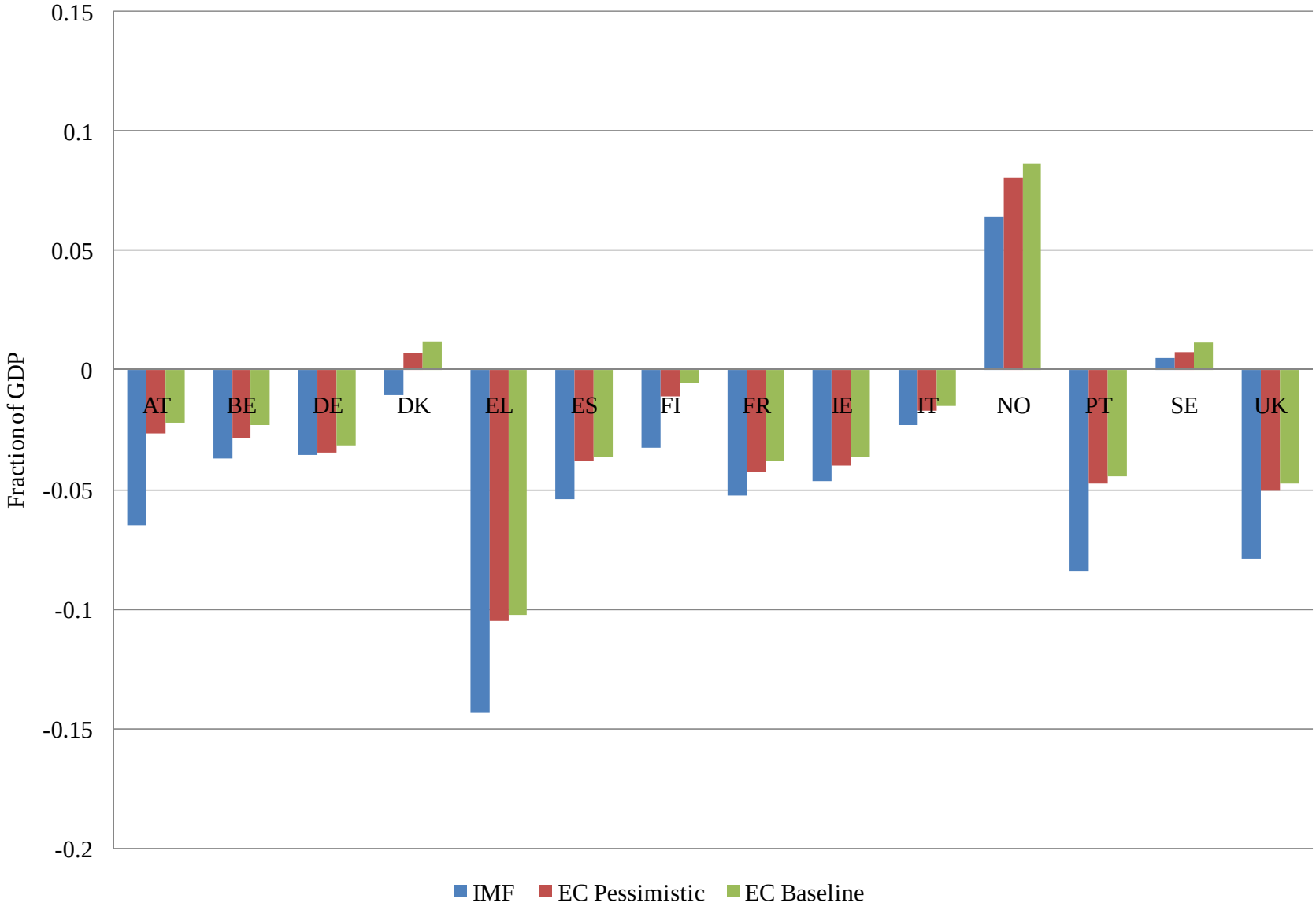


Figure 5. Fiscal Gaps versus Debt-GDP Ratios

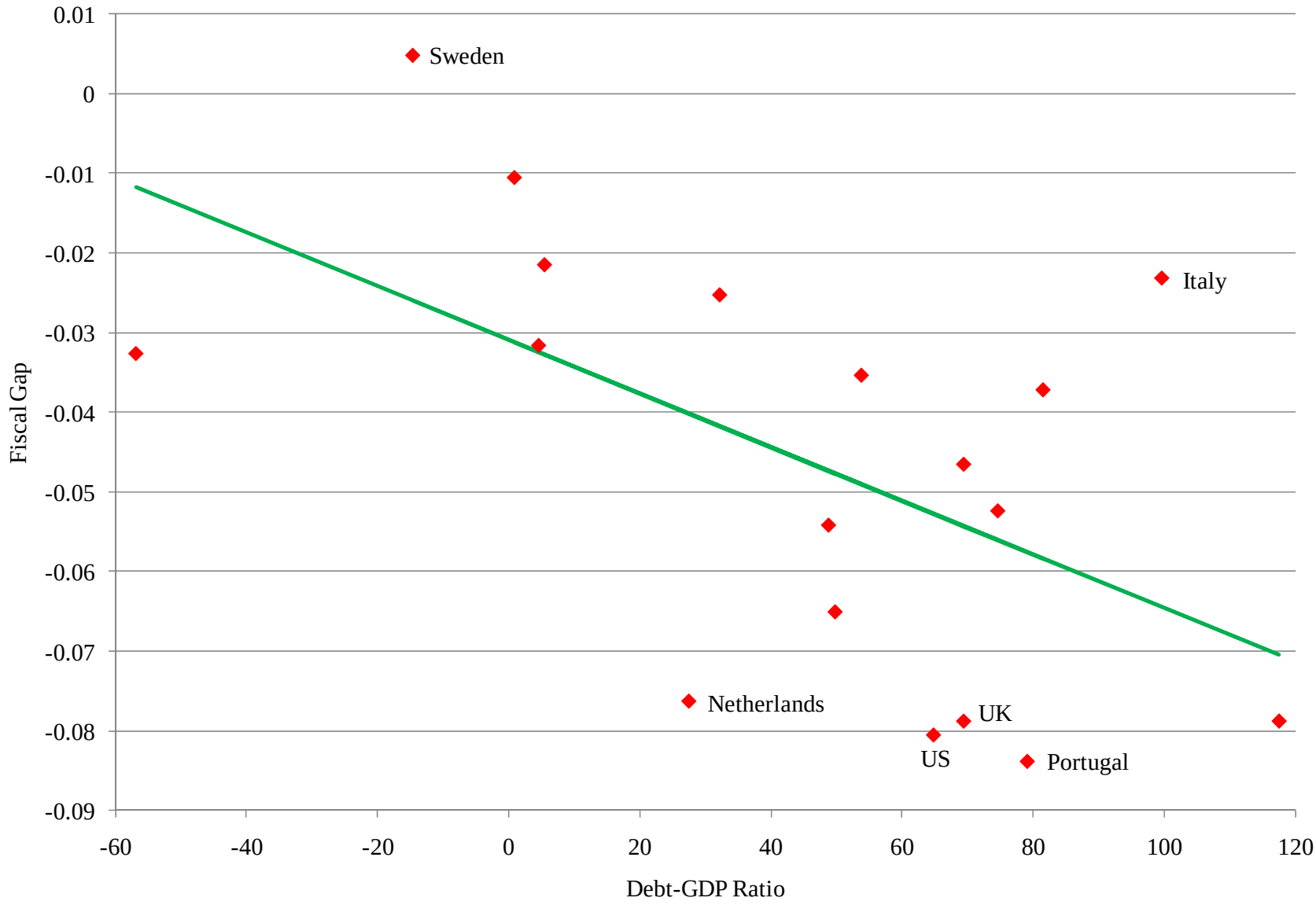


Figure 6. Fiscal Gaps, Different Interest and Growth Rate Assumptions

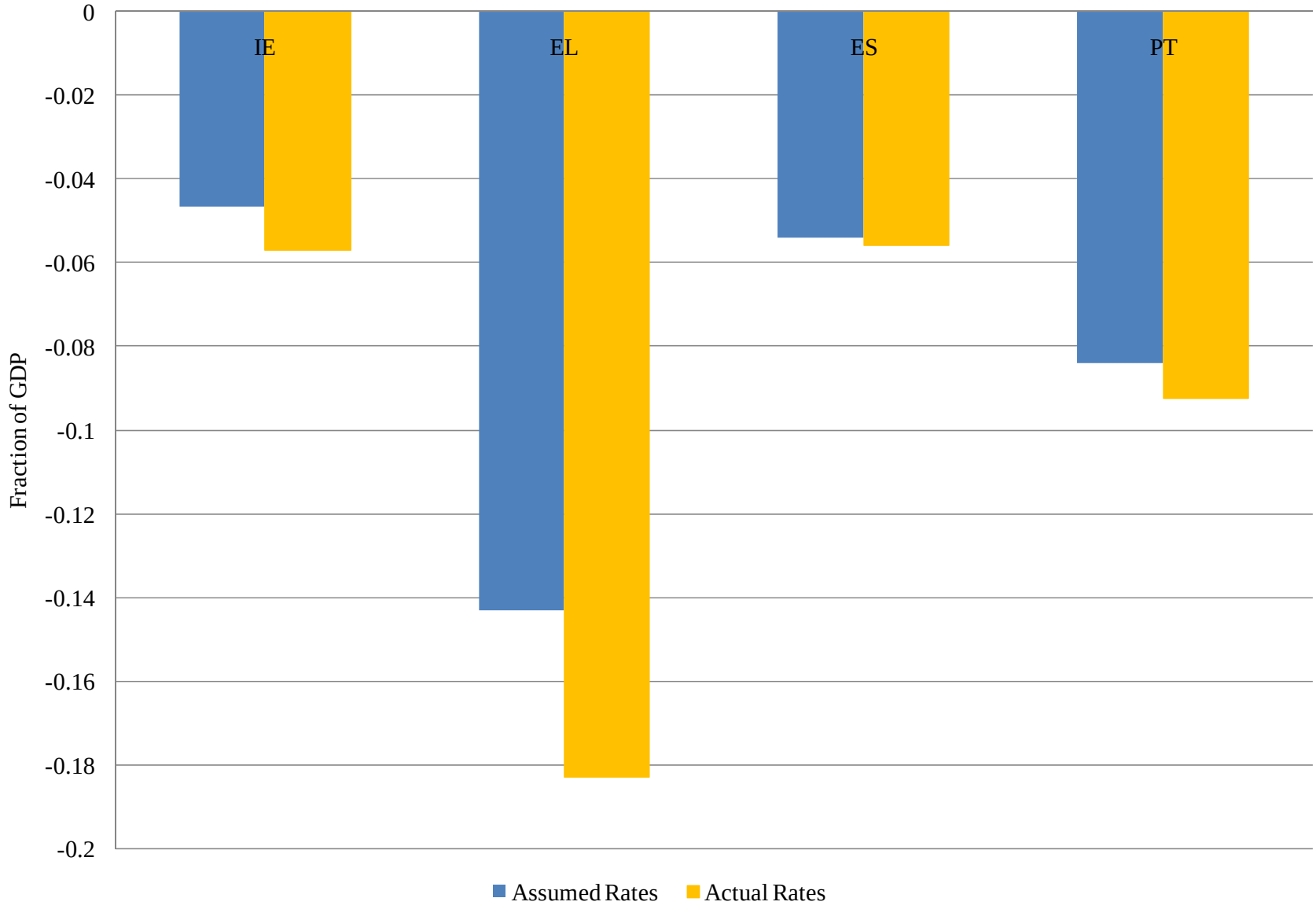
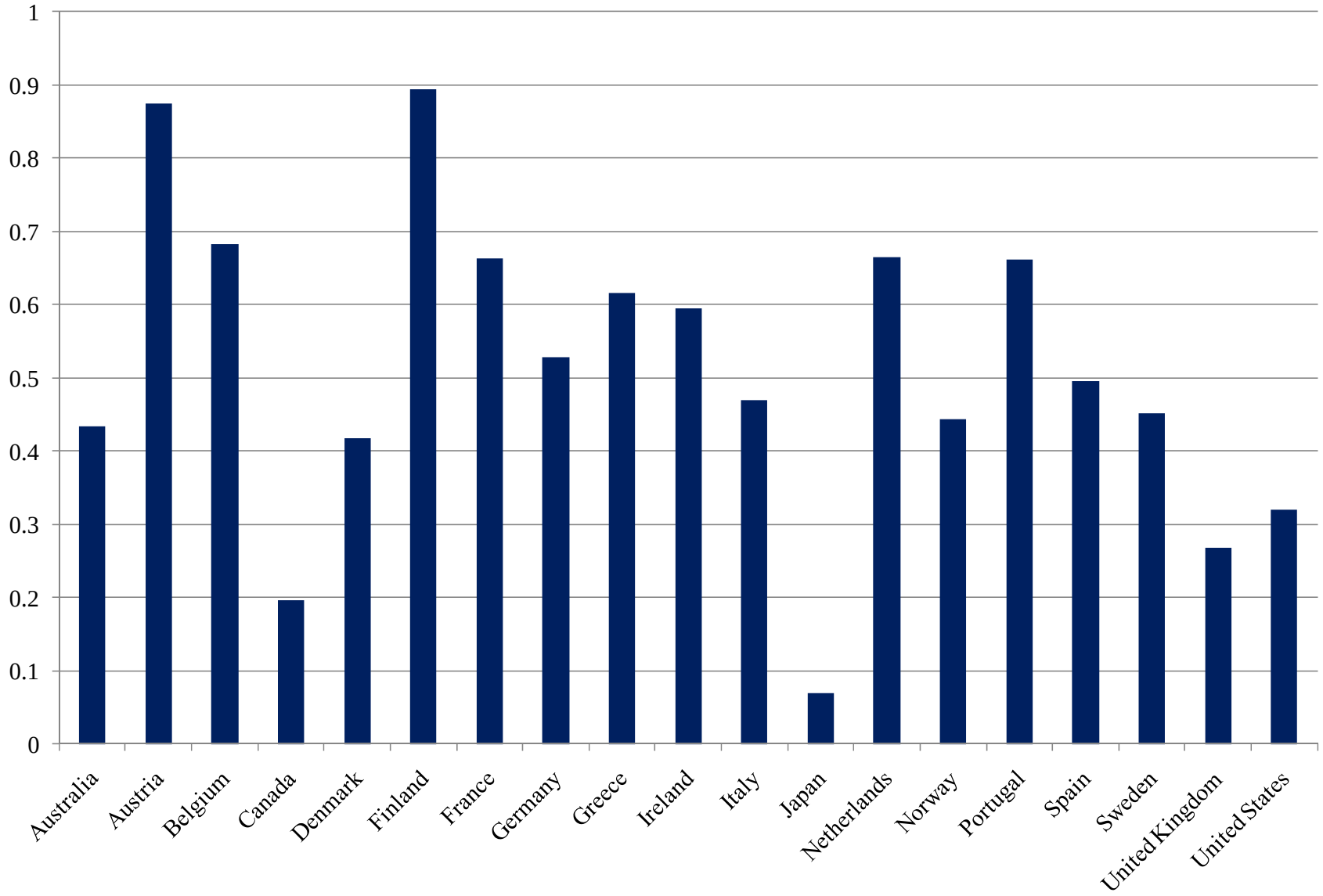
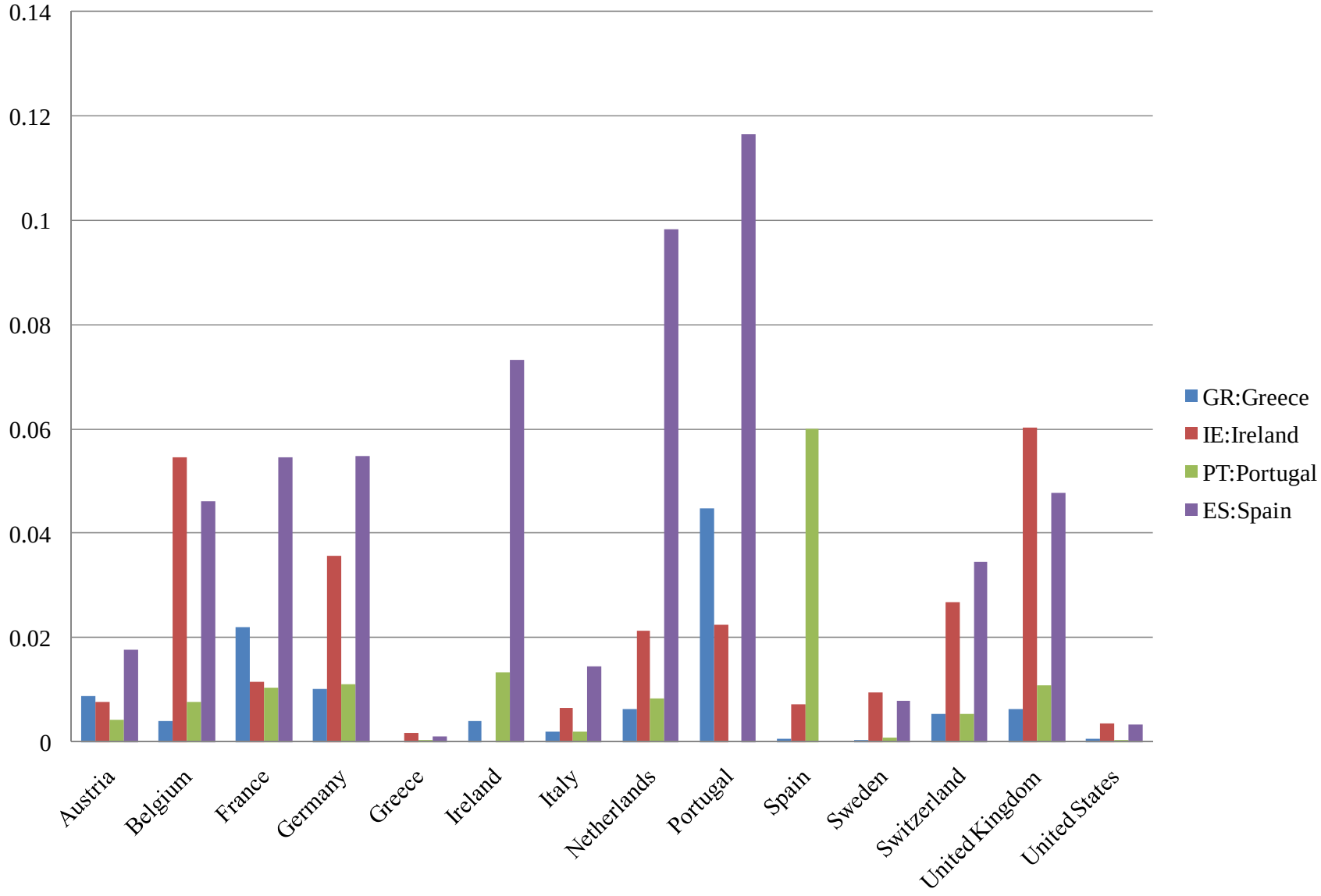


Figure 7. Fraction of Gross Sovereign Debt Held Externally, 2010



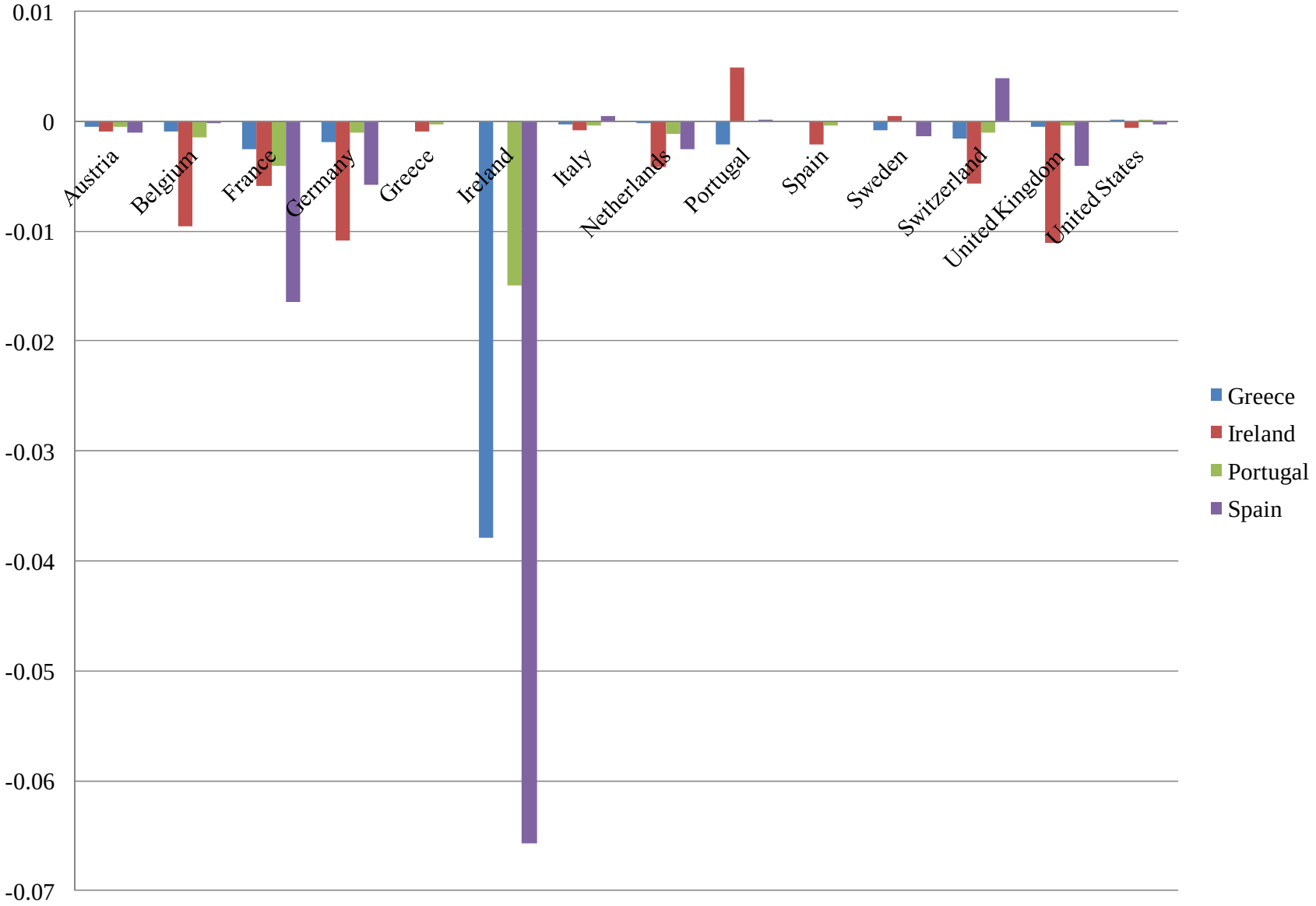
Source: IMF World Economic Outlook (April, 2011)

Figure 8. Claims Relative to GDP, December 2010



Sources: Claims: Bank for International Settlements, International bank claims, consolidated - ultimate risk basis (Table 9D)
GDP: IMF World Economic Outlook (April 2011)

Figure 9. Change in Claims Relative to GDP, Sept. - Dec. 2010



Sources: Claims: Bank for International Settlements, International bank claims, consolidated - ultimate risk basis (Table 9D)
GDP: IMF World Economic Outlook (April 2011)