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HIGHLIGHTS

- The impact of the financial crisis and its ensuing global recession on public finances has raised red flags regarding sovereign debt sustainability in advanced economies in the eurozone
- Projections based on fair assumptions suggest these countries are on an unsustainable trajectory unless they embark on serious fiscal consolidation programs, achieve significantly higher economic growth rates, or reduce their projected unfunded age-related spending
- The events taking place in the last few days highlight the need for immediate and decisive action from European authorities to contain the risks of contagion
- Assuming financial markets are able to surpass the near-term challenges, the widespread need for fiscal consolidation still paints a eurozone medium term outlook with slower economic growth, a weaker euro and a looser monetary policy from the European Central Bank

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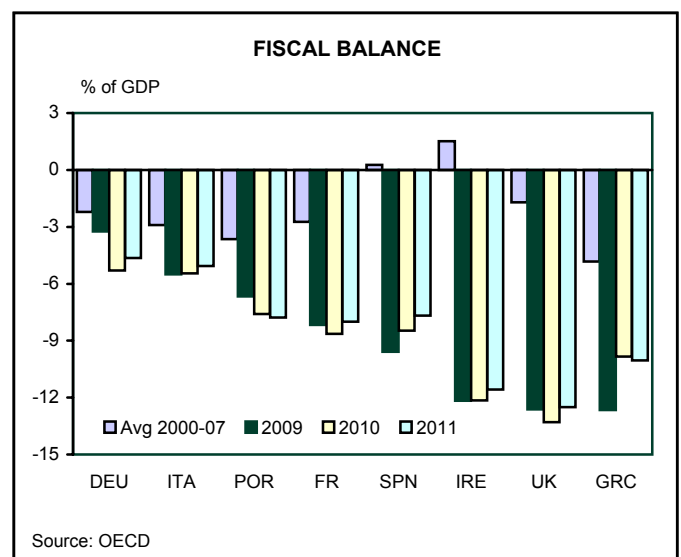
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EUROPEAN SOVEREIGN DEBT: THE BEGINNING OF A LONG JOURNEY DOWN A SLIPPERY ROAD

Policymakers across the eurozone are receiving a rude awakening to the pitfalls of having allowed government debt levels to escalate unchecked. Greece was thrust into the spotlight when market participants became aware that it would have difficulty rolling over US\$10.6 billion in maturing debt on May 19th. But Greece is only one among eight European countries – France, Germany, the United Kingdom and the disparagingly nicknamed PIIGS (Portugal, Ireland, Italy, Greece, and Spain) – that are under market scrutiny for unsustainable debt levels. In fact, Spain and Portugal have recently experienced debt downgrades by a major rating agency, and the stakes are rising that others may follow. Debt downgrades start a vicious cycle which pushes up the cost of borrowing, and this, in turn, makes it even harder for governments to meet near-term debt payment obligations. At this stage, a debt default by Greece or any one of the other at-risk European countries is becoming increasingly likely. All of these ‘at-risk’ countries are set to confront ballooning debt-to-GDP ratios unless there is a radical change to their fiscal approach. And, if you think the joint eurozone-IMF financial package for Greece that is currently afoot will be the saving grace, think again. There is no guarantee that this will be sufficient to reassure investors regarding the outlook for the other debt-beleaguered euro members. With yield spreads rising rapidly in a matter of days and with sizeable upcoming roll over needs of the other PIIGS (US\$ 588 billion from May-December 2010), Greece’s atonement today could be Portugal’s, Ireland’s, Italy’s or Spain’s tears tomorrow.

Are markets over-reacting? We think not. In this report we will detail and validate the severity of the debt problems for these eight European countries. And, unfortunately, the solution to these problems is not simple. There needs to be swift and coordinated action among eurozone members to put forward a more general financial approach to dealing with any country in debt crisis. The country-by-country piecemeal financial approach will leave financial markets vulnerable to bouts of volatility. In addition, governments will need to be steadfast in pursuing harsh fiscal restraint measures, which are likely to be met with political and social resistance. Alongside higher taxes, it will be necessary to reduce entitlements such as pensions and health care – a painful adjustment for citizens. However, in doing so, we must recog-



nize that tighter fiscal policies will have a detrimental effect on economic growth over the next few years, and this would only toughen the challenge of fiscal consolidation.

How Europe got into this mess

Fiscal deficits across all of the eight European countries under consideration were not born simply from the 2008 financial crisis. All of them – with the exception of Ireland and Spain – entered that crisis with their public finances in the red. Deficit positions were then exacerbated for all of the countries by the recession, which crippled fiscal revenues at the same time that governments were providing significant fiscal stimuli to buffer the downturn and, in some cases, rescue financial institutions. Although an economic recovery began in late 2009, the bad news is that the lingering legacy of weak economic and financial times means that the fiscal situation will not improve materially in 2011.

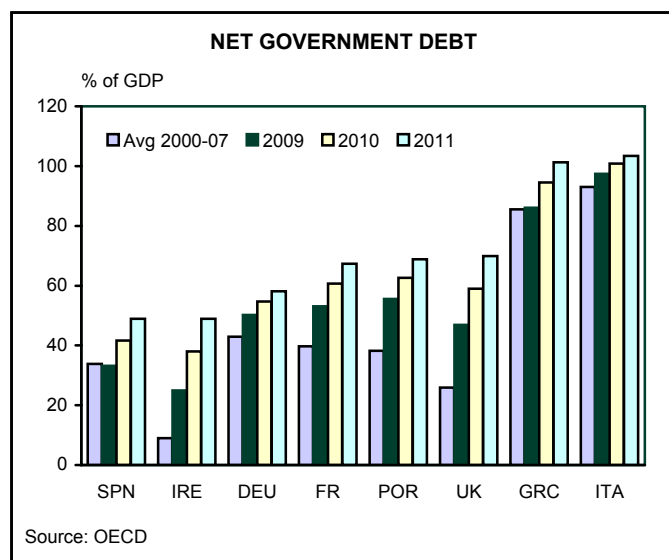
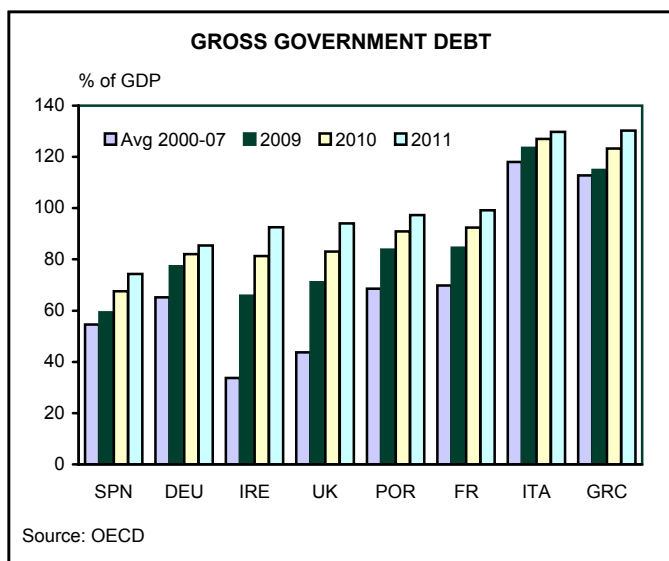
The fiscal deficits have added to government debt and increased the borrowing requirements of the countries. This can be seen in the sharp rise in sovereign debt-to-GDP ratios for all of them. Why is this a concern? Governments must finance their current and past borrowing, and a rising supply of debt increases interest payments. If a country does not control its rising debt, it risks reaching the point in which it can no longer afford to meet the bare minimum criteria of paying the interest costs. Financial markets monitor such risks closely and start demanding higher interest rates as the probability of debt default rises. The increase in rates often acts as a self fulfilling prophecy, as the additional borrowing costs can accelerate the timing of the default. Ultimately, governments will either respond to market pressures by putting their fiscal house in order to prevent the default or by undertaking a fiscal restructuring after the default has occurred.

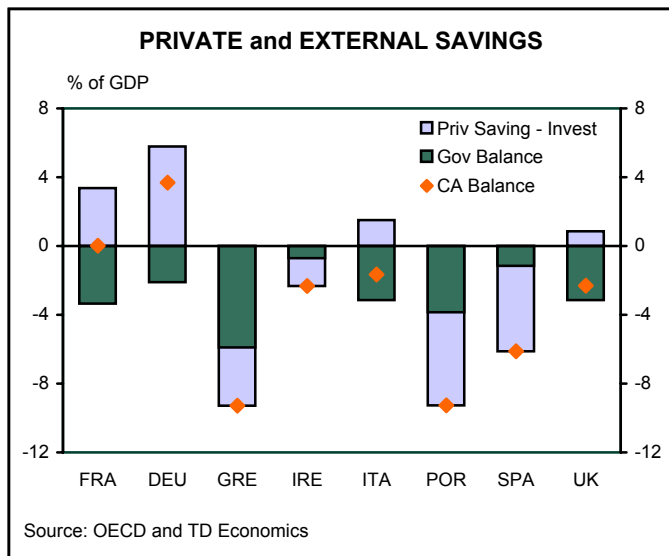
Financial markets are currently fretting about a possible default in Greece and some of the other countries under consideration – so what are the risks? According to OECD projections, by the end of 2011 both Italy and Greece are expected to have gross debt-to-GDP ratios of close to 130%. Ireland, the United Kingdom, Portugal, and France will fall into the 90% - 100% range, while Germany and Spain will be at 85% and 75%, respectively. Gross debt-to-GDP is a common measure used by market participants to assess default risks, and jitters generally set in when this ratio looks set to breach 100% – which explains why Greece is already in trouble.

However, using gross debt is not an accurate depiction of a country’s debt obligations. The measure only reflects total liabilities of a sovereign government and ignores its financial assets, which in some cases are very significant. Net debt (i.e. total outstanding government debt minus government financial assets) solves that shortcoming.

The projections for net debt ratios portray a better situation: all countries appear below 70% of GDP, except for Italy and Greece, which are at risk of breaching the 100% mark in the near term.

While the net debt-to-GDP ratio is a superior measure to gross debt, it still doesn’t provide the whole story of a country’s debt vulnerabilities. It is also relevant to explore the extent in which each country relies upon domestic private savings to finance its fiscal deficit. This is an important consideration because it is easier and less risky to borrow through domestic funds. A heavy foreign borrowing requirement means that a country must convince foreign investors to purchase and hold the government debt – with





	GROSS DEBT HELD ABROAD REACHES 100% OF GDP		TD Vulnerability Index
	Year	Years from Now	
Greece	2010	0	1st
Ireland	2015	5	4th
Portugal	2018	8	2nd
France	2020	10	7th
Spain	2023	13	5th
Germany	2028	18	8th
Italy	After 2030	20 +	3rd
United Kingdom	After 2030	20 +	6th

Source: TD Economics

the implication that the government is subject to the perceptions of risk and the changing demands of those investors.

Average annual data for the period 2000-09 shows Germany’s private savings exceeded its gross investments by an amount larger than the country’s fiscal deficit, an outcome mirrored by a current account surplus of 3.7% of GDP. In other words, the country generated enough private savings to finance its fixed investments, provide for its fiscal shortcomings, and on top of that supply external financing. On the other hand, Spain, Greece, Portugal, and Ireland generated insufficient savings to finance their demand for fixed capital, increasing their reliance on foreign investors to finance their investment needs. The latter renders those countries more vulnerable to a shift in investor sentiment, as is currently playing out for Greece.

Mirror, mirror on the wall, who’s the ugliest of all?

From the discussion above, it is clear that there are many factors that impact a country’s risk profile, and no one measure should be looked at in isolation of another. As such, we devised an index that reflects the relative importance of current account balances, debt-to-GDP ratios, fiscal balance-to-GDP, debt held abroad, maturity profiles and ratings from risk-rating agencies. According to our index, Greece is the most risky country, followed by Portugal, Italy, Ireland, Spain, the United Kingdom, France, and lastly Germany.

The main conclusion is that the gross and net debt-to-GDP ratios are sending warning signals about sovereign risks in Europe and the structure of that debt implies that markets are fully justified in their assessment of Greece, and their worries about several other countries. For instance, assuming the proportion of sovereign debt held abroad will

remain constant at its current level, debt projections indicate that within ten years, if these countries do not address their fiscal imbalances, Ireland, Portugal, and France will have debt levels in excess of 100%-of-GDP held by investors outside of the country. Given that investors are often purchasing government bonds with long term maturities, it becomes quickly apparent why investors are nervous.

What does the future hold?

Now that we have an understanding of what factors caused countries like Greece and others to be thrust into the market spotlight, we can now turn our attention to the main drivers shaping debt dynamics in the longer term and assess the future risks.

A country doesn’t suddenly find itself behind the eight ball, buried in debt. It is a process that typically occurs over many years and is a combination of economic variables (especially those affecting economic growth, inflation, and interest rates), institutional arrangements, and underlying demographics. In fact, the latter is a critical driver of a country’s future fiscal performance. A report published by the European Commission last year¹ shows public age-related spending (i.e., pensions, health care, long-term care, education, and unemployment benefits) in the euro area will rise by a total 5.25 percentage points of GDP during the period 2008-2060, with the largest increase stemming from public pensions. Naturally, there are significant differences between member countries, which reflect the diversity in public pension arrangements, as well as their distinctive demographic characteristics. Greece, Spain, and Ireland are projected to suffer the steepest jumps in spending due to ageing, although the last two benefit from a lower starting point.

Recent research published by the Bank of International Settlements² looking into the impact of rising age-related spending on public finances finds most countries in our eight-member group will confront ballooning debt-to-

GOVERNMENT AGE-RELATED SPENDING (% of GDP)				
	2007	2020	2060	Chg. 2007-60
Greece	22.1	24.0	38.0	15.9
France	28.6	29.5	31.3	2.7
Germany	23.7	23.7	28.5	4.8
Spain	19.5	20.9	28.5	9.0
Portugal	24.4	25.2	27.8	3.4
Italy	26.0	26.3	27.6	1.6
Ireland	17.2	18.6	26.1	8.9
United Kingdom	19.1	19.9	24.2	5.1

Source: European Commission, TD Economics

GDP ratios unless they make drastic changes to their fiscal behavior. The authors looked at the relationship between several variables: the ratio of outstanding government debt to nominal GDP, nominal interest rates, inflation, real GDP growth, and the government primary balance (i.e., total government revenues minus total government spending excluding interest payments)³.

The projection exercise goes as follows: Assume from 2011 until 2030 each country will experience growth and inflation rates matching its own 2000-2007 averages. Then, hold the gross debt-to-GDP ratios and the primary deficit, the latter excluding age-related spending, constant at 2011 levels as forecast by the OECD. In turn, allow age-related spending to grow as forecast by the European Commission. Finally, assume France, Germany, Italy, Portugal, and the United Kingdom will pay the same effective interest rates⁴ they paid on average during 2000-07. In the case of Greece, Spain, and Ireland we assume an effective rate of 4%. These countries greatly benefited from their accession to the euro zone, paying low nominal interest rates spreads with respect to German or French bonds during 2000-2007, which given their higher inflation resulted in very low real rates. It would not be reasonable to assume the same low nominal spreads will occur in the future, so we have lifted that assumption⁵. Combining all those assumptions yields the sovereign-debt paths plotted in solid lines in the charts below.

The graphs on the next page indicate that these countries are on an unsustainable trajectory unless they embark on serious fiscal consolidation programs, achieve higher economic growth rates, or reduce their projected unfunded age-related spending. And, since the countries under consideration are unlikely to be able to accumulate financial assets faster than their debt is rising, the implication is that the net debt-to-GDP ratios will eventually breach the critical 100% threshold unless concerted action is taken.

There is no silver bullet to kill the debt demon

With none of the eight European countries on a sustainable debt path, what tools are available to help them dig their way back to sovereign stability? A number of options have been put forward by various market pundits that essentially boil down to:

1. Growing their way out of debt
2. Constraining debt growth through some spending restraint
3. Inflate their way out of debt

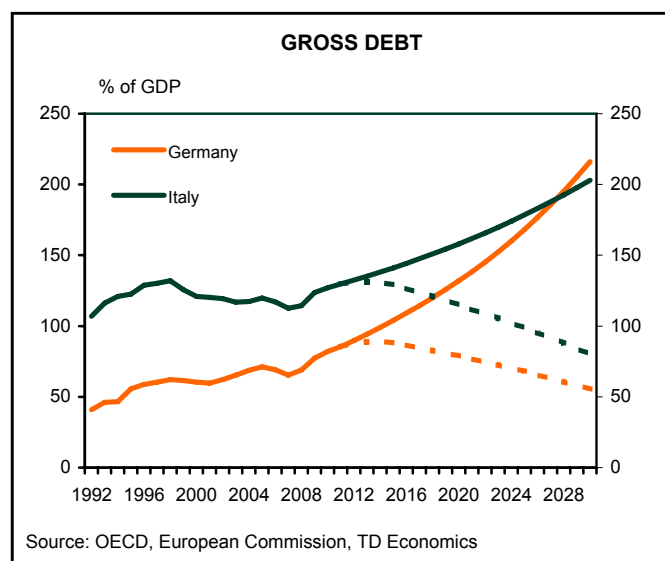
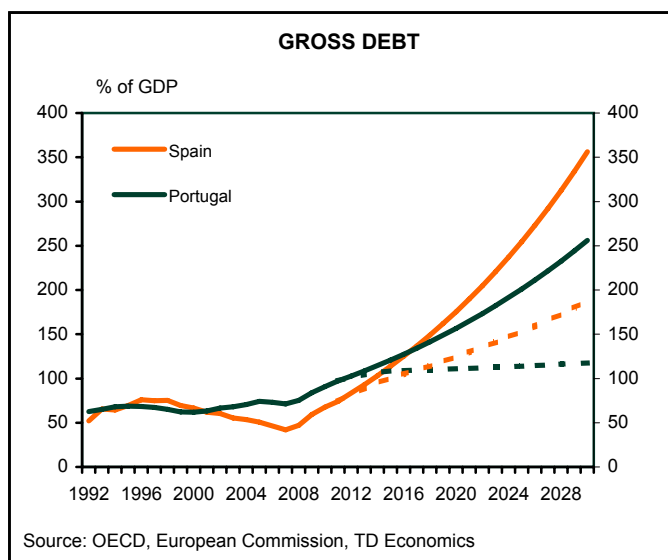
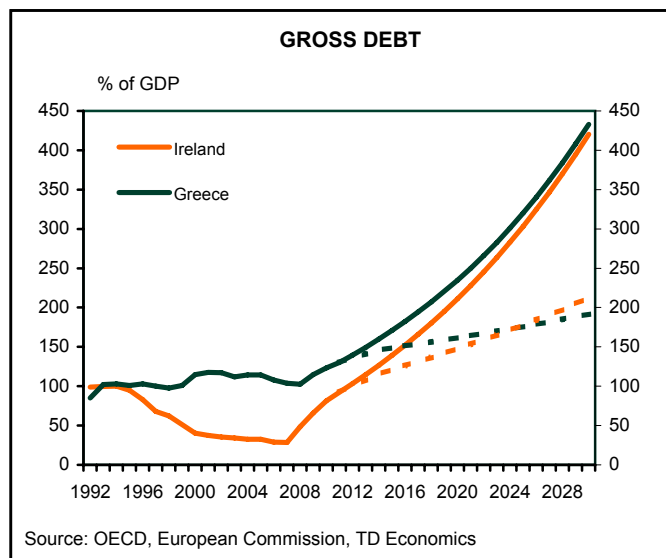
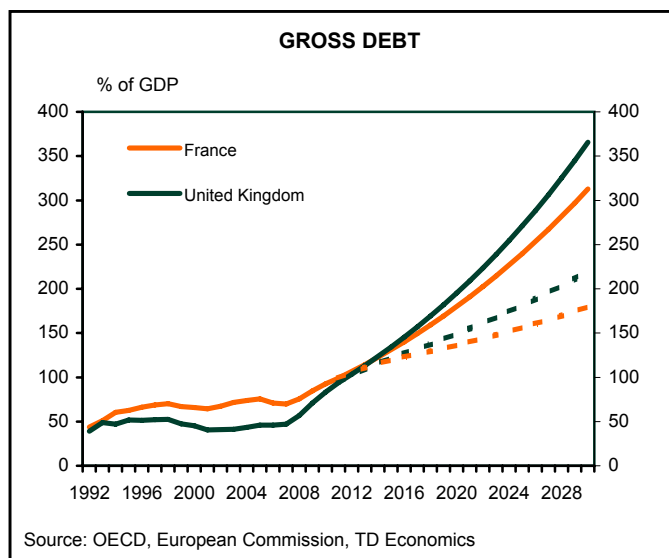
To break the suspense, the simple answer to all three of these possibilities is a resounding ‘NO’. Let’s look at each one in turn:

1. Growing their way out of debt

Assume governments do not address their fiscal imbalances. Instead, they allow age-related spending to rise and keep their primary deficits at the original level. How much economic growth would they need in order to stabilize their debt ratios? For example, if they want their gross debt ratios to converge to 100%-of-GDP by 2030, Ireland would need to boost its annual real GDP growth rate by 11.5 percentage points (pp), the United Kingdom would have to raise it by 11 pp, Spain by 8.8 pp, Greece by 8.2 pp, France by 8 pp, Portugal by 7.6 pp, Germany by 4.5 pp, and Italy by 3.5 pp. Of course, we all know the policymaker’s keyboard does not come with a “supercharged-real-GDP” button. These are completely unrealistic outcomes, so the economies cannot grow their way out of the problem.

2. Constraining debt growth through some spending restraint

Now let’s assume these countries are able to improve their primary balances by 1 percentage point of GDP each year during 2012-2016 and keep it at that level afterwards. Assume also that age-related spending is held constant at 2011’s projected figures throughout the entire forecast horizon. Still under this fiscal consolidation plan, most of them would face rising debt-to-GDP ratios, as the dotted lines in the graphs show. The only exceptions are Germany and Italy, both of which would experience declining debt ratios. This is due to the fact that both of these countries have already put some spending restraint measures in place that have left their initial fiscal primary deficits much smaller than the other countries, which in turn (not surprisingly) demonstrates the benefits of acting early and frontloading the fiscal adjustment.



3. Inflating away the debt

We hear all too often that when push comes to shove, a government always has the option of allowing inflation to escalate, which translates into higher nominal GDP and thereby reduces the debt-to-gdp ratio. Letting inflation rise could also improve the fiscal balance, as revenues increase in tandem with prices and fiscal spending typically takes longer to adjust. However, the benefits derived from higher inflation are limited by several factors, such as the maturity structure of government debt (i.e. the shorter the maturity, the faster debt will be rolled over at higher nominal interest rates), as well as the existence of inflation-adjusted and foreign-currency denominated debt instruments.

Is it even possible for countries within the eurozone to deliberately generate higher inflation? It is not clear how a

government would do this within the currency union. The country does not have control over its money supply because that is determined by the European Central Bank (ECB). It also cannot take the traditional path of creating inflation by allowing its currency to depreciate, thus raising import prices that would feed through to consumer prices. Even if there is a way to raising domestic prices, it could be self-defeating. The inflation differential with respect to its euro peers would appreciate that country's real exchange rate vis-à-vis the other member countries. This would hurt its competitiveness, thus having a negative impact on its exports, which would ultimately reduce the country's growth rate. This does not bode well with the objective of reducing debt-to-GDP ratios.

If the country did leave the eurozone, there is greater scope to inflate the debt burden away by printing money



and lowering the value of its currency. But, the task is not simple. As higher inflation expectations become entrenched, not only do nominal interest rates rise to compensate investors for current inflation, but creditors also demand a higher inflation risk premium against the possibility of even higher future inflation. Another typical market reaction would be reduced demand for long-term debt in favor of shorter maturities. As interest payments rise driven by higher interest rates, ever rising inflation rates are required to keep up with them. This erodes the role of money as a store of value, and people react by reducing their demand for money to protect their wealth (i.e., people get rid of money by buying physical assets or a stable foreign currency). As a result, the government sees its tax base shrink, forcing it to accelerate the inflationary process by printing more money until the vicious cycle unravels⁶. No matter how you slice it, higher inflation is not a viable alternative to containing rising debt ratios; on the contrary, it is self-defeating and only ends up wiping out the value of the country's assets.

What can be done to avoid serious difficulties down the road?

So now that we've determined that there is no silver bullet to prevent sovereign debt in Europe from escalating to unsustainable levels, it is clear that governments will have to engage in significant fiscal consolidation efforts, including reduced government spending, higher taxes and sizeable reductions in entitlements. Although this will present a major social and political challenge, the noticeable differences in the European Commission's forecasts for age-related spending lead us to believe that there is enough latitude for some countries (e.g. Greece most notably) to introduce meaningful fiscal-saving reforms if there is the political will to do so.

Many advanced economies have gone through significant fiscal consolidation instances in the past⁷, but the fact that this time around a large group of economically and financially intertwined countries urgently need to bring their fiscal coffers back to good health at the same time could jeopardize the economic recovery or run the risk of creating protracted weak economic growth in the region. The accompanying table shows the economic growth and unemployment implications of lowering each government's primary balance by 1 percentage point. This shows that Greece's fiscal consolidation plan target of a 4%-of-GDP cut in its budget deficit would induce a 1 percentage point drop in its economic growth rate and would drive the unemployment rate up by 1.6 percentage points.

CUMULATIVE 4-QUARTER IMPACT OF A 1%-OF-GDP REDUCTION IN THE PRIMARY DEFICIT		
	GDP Growth	Unemployment
France	-0.43	0.33
Germany	-0.35	0.76
Greece	-0.26	0.40
Portugal	-0.30	0.10
Spain	-0.87	0.74
United Kingdom	-0.63	0.47

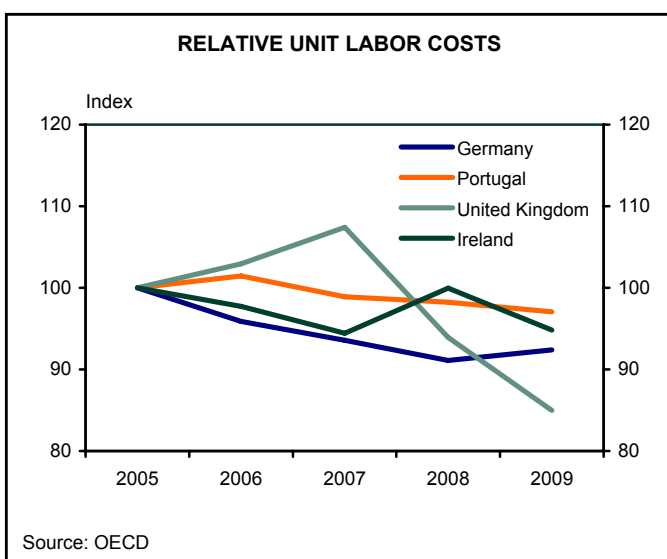
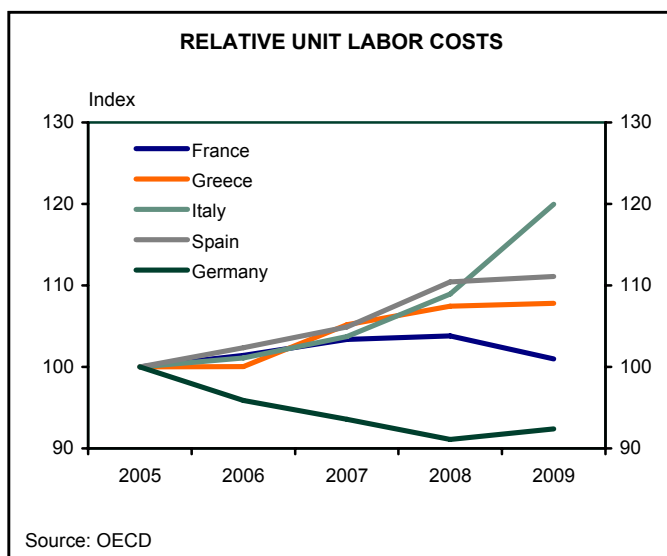
Source: TD Economics

And this understates the impact as the unfortunate reality is that fiscal austerity of this magnitude will generate a negative feedback loop to the domestic and regional European economy. It will adversely impact growth and employment, and this will hinder a government's ability to actually achieve its deficit reduction goal, as fiscal revenues fall in line with economic activity. Ultimately, the drag on economic activity will become less and less as debt levels realign to sustainable levels, but the adjustment process could be exceedingly painful and drawn out.

One of the key ways to lessen the pain is for government's to simultaneously address some of the structural factors which hinder competitiveness, and consequently undermine their external positions. As an example, the OECD publishes a relative unit labor cost index, in which an increase corresponds with deterioration in a country's competitive position. Measuring the performance of each country vis-à-vis Germany, the top performer in the group, Greece, Italy, and Spain lost ground during 2006-2009. Meanwhile, Ireland, Portugal and the UK managed to stay close to Germany's performance⁸. Given the fact that all of these countries share the same currency, those with higher labor costs cannot resort to a devaluation to offset their competitive disadvantage. Hence, their exports lost market share and at the same time they imported a higher portion of their domestic consumption. Introducing greater flexibility in labor regulations and changes to unemployment benefits to make them less appealing for those who can work and choose not to do so could help to reduce labor costs and improve productivity – thus helping to stem the negative feedback loop from fiscal austerity.

Fiscal restraint calls for loose monetary policy

Regardless of whether government's tackle competitiveness issues or not, the drag fiscal austerity imposes on economic growth for the individual countries and region as a whole most likely means that the European Central



Bank will keep interest rates lower than would otherwise have been the case. A period of protracted weak economic activity and the likely persistence of high unemployment rates should also keep inflationary pressures in check.

Near-term considerations must first be addressed

So far the discussion has been on policy actions that need to play out over the next several years. However, the events taking place in the last few days highlight the need for immediate and decisive action from European authorities to contain the risks of contagion from Greece's debt financing difficulties to other vulnerable sovereigns in the region. If there is no concrete action in the coming days to address the May 19 redemption date for Greece, risk aversion will skyrocket beyond what we've already seen and investors will scrutinize the debt maturity calendar of other countries. During May-July 2010, Ireland faces US\$10.6 billion of

SOVEREIGN DEBT MATURITIES (US\$ Bill, % of total sovereign debt outstanding)						
	2010		2011		2012	
France	343.2	15.7%	253.2	11.6%	192.3	8.8%
Germany	355.4	17.2%	299.6	14.5%	201.8	9.8%
Greece	34.5	6.3%	58.9	10.8%	57.6	10.6%
Ireland	13.6	8.2%	11.4	6.9%	12.9	7.8%
Italy	393.0	14.6%	319.5	11.9%	280.3	10.4%
Portugal	29.3	13.1%	27.8	12.4%	16.9	7.6%
Spain	117.7	12.6%	137.7	14.7%	103.4	11.0%
United Kingdom	179.1	7.8%	138.9	6.1%	135.6	5.9%

Source: Bloomberg, TD Economics

maturing debt, Portugal US\$18.1 billion, Greece US\$24.9 billion, Spain US\$68.6 billion, and Italy US\$124.6 billion. This is only maturing debt, to which must be added each country's financing needs for their current fiscal deficits. It will certainly be a test of market confidence. The yields investors demand to fund the refinancing of that debt could determine a country's fate in pushing them closer to fiscal unsustainability.

And this has financial system implications as European banks have significant amounts of sovereign debt on their books. The increase in government bond yields triggered by the bleak sovereign debt outlook has hurt bond prices of the most vulnerable sovereigns within this group, and with them, the balance sheets of European financial institutions with significant exposure. In relation to rising sovereign yields, the funding costs on financial institutions' debt have also become more expensive. This impact is compounded by the fact that most banks issued government-guaranteed debt during the 2008 financial crisis, which is now approaching maturity. This means financial institutions will once again be under significant pressure to roll over that debt, and government support in the form of extended guarantee programs

SOVEREIGN VULNERABILITY (% of GDP)		
	^ BIS Reporting Banks Exposure to Sovereign	* Gen. Gov. Debt Held Abroad
France	7.9%	48.7%
Germany	10.9%	40.3%
Greece	29.1%	99.0%
Ireland	9.9%	47.2%
Italy	18.6%	56.4%
Portugal	23.9%	60.2%
Spain	7.8%	26.9%
United Kingdom	4.5%	17.9%

Source: * IMF-Global Financial Stability Report April 2010
^BIS, TD Economics

BIS REPORTING BANKS CLAIMS ON PIIGS (% OF LENDER BANKS' COUNTRY GDP)						
	Greece	Ireland	Italy	Portugal	Spain	Total Exposure to PIIGS
Austria	1.2	2.2	6.6	0.7	2.3	13.0
Belgium	0.8	12.9	6.3	0.7	4.6	25.3
Denmark	0.1	6.7	0.2	0.1	0.7	7.7
France	2.8	2.3	19.1	1.7	8.2	34.0
Germany	1.3	5.5	5.7	1.4	7.1	21.0
Greece	0.0	0.2	0.2	0.0	0.1	0.6
Ireland	3.7	0.0	20.3	2.4	13.3	39.7
Italy	0.3	0.9	0.0	0.3	1.5	3.0
Netherlands	1.5	3.9	8.7	1.6	15.1	30.7
Portugal	4.3	9.4	2.3	0.0	12.3	28.3
Spain	0.1	1.1	3.2	5.9	0.0	10.2
Sweden	0.2	1.2	0.6	0.1	1.5	3.6
Switzerland	0.7	3.3	3.3	0.8	3.7	11.9
United Kingdom	0.7	8.6	3.5	1.1	5.2	19.1

Source: BIS, Haver Analytics, TD Economics

might not be there to assist them. According to the latest IMF Global Financial Stability Report, European banks will need to roll over nearly US\$ 2.3 trillion between 2010-2012. Unfortunately, this timing coincides with heavy sovereign debt issuances. As you've probably guessed already, here again we have the potential for a negative feedback loop into the economy. Banks, who were initial participants in sovereign debt markets, will now be constrained by their own funding limitations to supply credit to governments. In the end, private credit supply could be impacted, adding to the fiscal drag on economic activity.

It is in this way that even countries within the eurozone with much better sovereign debt standings, such as Belgium and the Netherlands, can feel the negative ramifications since they are exposed to a PIIGS default through the commercial activities of its local banks in those sovereigns.

In the end, there is no simple solution

After all this effort to frame and understand the complexity of the European sovereign debt issue, we keep arriving to the same conclusion: there is really no way out but for the swift implementation of deep fiscal austerity measures. Unfortunately, this solution looks like it's resting on a house of cards. Will it require the at-risk eurozone members to be pushed to the brink of a full blown financial crisis for this to occur or will Greece be the wake up call for the others? And, what is the likelihood that a eurozone member will default on its debt, causing investor jitters to ripple even more strongly through the global economy? In order to avert the risk of financial contagion, or a debt default by one

or more member countries, there needs to be coordinated action within the eurozone to develop a general financial approach to address hotspots across the entire region. An individual financial assistance package, like that being discussed for Greece, just doesn't cut the mustard. As an example, even if a eurozone-IMF program is implemented to address Greece's immediate financial needs, it may not be sufficient to reassure investors regarding the outlook for the other debt-beleaguered euro members. With yield spreads rising rapidly in a matter of days and with sizeable upcoming roll over needs of the other PIIGS (US\$ 588 billion from May-December 2010), Greece's atonement today could be Portugal's, Ireland's, Italy's or Spain's tears tomorrow. For all the reasons we have discussed so far, the problem is rapidly mutating from a solvency issue to a liquidity issue, and as such, it can end up penalizing a country which, in principle, might have a better long term outlook than some of its peers.

In addition, it remains to be seen whether investors will be convinced of the effectiveness and of the political will to stand behind fiscal consolidation proposals. Governments need to have transparent and credible plans. Until this is established, financial markets will continue to suffer bouts of volatility. If efforts fail to impress, or governments blink in the face of unbearable domestic social pressures, a country could conclude that it needs to exit the currency union in order to regain control over monetary policy to help mitigate the burden of the fiscal adjustment. In the short term, this decision would do nothing but aggravate the debt crisis, as their reinstated currencies will immediately depreciate making euro-denominated debt payments more onerous. Even if there is a debt default of a small member, this would have immediate repercussions across the euro region, given the transmission channels we have explored thus far. That is why swift and coordinated action with a general financial approach is necessary.

Assuming financial markets are able to surpass the near-term challenges, the widespread need for fiscal consolidation still paints a eurozone medium-term outlook that embeds a slower rate of economic growth, a weaker euro and a more accommodative monetary policy stance from the European Central Bank than would otherwise have been the case. Any way you look at it, escalating government debt is clearly a case of the glass being half empty.

For information on how the European debt crisis could impact Canada, see the report "Framing the Greek Crisis for Canada" available on our web site www.td.com/economics.

Appendix

We start from the consolidated government budget equation (1)

$$D_t = (1+i_t) \cdot D_{t-1} + (G_t - T_t) - (M_t - M_{t-1}) \quad (1)$$

where D_t is the outstanding government debt, i_t is the nominal interest rate, $(G_t - T_t)$ is the primary balance computed as total government outlays minus interest payments minus total government revenues, and the last right-hand side term is seigniorage (i.e., the increase in the monetary base). Dividing the terms on both sides by nominal GDP, assuming seigniorage is zero, and rearranging we obtain:

$$\frac{D_t}{Y_t} = (1+i_t) \cdot \frac{D_{t-1}}{Y_{t-1}} \cdot \frac{Y_{t-1}}{Y_t} + \left(\frac{G_t}{Y_t} - \frac{T_t}{Y_t} \right) \quad (2)$$

$$\frac{D_t}{Y_t} = \frac{(1+i_t)}{(1+\rho_t)} \cdot \frac{D_{t-1}}{Y_{t-1}} + \left(\frac{G_t}{Y_t} - \frac{T_t}{Y_t} \right) \quad (3)$$

$$d_t = \frac{(1+i_t)}{(1+\rho_t)} \cdot d_{t-1} + (g_t - t_t) \quad (4)$$

where ρ_t is the rate of growth of nominal GDP. Introducing the inflation rate π_t and rearranging terms yields:

$$d_t = \frac{(1+i_t)/(1+\pi_t)}{(1+\rho_t)/(1+\pi_t)} \cdot d_{t-1} + (g_t - t_t) \quad (5)$$

$$d_t = \frac{(1+i_t)}{(1+r_t) \cdot (1+\pi_t)} \cdot d_{t-1} + (g_t - t_t) \quad (6)$$

where r_t is the rate of growth of real GDP. Therefore, defining \hat{i}_t as

$$\hat{i}_t \equiv \frac{(1+i_t)}{(1+r_t) \cdot (1+\pi_t)} - 1 \cong i_t - \pi_t - r_t \quad (7)$$

finally yields,

$$d_t - d_{t-1} = \hat{i}_t \cdot d_{t-1} + (g_t - t_t) \quad (8)$$

which is the equation dictating the evolution of the debt-to-GDP ratio used to draw the projections shown in the graphs.

**Endnotes**

- 1 European Commission: 2009 Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060)]
- 2 BIS Working Paper No 300 – The future of public debt: prospects and implications, by Cecchetti, S, Mohanty, M, and Zampolli, F.
- 3 See Appendix for an equation tying all these variables together.
- 4 Computed as the ratio of interest payments made on a particular year, divided by the outstanding debt at the end of the previous year.
- 5 The IMF publication “The State of Public Finances Cross-Country Fiscal Monitor: November 2009” mentions that ongoing research by IMF staff members points to empirical evidence supporting the claim that higher fiscal deficits and higher debt-to-GDP ratios would drive nominal government debt interest rates up. Specifically, a 1 percentage point increase in the fiscal deficit-to-GDP ratio raises long-term nominal interest rates by up to 60 basis points, while the same increase in the debt-to-GDP ratio causes the nominal interest rate to jump 5 basis points (e.g. when the debt ratio jumps 20 percentage points, the long-term government bond yields climb 100 basis points). Moreover, the magnitude of the interest rate reaction is also dependent on the initial level of deficit and debt (i.e., nominal interest rates rise more for countries showing initially higher deficits or debt ratios).
- 6 Most hyperinflationary episodes in Latin America during the 80’s and early 90’s were caused to a great extent by governments which resorted to printing money and running high inflation rates to finance their fiscal deficits. Inflation reached 4,000% in Argentina in 1990; 6,000% in Perú in 1992; and 2,500% in Brazil in 1991.
- 7 Germany and the UK posted average underlying primary deficits of 0.6% and 2.6% of GDP, respectively, during 1992-96. They both reverted to underlying primary surpluses of 0.7% and 2.4% of GDP, respectively, during 1997-2000.
- 8 Private sector workers’ compensations adjusted by inflation also played in Germany’s favor, declining at an annual average pace of 1.1% during 2001-09. On the other hand, Greek private sector workers saw their compensations rise in real terms at an average annual pace of 1.3% during the same period.

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