



# ANNUAL REPORT | 2011



Message from Our President



Sovereign Debt: A Modern Greek Tragedy



Message from the Chairman of the Board



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FEDERAL RESERVE BANK OF ST. LOUIS  
**ANNUAL REPORT**  
*for the year 2011*

Published May 2012



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## PRESIDENT’S MESSAGE

### European Sovereign Debt Crisis: A Wake-up Call for the U.S.

In recent years, many countries’ deficit-to-GDP (gross domestic product) and debt-to-GDP ratios rose as governments increased their borrowing on international credit markets to finance spending. For some European countries in particular, the ratios reached far beyond those considered sustainable. Consequently, these countries—including Greece, Ireland and Portugal—saw their borrowing costs rise dramatically as markets began questioning the countries’ ability and willingness to repay their debt.

Although the U.S. continues to have low borrowing costs, the U.S. deficit-to-GDP and debt-to-GDP ratios are nearly as high as those of some of the countries that have had difficulty borrowing. The current European sovereign debt crisis serves as a wake-up call for the U.S. fiscal situation.

Borrowing in international markets is a delicate matter. A country cannot accumulate unlimited amounts of debt; there is such a thing as too much debt, and it occurs at the point where the country is indifferent between the temporary benefit of defaulting and the cost of not having continued access to international credit markets. Markets understand that at some high level of debt a country has a disincentive to repay it, and, therefore, markets will not lend beyond this point.


Interest rates alone are not the best way to determine whether a nation is borrowing too much or to evaluate the probability of a debt crisis. Witness Greece and Portugal—two of the latest countries to face this borrowing limit: Interest rates tend to stay low until a crisis occurs, at which time they rise rapidly. Today, the U.S. has low borrowing rates, but these low rates should not be comforting regarding the likelihood of hitting the debt limit.

So, what is the limit for debt accumulation? While it can be difficult to evaluate, research has found that once a country’s gross debt-to-GDP ratio surpasses roughly 90 percent, the debt starts to be a drag on economic growth.<sup>1</sup> In general, the European countries that continue to have poor economic performances are the ones that borrowed too much and are beyond this ratio. Over the past couple of years, they have tended to have relatively high (and frequently increasing) unemployment rates and low or negative GDP growth. Of course,



slower growth tends to exacerbate a country’s debt problems. In contrast, countries that have not carried too much debt—in particular, Germany and some of its immediate neighbors—have tended to have relatively low (and frequently decreasing) unemployment rates and positive GDP growth.

The U.S. gross debt-to-GDP ratio is higher than 90 percent, and projections indicate that it will rise further. Now is the time for fiscal discipline in order to maintain the credibility in international financial markets that the U.S. built up over many years. Failure to create a credible deficit-reduction plan could be detrimental to economic prospects. Furthermore, as the European sovereign debt crisis has shown, by the time a country reaches the crisis situation, fiscal austerity might be the best of many unappealing alternatives. Returning to more normal debt levels will take many years, but the economy would likely benefit if the U.S. were to get on a sustainable fiscal path over the medium term.

Some people say that the U.S. cannot reduce the deficit and debt because the economy remains in dire straits, but the experience of the 1990s suggests otherwise. During the 1990s, the U.S. had substantial deficit reduction, and the debt-to-GDP ratio declined. The economy boomed during the second half of the decade, which helped to reduce the debt more quickly. While reviving economic growth would also help now, temporary fiscal policies and monetary policy are not the best way to do that. Having a credible deficit- and debt-reduction plan in place would likely spur investment in the economy, as it did during the 1990s. 

A handwritten signature in black ink, appearing to read 'J. Bullard', written in a cursive, flowing style.

James Bullard  
President and CEO

<sup>1</sup> For example, see Cecchetti, Stephen G.; Mohanty, M.S.; and Zampolli, Fabrizio. “The Real Effects of Debt,” in *Achieving Maximum Long-Run Growth*. Presented at the 2011 Economic Policy Symposium, Jackson Hole, Wyo., Aug. 25-27, 2011.





# Sovereign Debt: A Modern Greek Tragedy

by Fernando M. Martin and Christopher J. Waller

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For the second time in five years, the world faces a financial crisis that threatens the health of the global economy. The first crisis, in 2007-08, was driven by excessive mortgage debt owed by *households*. The current crisis is driven by excessive government debt owed by entire *countries*. The common factor driving both of these crises is the fear that debts will not be repaid. While this is a constant concern with individual households, it is almost unimaginable that highly developed economies with democratic governments would default on their debt. Yet that is the harsh reality we face as Portugal, Ireland, Italy, Greece and Spain—the so-called PIIGS coun-

tries—struggle to get their debt under control. And it is not only the southern European countries that are in trouble—the U.S. and France had their credit ratings downgraded in 2011 due to fears of long-run insolvency.

At moments like these, the public begins to ask questions about national debt:

*Why do nations borrow? When does the level of debt become a burden? What happens if a nation defaults on its debt? How did Europe get itself into this situation, and how can it get out? Is the U.S. in equally serious trouble because of its debt?*

This essay addresses these questions and provides some insight as to what may happen in the future.





## Why Is It Called “Sovereign Debt”?

Since the U.S. is a democracy that chooses its government representatives from its own citizenry, we refer to the debt accumulated by the government as the “national debt” or “the debt of the nation.”

In the past, when monarchies were the main form of government, the debt was referred to as “sovereign debt” since it was debt accumulated by the monarchy as opposed to the nation’s citizens. Today, the terms “national debt,” “government debt” and “sovereign debt” are all conceptually the same and are used interchangeably.

### The Function of National Debt

When governments spend more than they receive in tax revenue during a given period, they must finance the shortfall by borrowing. The current shortfall is called the deficit. If a country generates more tax revenue than the government spends, it runs a surplus, which pays off existing debt. Thus, the national debt is the sum of the current and all past deficits/surpluses. For example, the 2011 U.S. federal deficit was \$1.3 trillion, while the national debt was about \$10 trillion.<sup>1</sup> This \$10 trillion debt is the net accumulation of all spending shortfalls back to the founding of the country.<sup>2</sup>

But why would a country choose to spend more than it earns in tax revenue? For many of the same reasons individuals borrow: to consume more goods today at the cost of consuming less tomorrow.

Why would a government choose to have more consumption today? Historically, the answer has been wars. Wars are expensive and require the government to acquire large quantities of goods and services immediately. Governments could finance this by dramatically raising taxes temporarily. However, it is actually better to borrow the resources and slowly repay the debt over time with permanently higher future taxes. This is referred to as “tax smoothing,” a concept articulated by Robert Barro, an economist at Harvard University, in an influential 1979 paper.<sup>3</sup> The idea is similar to a mortgage—borrow a lot of money to buy a house now and slowly pay it off over time.

In addition to wars, government borrowing has been used to finance civil works, such as the interstate highway system. Modern governments have also borrowed to finance less tangible items, such as education, pensions and medical care.

By borrowing today, governments are implying that they will raise future taxes to pay off their debts. A key issue is how burdensome these future taxes will be. As a rough rule of thumb, economists look at the ratio of the national debt to national income as a measure of the debt burden. The idea is to see how hard it would be to pay off all of the nation’s debt with one year of national income (i.e., GDP). Note that this is a very conservative measure of a debt burden; it only considers using one year’s income rather than a stream of future income to repay the debt, and it ignores the wealth of the nation. Notice that by this measure, the debt burden can be reduced by paying off debt or by the economy growing faster than debt.

### Rolling Over Debt and Default

Since the national debt is the accumulation of all past deficits, does this mean that debt issued to finance, say, the Civil War, has never been repaid? No. That specific debt was repaid by running a surplus and rolling over the debt. Rolling over the debt means paying off old debt by issuing new debt (akin to paying off your Visa card with your MasterCard). Nearly all nations in the world have outstanding sovereign debt, and they typically roll over the debt when it comes due.

Government debt is issued at different maturities, which determines when the debt is to be repaid. Governments typically borrow funds with maturity dates as short as three months and as long as 30 years. The interest rate the government pays depends on the term to maturity when the debt is issued. The relationship between the interest rate paid and the maturity of the debt is called the term structure of interest rates—or, more succinctly, the yield curve. Figure 1 plots the yield curve for U.S. debt.

The yield curve in Figure 1 has the typical shape: upward sloping, meaning that the longer the time to repayment, the higher is the interest rate. Simply put, it is much cheaper to borrow for a short period of time than to borrow for a long period of time. Consequently, governments have an incentive to issue debt with a short maturity. However, this requires them to roll over their debt more often. As a result, governments face a trade-off—borrow more cheaply but run the risk that the debt will not be rolled over. Thus, governments typically issue debt at a variety of maturities.

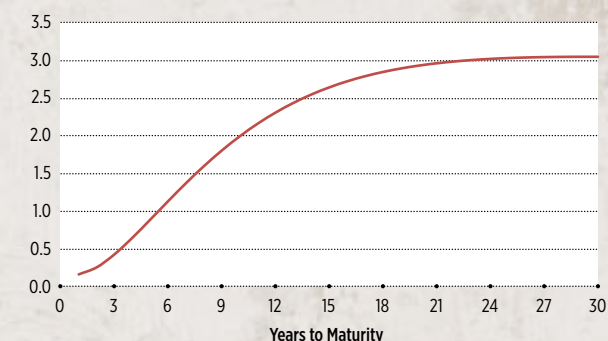
Creditors are willing to roll over the debt if they believe they will be repaid in the future. If they fear this will not happen, then they will ask for immediate repayment of the debt or they will demand a very high interest rate to compensate them for the risk of default. In either case, the government would need to increase tax revenue or reduce spending in order to obtain the resources needed to repay the debt and the interest. But the government cannot be forced to repay its debt—it may choose to simply default.<sup>4</sup>

While the idea that an advanced country such as the U.S. would default on its debt seems crazy, historically it has been quite common for sovereigns to default on their debts. Economists Carmen Reinhart at the Peterson Institute for International Economics and Kenneth Rogoff at Harvard University document the history of sovereign debt in their 2009 book *This Time Is Different*.<sup>5</sup>

FIGURE 1

#### U.S. Treasury Security Yield Curve

Percent, Continuously Compounded Zero Coupon



SOURCE: Federal Reserve Board/Haver Analytics.  
Bond yields are as of the end of December 2011.

^ FIGURE 1

Governments usually sell debt (bonds) with maturity dates ranging from three months to 30 years. The shorter the time period for repayment, the lower the interest rate that the government has to pay. The relationship between the rate and the maturity of the debt is called the term structure of interest rates—or, more succinctly, the yield curve. The figure shows the yield curve for all types of bonds that make up the U.S. debt.



Between 1300 and 1799, now-rich European countries such as Austria, England, France, Germany (Prussia), Portugal and Spain all defaulted at least once on their sovereign debt. France and Spain led the pack, with eight and six default episodes each. The 19th century witnessed a surge of sovereign debt defaults and rescheduling in Africa, Europe and Latin America; Spain alone defaulted eight times.

Sometimes, countries default on their external creditors. Other times, governments default on their own citizens. In today's complex and interconnected world economy, which traits make us classify debt as internal or external? Consider the following relevant criteria. First, a government may issue debt in its own currency or debt denominated/indexed in some foreign currency. Second, debt may be held by residents or nonresidents. Third, debt may be adjudicated by local authorities or international institutions. Due to the degree of integration of today's capital markets, a country's debt likely will have both internal and external components.

Governments typically favor issuing debt in their own currency since this allows them to print money to repay it, if necessary. Generating revenue from newly printed money (a process known as seigniorage) to repay debt has been a recurrent practice for centuries and typically generates high inflation rates for a period of time. The financing of debt through inflation constitutes a form of (partial) default because the currency that is used to repay the debt decreases in value as prices increase.



For example, in World War II's aftermath (1946-48), the U.S. federal government implemented a policy of high inflation—10 percent annually on average—to reduce the burden of accumulated debt. Lee Ohanian, an economist at UCLA, estimated that the reduction of the real value of debt due to the increase in prices was equivalent to a repudiation of debt worth 40 percent of gross national product.<sup>6</sup>

However, printing money to repay debt carries a cost—inflation. A country can overuse seigniorage and create very high inflation rates, even hyperinflation. Some of the most notorious episodes in the 20th century include Germany and Hungary in the early 1920s, Bolivia in 1984-85, Argentina in 1989-90 and Zimbabwe in 2008.

Governments may alternatively issue debt denominated in foreign currency. This helps governments with a record of high inflation to increase their credibility with creditors, as the option to use seigniorage to repay the debt is no longer available. In fact, a country's credibility may be so low that it has no option but to issue debt in a more-stable foreign currency. However, a government may reach a point where it is no longer willing to tax its citizens to acquire the foreign currency necessary to meet its obligations, choosing instead to default. A good example is the Argentine sovereign debt default and restructuring in 2002.

Who holds the debt—residents or nonresidents—has an impact on the incentives to default. Clearly, it is politically more difficult for elected officials to default on residents because they can oust those representatives from office. However, defaulting on external creditors is not a “free lunch.” Countries can be barred from international capital markets until a satisfactory debt restructuring agreement has been reached. As with individuals, a bad credit history implies higher financing rates and lower borrowing ceilings.

Finally, where payment disputes are resolved is of paramount importance. A defaulting government is likely to have much more influence over local courts than foreign courts. Reinhart and Rogoff argue that the only absolute criterion when classifying debt as internal is that it be adjudicated by domestic authorities.

So, why and when do countries default? Often, default is driven by the markets' unwillingness to roll over existing debt or their willingness to do so only at a prohibitively high cost. This may occur because creditors believe the debt of a nation is high enough that the government may be unable to levy enough resources to repay its debt.

Thus, the higher the debt burden, the more likely a country is to default on its debt. However, the debt burden is not always a good predictor of default. For example, Brazil and Mexico defaulted in the early 1980s when their debt-to-GDP ratio was only 50 percent, whereas Japan has not defaulted in the postwar period, even though its debt burden has been over 100 percent since the mid-1990s and is currently 200 percent.

What this suggests is that creditors often refuse to roll over debt because they believe governments are unwilling—instead of unable—to tax citizens enough to meet debt obligations. In other words, creditors fear a country does not have the political will to raise taxes or cut spending in order to get its fiscal house in order.<sup>7</sup>

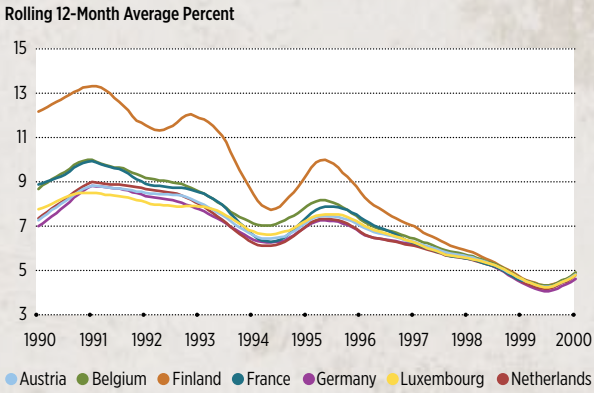
The sheer magnitude of the debt burden is, therefore, insufficient to predict default; other complementary indicators, such as sovereign ratings by international credit-rating agencies (S&P, Moody's, etc.) and the debt-to-exports ratio, need to be taken into account.

Although defaulting on sovereign debt is an age-old phenomenon, we have not seen an outright default by a developed nation since 1946. It is for this reason that the current financial crisis in Europe has caused such a stir. But European countries have been in debt for decades and with relatively high debt-to-GDP ratios. So why has this crisis surfaced now?

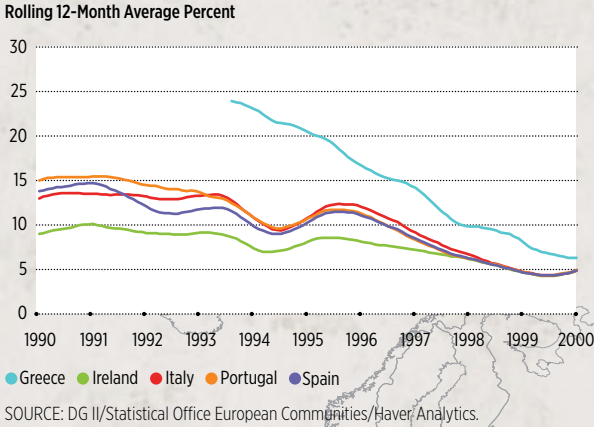
### The European Union and the Euro

Having fought two world wars on its own soil within a generation, Europe embarked on a strategy to ensure that war would never come to Europe again. A key element of that strategy was an integrated European economy and potentially a single currency. The belief was that the greater the economic integration of Europe, the less likely countries would go to war again. Thus, with the signing of the Treaty of Rome in 1957, the European Union (EU) was created, and Europe began the process of creating—if not politically, at least economically—the United States of Europe. Over the decades since, tariffs and capital controls were eliminated, free mobility of labor across borders was allowed and substantial fiscal transfers flowed from the north to the south for economic development. Then, in 1992, the Maastricht treaty was signed, which paved the way for the Economic and Monetary Union (EMU) and a single currency—the euro. The euro would be managed by a pan-European institution known as the European Central Bank (ECB).

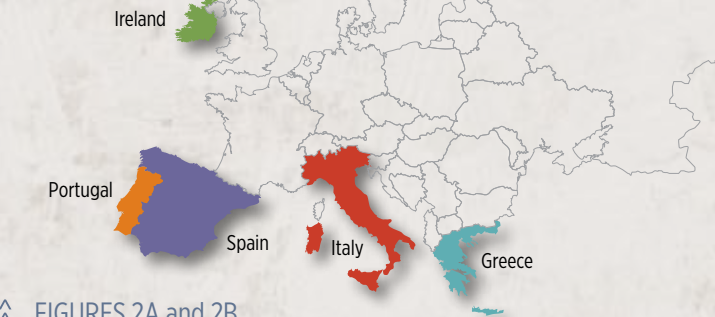
**FIGURE 2A**  
**Long-Term Interest Rates for the Original Eurozone Members except Portugal, Ireland, Italy and Spain**



**FIGURE 2B**  
**Long-Term Interest Rates for Portugal, Ireland, Italy, Greece and Spain (PIIGS)**



SOURCE: DG II/Statistical Office European Communities/Haver Analytics.



^ FIGURES 2A and 2B

In 1992, the Maastricht treaty was signed, paving the way for the Economic and Monetary Union and a single currency—the euro. At the time, economic performance of countries that wanted to belong to the EMU varied greatly. Membership required many countries to lower their long-term interest rates, inflation rates and other key indicators. As the figures show, progress was made on long-term interest rates by both groups of countries—the relatively fiscally healthy ones and those not-so-healthy ones, namely Portugal, Ireland, Italy, Greece and Spain, commonly called the PIIGS. Note, however, that the percentages in the vertical axes of the two figures vary considerably.



FIGURE 3A  
Annual Inflation

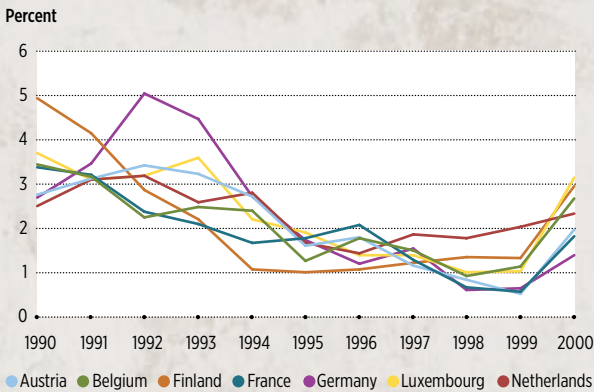


FIGURE 3B  
Annual Inflation (PIIGS)

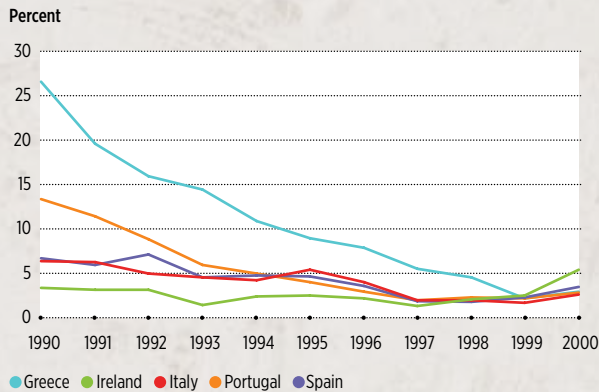


FIGURE 4A  
Government Deficit/GDP

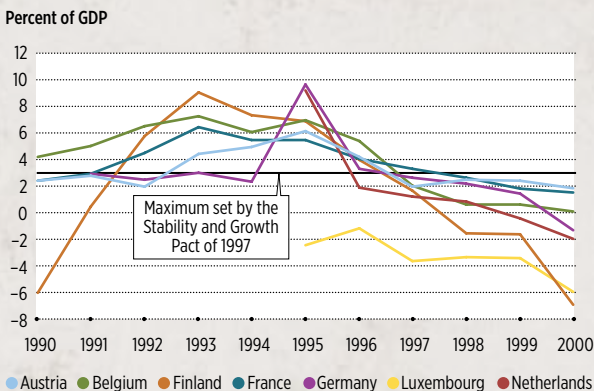


FIGURE 4B  
Government Deficit/GDP (PIIGS)

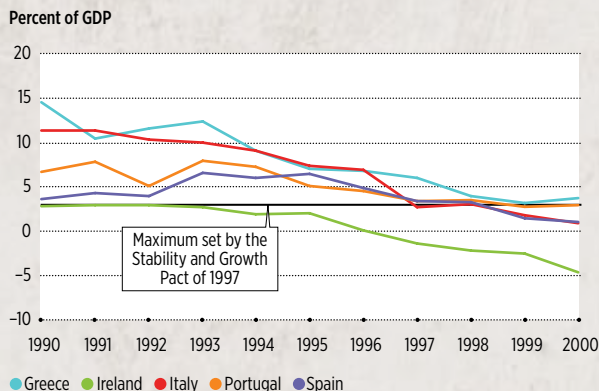


FIGURE 5A  
Gross Government Debt/GDP

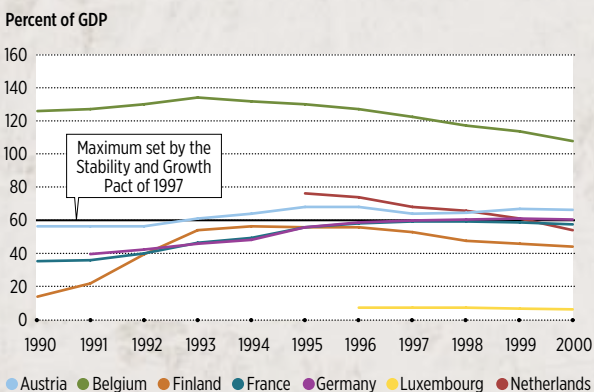
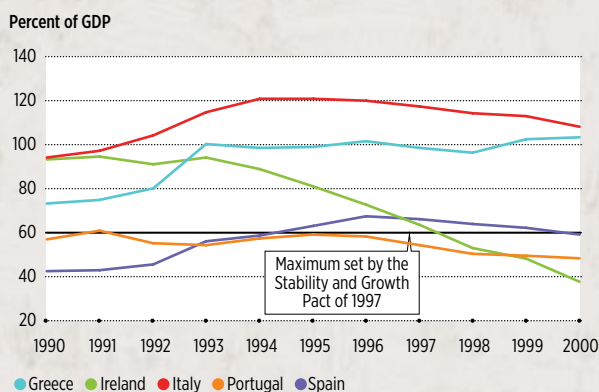


FIGURE 5B  
Gross Government Debt/GDP (PIIGS)



Economic performance of countries in the EU varied greatly. In order to ensure a smooth transition to a single currency, these differences had to be reduced. To speed the convergence of economic performance across EU members, three criteria were established to join the monetary union. First, a country’s long-term nominal interest rate had to be within 2 percentage points of the average rate of the three EU members with the lowest rates. Second, the inflation rate had to be within 1.5 percentage points of the average of the three EU members with the lowest inflation rates. Finally, a country had to join the exchange rate mechanism, which required maintaining the currency exchange rate within a narrow band for two consecutive years without a significant devaluation.

These criteria imposed economic discipline at the central banks of prospective members of the EMU. There was great success in meeting these measures by most of the countries that adopted the euro, as shown in Figures 2 and 3.

Nevertheless, there was great concern that if governments did not get their fiscal houses in order, there would be pressure on the new ECB to print money to finance spending by those governments.

Having experienced hyperinflation from signiorage creation, Germany was adamant that certain fiscal criteria had to be met to avoid this fate for all of Europe. Consequently, in 1997, the Stability and Growth Pact was signed. This pact added two criteria for prospective

members of the EMU. First, they were required to keep the ratio of their deficits as a fraction of GDP to 3 percent or less. Second, they were required to keep the ratio of their gross government debt to GDP at or below 60 percent. The idea was that the Stability and Growth Pact would impose economic discipline on governments of prospective euro members. This goal had varying degrees of success, as shown in Figures 4 and 5.

All told, there were five economic criteria that had to be met to join the EMU. Unfortunately, all of these criteria were to be met only prior to joining the EMU—once a country joined, fiscal discipline vanished.

A constant concern in the 1990s for those studying the EU process was how to handle a secession or ouster of a country from the EMU or EU. Many argued that the Maastricht treaty needed to lay out contingency plans for such an event. However, for political reasons, this was not to be discussed. The idea of making plans for the breakup of a union before it even started seemed ludicrous. In short, you can’t talk about divorce on your wedding night! Alas, as often happens in marriage, this lack of planning would come back to haunt the EU.

The Start of the EMU and Greece’s Shaky Entry

The euro was officially launched in 1999 as a unit of account, with actual notes and coins being issued in 2002. There were 11 initial members of the EMU; member countries form the euro area, which is more commonly referred to as the eurozone. Greece was not a member, even though it wanted entry. It was initially denied entry to the EMU in 1998 but won entry in 2000 and joined the eurozone in 2001.

Greece was denied entry in 1998 because it had met *none* of the economic criteria laid out in the Maastricht treaty or the Stability and Growth Pact. In 1997, Greece had high inflation (5.4 percent), very high long-term interest rates (9.9 percent), it did not participate in the exchange rate mechanism, its deficit-to-GDP ratio was 6 percent and its debt-to-GDP ratio was a whopping 98.7 percent.<sup>8</sup> However, many of the initial eurozone members did not meet the fiscal criteria either, as shown in Figures 4 and 5.

Nevertheless, several of the potential eurozone members were moving in the right direction. Italy, for example, had lowered its deficit-to-GDP ratio from 11 percent in 1990 to only about 1 percent in 2000, while lowering its debt-to-GDP ratio from a peak of 121 percent in 1994 to under 110 percent in 2000. Belgium, despite having



SOURCE: International Monetary Fund, World Economic Outlook database, April 2012.



FIGURE 6A

Government Deficit/GDP

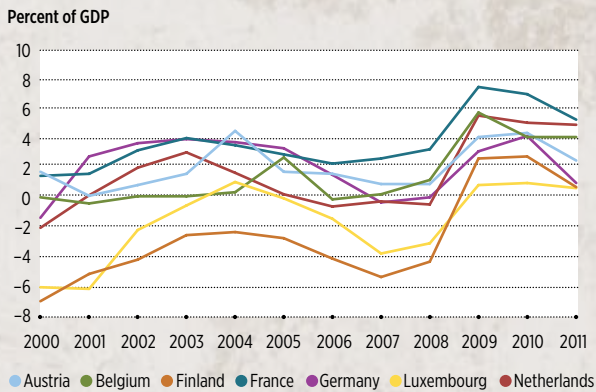
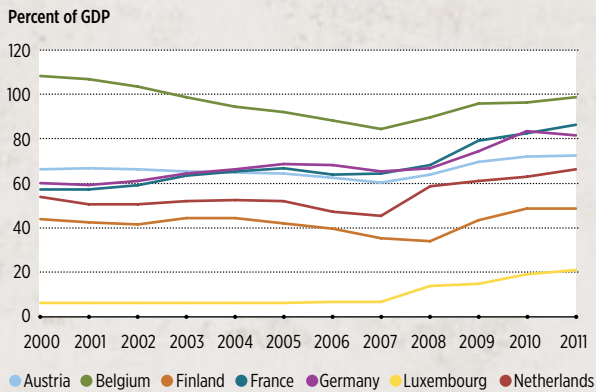


FIGURE 7A

Gross Government Debt/GDP



SOURCE: International Monetary Fund, World Economic Outlook database, April 2012.  
NOTE: 2011 data for Greece, Portugal, Finland and France are estimated.

FIGURE 6B

Government Deficit/GDP (PIIGS)

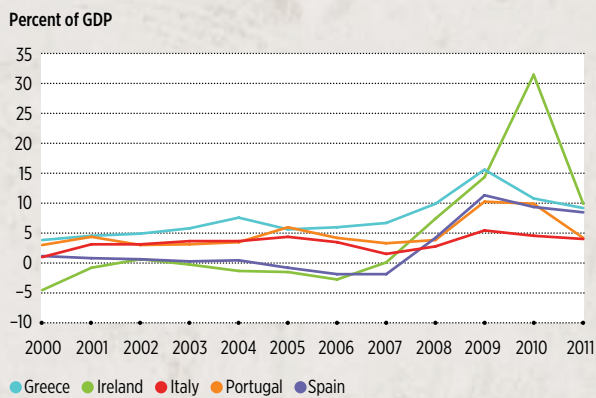


FIGURE 7B

Gross Government Debt/GDP (PIIGS)

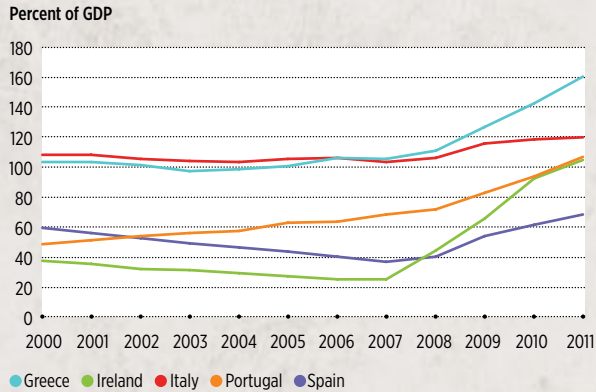
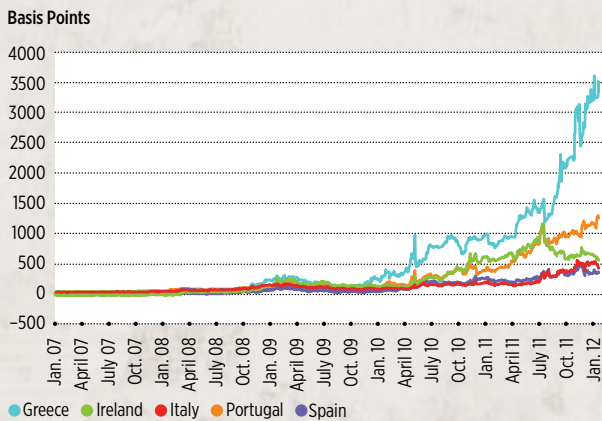


FIGURE 8

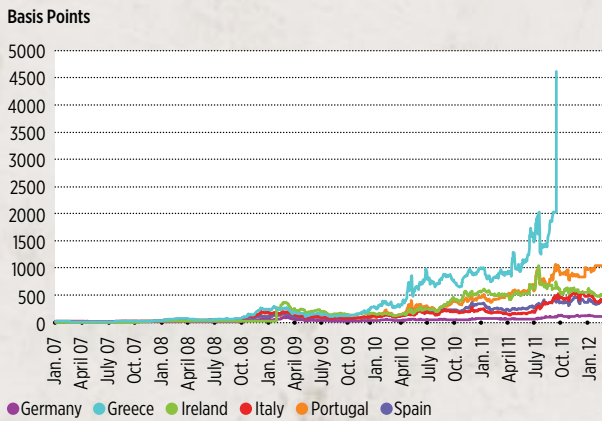
Yield Spreads between PIIGS' and Germany's 10-Year Bonds



SOURCE: Reuters/Haver Analytics.

FIGURE 9

Credit Default Swap Prices on Germany's and PIIGS' 10-Year Bonds



SOURCE: Bloomberg.

the highest debt-to-GDP ratio in Europe, had lowered it from 126 percent in 1990 to 108 percent in 2000. Most surprising, the “Celtic tiger,” Ireland, had lowered its debt-to-GDP ratio from 94 percent to 38 percent over the same period. Thus, the general assessment was that, despite failing to meet the criteria in the Stability and Growth Pact, these countries were doing the right thing and would eventually meet the criteria.

What about Greece? As the data show in Figure 5B, Greece was moving in the wrong direction. Its debt-to-GDP ratio increased from 73 percent in 1990 to 103 percent in 2000. But the euphoria of creating a single currency to compete with the U.S. dollar led to the decision to let Greece into the eurozone.

Upon joining the EMU, Greece saw its inflation rate converge to that of the rest of Europe, which is not surprising in a currency union. Somewhat more surprising is that the interest rate on long-term Greek debt converged to the rate paid by Germany and France. The same held for the debt of Spain, Italy, Ireland and Portugal.

Thus, financial markets came to view the sovereign debt of eurozone members as being perfect substitutes despite the absence of a fiscal union and dramatically different fiscal positions of euro members. If the probability of default was the same for each country, then the convergence of inflation rates would justify having equivalent interest rates on long-term debt. But given the disparity in fiscal positions, the probability of default was not the same for all countries, and interest rates should have reflected this. The ability to borrow at the

same rate of interest as Germany induced some European countries to borrow substantially in international financial markets, notably Portugal, whose debt-to-GDP ratio went from 48 percent in 2000 to 72 percent in 2008.

Again, if investors have confidence that a country will repay its debt, then the rollover problem becomes irrelevant. However, if some type of “shock” occurs that shakes investor confidence, the rollover problem can rear its ugly head and create havoc for governments.

Greece, Ireland and Portugal

The fiscal situation in several eurozone countries has deteriorated significantly since 2008. Figures 6 and 7 show deficit-to-GDP and debt-to-GDP ratios for selected countries.

In the summer of 2009, a new Greek government took power. At the time, Greece was believed to have a deficit-to-GDP ratio of just under 4 percent while its debt-to-GDP ratio was about 125 percent. After inspecting the tax and spending data, the new government realized that the statistics were flawed. The deficit-to-GDP ratio was not just under 4 percent but rather just under 16 percent! Although everyone suspected the Greeks were misleading the markets with their fiscal numbers, no one thought it was this severe.

At the same time, Ireland was beginning to incur the true cost of bailing out its banking system during the 2007-08 financial crisis. In 2007, Ireland's debt-to-GDP ratio was just 25 percent, and its deficit was zero. By 2010, Ireland's debt-to-GDP ratio was 93 percent, and its deficit-to-GDP ratio was over 30 percent.

The fiscal shocks hitting these two small countries woke up the financial markets to the risk of default on sovereign debt. No longer did financial markets view European debt as perfect substitutes for one another. Markets began incorporating default risk into the interest rates charged to governments to roll over their debt. This is shown in Figure 8. Between January 2008 and January 2012, the spreads between Greek and German debt increased about 3,300 basis points, while the spread between Irish and German debt jumped to about 550 basis points (peaking at 1,164 basis points in July 2011).

In addition, the change in default risk was reflected in the prices of credit default swaps (CDS) on sovereign debt—essentially an insurance policy against default. If the government defaults on its debt, whoever sells the credit default swap is responsible for covering the government's debt obligation to the buyer of the CDS. The

<< FIGURES 6A-7B

After the financial crisis gained steam in 2008, the financial situation in many eurozone countries deteriorated significantly, as can be seen in their deficit/GDP and debt/GDP ratios.

<< FIGURES 8 and 9

Until late 2008, financial markets treated the debt of all eurozone members the same, no matter that some countries had their fiscal houses in order (Germany, for example) and others didn't (Greece and the other so-called PIIGS countries). Once the deteriorating fiscal condition of Greece and Ireland became well-known, the markets began to incorporate default risk into the interest rates charged to governments to roll over their debt. Hence, the spreads between what Germany paid on 10-year bonds, for example, widened greatly over what the less frugal countries had to pay. The same happened with credit default swap prices.





# Austerity

In response to increasing interest rates, the Greek and Irish governments began discussing or implementing unpopular austerity measures to get their fiscal houses in order. ... Although this sounds like good news from the markets' point of view, the severity of the measures also suggested that voters in Greece or Ireland might revolt and decide to default rather than bear the costs of austerity. Alas, there is no magic elixir to deal with the burden of debt that is accumulated over decades.

price demanded by a CDS seller reflects the probability of default—the higher the probability of default, the higher the price charged to acquire the insurance. The CDS prices for various European countries are shown in Figure 9. As the data show, CDS prices skyrocketed for Greece and Ireland (and Portugal, as we shall discuss below), reflecting an increased fear of default.

In response to increasing interest rates, the Greek and Irish governments began discussing or implementing unpopular austerity measures to get their fiscal houses in order. Through a combination of tax increases and reductions in spending, Greece's deficit-to-GDP ratio fell from 16 percent in 2009 to a projected 8 percent for 2011; Ireland's fell from a peak 31 percent in 2010 to 10 percent in 2011.

Although this sounds like good news from the markets' point of view, the severity of the measures also suggested that voters in Greece or Ireland might revolt and decide to default rather than bear the costs of austerity. Alas, there is no magic elixir to deal with the burden of debt that is accumulated over decades.

Portugal is often thrown in when Greece and Ireland are discussed. Although the recent crisis has deteriorated Portugal's economic conditions, its issues are long-standing. For example, the unemployment rate has been rising since 2002, going from about 4 percent on average in 2000-01 to 8 percent in 2007. On the fiscal side, debt-to-GDP increased from 48 percent in 2000 to 68 percent in 2007, with a deficit that averaged about 3 percent of GDP. The financial crisis only made matters worse. In 2009-10, the deficit averaged 10 percent of GDP and debt-to-GDP had climbed to 93 percent. The unemployment rate continued to increase, reaching 12.5 percent in 2011:Q3. GDP contracted in late 2008 and throughout 2009, although growth resumed in 2010, as in most other developed countries. However, output again contracted in the first three quarters of 2011. As with Greece and Ireland, Portugal's government bond yields and CDS prices have increased substantially since early 2010. (See Figures 8 and 9.) Between January 2008 and January 2012, the spreads between Portuguese and German debt increased about 1,150 basis points.

## The EU Response to the Crisis

Greek banks hold about 20 percent of Greek sovereign debt (€60 billion), and a Greek default would dramatically weaken the balance sheets of these banks. Thus, markets stopped rolling over these banks' debt due to

fears that they would no longer be able to honor their obligations. This, in turn, meant that Greek banks could not roll over funding of Greek government debt.

EU leaders, seeing the gravity of the situation, decided in May 2010 to provide €500 billion in financing to the member countries facing difficulties rolling over their debt. The biggest contributors to the fund were Germany (€120 billion) and France (€90 billion).

Why would Germany and France be willing to transfer tax revenue from their citizens to Greece and Ireland? One reason is that other European banks also hold a significant amount of Greek and Irish debt. German banks hold 8 percent (about €24 billion) of Greek debt, and French banks hold about 5 percent (€15 billion) of Greek debt. EU leaders feared that a default on Greek and Irish debt would cause a serious deterioration in their own banks' values and that a bank run would ensue.

However, Greece and Ireland are very small economies—Greece's GDP (measured in U.S. dollars) was about \$300 billion in 2010, while Ireland's was approximately \$200 billion. Their combined GDP is less than the GDP of Pennsylvania. It seems hard to believe that a concern over Pennsylvania's state debt would roil world financial markets and frighten U.S. leaders. How is it that the debt problems of two small countries could create so much havoc that the entire EU would intervene? Wouldn't it be easier and cheaper for the German and French governments to just buy the Greek and Irish debt held by their banks?

Greece and Ireland (and Portugal) were not really the problem. They were merely a wake-up call to the very large debt burdens of large European economies, such as Italy and Spain.

Italy has about €1.9 trillion of debt outstanding, of which 50 percent is held externally. Furthermore, Italy needs to roll over more than €300 billion of debt in 2012, an amount greater than the entire Greek debt! Complicating matters is the fact that Italy has had essentially zero economic growth over the past decade; thus, it has not been able to reduce its debt burden through income growth. Consequently, Italian debt per capita is the second-highest in the world. The debt is particularly burdensome: Italy spends about 5 percent of GDP on interest payments, 2 percentage points more than the euro area average and what the U.S. pays. Combine this with an aging population and a birth replacement rate of 1.4, and it is clear why financial markets became alarmed about the possibility of a default on Italian government debt.<sup>9</sup> As a result, the interest rates on Italian

debt soared to 7 percent in late 2011 in order to induce investors to roll over their holdings of Italian government debt.

Similarly, Spain's public debt has reached about €735 billion. Roughly a quarter of these obligations are short-term (i.e., mature in less than a year). Spain enjoyed an auspicious run in the first half of the 2000s. Government debt decreased steadily, the product of a growing primary surplus. GDP was growing at an annual rate of 3.6 percent on average before the 2008 crisis hit. Its troubled labor market showed continuous improvement, with the unemployment rate reaching 8 percent in mid-2007, down from 15 percent at the beginning of 2000.

Since late 2008, Spain's economic conditions have deteriorated substantially. Debt and deficits grew enormously: The deficit averaged 10 percent of GDP in 2009-10, and debt surpassed its 2000 levels, undoing about a decade of steady decline. Output growth has remained tepid, below an annual rate of 1 percent. Most discouraging, the unemployment rate has soared back to a level we have not seen since the mid-1990s. As of the third quarter of 2011, the unemployment rate was about 22 percent. As with Italy, interest rates on debt have been increasing steadily since early 2008.

It became clear in 2011 that the initial round of assistance from the EU for sovereign debt funding would not be enough if the markets stopped rolling over the debt of Italy and Spain. Therefore, an additional €340 billion of funding was provided.

In December of 2011, the ECB poured liquidity into the banking system to try to stem the crisis. It did so by committing to provide up to €1 trillion of funding to banks for up to three years. The hope was this action would calm financial markets and ease short-term funding problems for the governments facing rollover pressure. These actions have been very successful to date, as short-term interest rates have declined substantially. However, interest rates beyond three years have not declined much. This suggests the ECB has given European governments three years of breathing room to make the appropriate fiscal adjustments. Nevertheless, the adjustments must be made.

Only time will tell whether these actions will be sufficient to finally end the sovereign debt crisis in Europe.

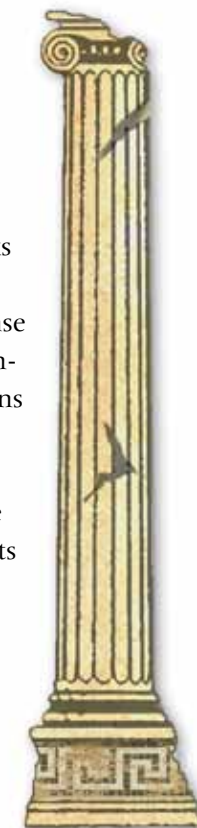
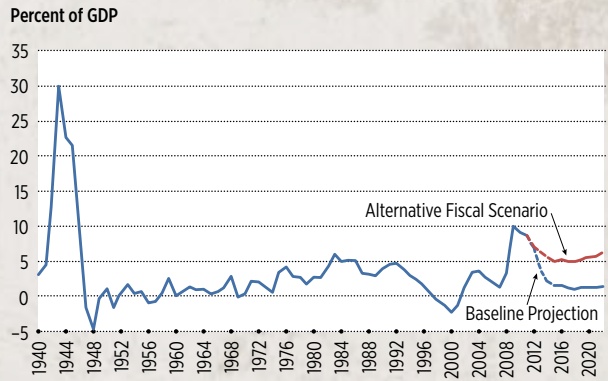




FIGURE 10

U.S. Federal Deficit



SOURCE: Congressional Budget Office.

FIGURE 10

The U.S. federal deficit is higher than it's been since the end of World War II. The two projections are from the Congressional Budget Office. The baseline projection assumes current tax cuts will be allowed to expire. The alternative mostly assumes the extension of these tax provisions. The projections are as of March 2012. The years are fiscal years.

On March 9, 2012, four-fifths of Greece's private creditors agreed to a bond swap. This debt restructuring will reduce obligations by €100 billion, about half the face value of eligible bonds. Given that some creditors will be forced to exchange their bond holdings, this event has triggered the payment of credit default swaps on Greek debt. The default will impose severe losses on domestic banks, which, as mentioned above, hold a substantial fraction of Greek debt.

The Situation in the U.S.

As the economic situation in Europe has deteriorated, the U.S. has been going down its own rocky path. In response to the recession following the recent financial crisis, the U.S. government has been running deficits of a magnitude not seen since World War II. (See Figure 10.) These deficits are the result of both lower revenue and higher expenditure, the latter mostly due to increases in income security programs (e.g., unemployment benefits) and Social Security, Medicare and Medicaid payments. As a consequence, total debt from all levels of government went from 53 percent of GDP in 2007 to 84 percent in 2011.

Despite the large increase in debt, U.S. bond yields have remained low (about zero for 3-month and 1-year bonds) throughout this episode. In part, the reason is "flight to quality." As investors have reduced their exposure to troubled private asset markets (e.g., mortgages) and risky sovereign debt (e.g., Greece, Ireland and Portugal, but also Italy and Spain), the demand for U.S. Treasuries has soared. Germany, Japan and the U.K. have also experienced a decline in government bond yields due to increased demand.

Regardless of how the European situation gets resolved, the U.S. faces its own challenges. According to the latest baseline projections from the Congressional Budget Office (CBO), federal debt held by the public will go from 68 percent of GDP in 2011 to 71 percent of GDP in 2016, reaching a peak of 76 percent of GDP in 2013. Interest payments on the debt will go from 1.5 percent to 1.8 percent of GDP over the same period. Under an alternative fiscal scenario—which mostly assumes the extension of expiring tax provisions—the CBO projects that debt held by the public would rise to 83 percent of GDP by 2016.

No matter which budget outlook prevails, the U.S. will have to decide whether it is comfortable maintaining a larger stock of debt, with its associated higher

financial burden, or prefers to return to levels that are more normal by historic standards. Either way, there will be a need for higher taxation and stronger incentives for inflation. The CBO currently estimates that federal tax revenue will increase by about 5 percentage points of GDP between 2011 and 2016 if current tax legislation is carried out.<sup>10</sup> Under the alternative fiscal scenario, this increase would be cut in half.

Compounding this situation is the outlook for expenditures. Since the 1950s, transfers—Social Security, Medicare, Medicaid, etc.—have been steadily growing as a share of federal outlays. Currently, transfers represent about two-thirds of expenditures net of interest payments. As a comparison, defense spending is about a fifth of all expenditures. By 2016, transfers are projected to be at 14 percent of GDP, and total outlays before interest payments will reach 23 percent of GDP.

In summary, the U.S. faces difficult fiscal choices. Taxes have to be raised and/or spending must be cut. The pain associated with these actions will fall on different groups, and that leads to political conflict. Political conflict means delay in getting the U.S. fiscal situation on firmer ground. Whether this conflict will scare financial markets and lead to a rollover crisis for the U.S. remains to be seen.

Conclusion

So what is the moral of this modern debt tragedy? As is the case with any form of debt, the ability to borrow from the future to finance current consumption can be tremendously beneficial. For example, the U.S. debt incurred to finance World War II helped free the world from fascism and Nazism, thereby setting the stage for the spread of democracy around the world. Most would agree that borrowing in this instance generated large benefits for the entire world. Therefore, public debt can be used to achieve good outcomes for society.

However, the tragedy of this story is that borrowing, by its very nature, is seductive—the rewards are felt immediately and the pain is postponed to the future. Thus, it is very tempting for government leaders, much like individuals and households, to push the envelope of borrowing to obtain current pleasure while downplaying the pain that will come. As a result, debt burdens can rise to levels that eventually become unsustainable, leading to crisis and periods of severe austerity. The world has moved into such an era now, and the final act of this modern tragedy is yet to come.

ENDNOTES

- <sup>1</sup> This figure corresponds to what is known as "debt held by the public." The U.S. "gross debt," which includes holdings by federal agencies—i.e., money that the government owes to itself—was about \$15 trillion by the end of fiscal year 2011.
- <sup>2</sup> Since the U.S. is a democracy that chooses its government representatives from its own citizenry, we refer to the debt accumulated by the government as the "national debt" or "the debt of the nation." In the past, when monarchies were the main form of government, the debt was referred to as "sovereign debt" since it was debt accumulated by the monarchy as opposed to the nation's citizens. Today, the terms "national debt," "government debt" and "sovereign debt" are all conceptually the same and are used interchangeably.
- <sup>3</sup> Barro, Robert J. "On the Determination of the Public Debt," *Journal of Political Economy*, October 1979, 87(5), pp. 940-971.
- <sup>4</sup> Note that default on sovereign debt is hardly ever full and absolute. Most of the time, payments are suspended for a while (it can be a very long while), and restructuring takes place. This process typically involves both a reduction in total commitments and a rescheduling of payments.
- <sup>5</sup> Reinhart, Carmen M.; Rogoff, Kenneth S. *This Time Is Different*. Princeton University Press, 2009.
- <sup>6</sup> Ohanian, Lee. *The Macroeconomic Effects of War Finance in the United States: Taxes, Inflation, and Deficit Finance*. New York, Garland Press, 1998.
- <sup>7</sup> This was the reason given by Standard & Poor's for downgrading U.S. debt in August 2011.
- <sup>8</sup> We use definitions consistent with the Maastricht treaty. Thus, fiscal accounts cover all levels of government, i.e., central, local and social security. "Debt" is defined as "gross debt," which includes currency and deposits, securities (i.e., bonds) and loans.
- <sup>9</sup> The replacement rate is the number of children born to each woman in a country. Ignoring immigration, a country's population will shrink if the replacement rate is less than 2 for an extended period of time. A shrinking population means a smaller future pool of workers to tax.
- <sup>10</sup> This is mainly due to the expiration of tax provisions enacted in 2001, 2003 and 2009 and extended in 2010.



Sovereign Debt:  
A Modern  
Greek Tragedy

You've read the essay.  
Now, watch the video.



Go online to watch a 10-minute  
video of the authors of this essay as  
they discuss their key points. See  
[stlouisfed.org/publications/ar](http://stlouisfed.org/publications/ar)



# Our Work. Our People.

Our nation's central bank, the Federal Reserve, has three main components: the Board of Governors, the Federal Open Market Committee and the 12 Reserve banks around the country, including the Federal Reserve Bank of St. Louis. This decentralized structure helps to ensure that the diverse views and economic conditions of all regions of the country are represented in monetary policymaking.

The St. Louis Fed was established in 1914. It oversees the Eighth Federal Reserve District, which is made up of Arkansas and parts of Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee. At the St. Louis Fed, economists support the Bank president and constituents by conducting regional, national and international economic research. Other staff members supervise financial institutions to help ensure their safety and soundness. Financial services are provided to District banks and the U.S. Treasury to keep the nation's payments system running efficiently. The Bank produces

financial and economic education for primary and high school students and teachers, as well as workshops and conferences for college professors, business people and the general public. The St. Louis Fed also works within communities to foster innovation and partnerships in community development. The District's board of directors provides governance oversight of management and approves management's allocation of resources to the Bank's major activities.

The numbers that follow provide a glimpse of our work and our people in 2011.



**956 employees**, the majority of whom work at the District's headquarters in St. Louis, with staff also located at the branches in Little Rock, Louisville and Memphis. Turnover for the year was 4.8 percent.

IT employees Karthik Nachiappan and Shawn Brown in a server room.

**112 state-chartered banks** were under our supervision, up seven from 2010 and up 33 from a decade ago. No state member bank has failed since the onset of the financial crisis in 2007. (In fact, no member bank has failed since the early 1990s.)

**196 meetings held with bank CEOs** to discuss local economic conditions and monetary policy developments impacting markets.

**9,100** business and industry leaders, as well as members of the general public, attended **146 speeches** given outside the Bank by Bank executives.



Above, Kathy Cosgrove (left) and Deon Anderson of the Bank's library clean up at a downtown St. Louis church after helping to serve a meal to the homeless.

Many employees volunteer their free time to serve those in need throughout the community. Many of these efforts are organized by a Bank group called Fed Employee Volunteer Resources (FEVR).

To the right, Chris Gelsinger of the Banking Supervision and Regulation division helps to build a house for Habitat for Humanity.



Kathy Cowan of the Community Development office in the Memphis Branch of the Bank and Glenda Wilson (foreground), the Community Affairs Officer for the St. Louis Fed, work to ensure that underserved communities have fair access to credit.

**71,575 hours** were devoted to turning innovation into action in Community Development's 10,000-Hour Challenge. The challenge encouraged community development professionals to collectively dedicate themselves to 10,000 hours of innovation. For example, a Montana-based housing developer contributed 4,300 hours during construction of a sustainable, affordable housing development registered for LEED gold certification.

**17.7 million page views** to all online sites of our Research division. These sites include that of our signature economic database, FRED® (Federal Reserve Economic Data), as well as those sites for our publications.



In addition, there were more than **15 million hits** to the RePEc (Research Papers in Economics) database, which the St. Louis Fed started hosting in 2011.

Besides speaking at meetings and conferences inside and outside the Bank, **President James Bullard** participates often in media interviews in order to share his views with a wide audience.



Cash and canned goods equal to **131,925 cans** of food were donated by employees to a local food bank during the St. Louis Fed's annual food drive, bringing the total to over **1 million** since this event began at the St. Louis Fed in 1994.



Among our Research economists: Luciana Juvenal, Michael Owyang, Maria Canon, Daniel Thornton and Subhayu Bandyopadhyay.

**41 working papers** and **41 articles published** or accepted for publication in peer-reviewed journals by our **27 economists** in the Research division and Office of the President. These economists' works were cited more than **700 times** by other authors in peer-reviewed articles published in 2010 (the most recent year for which this number is available).



16,632 guests

attended **724 meetings** or conferences in our Gateway Conference Center.



Students from nine universities in four states gathered for a “Day at the Fed” held at the Bank. They learned about the Fed, including about job opportunities.



**\$105 billion:** the dollar value of all currency deposited by financial institutions into the St. Louis Fed’s vaults plus the dollar value of all currency ordered by financial institutions from the St. Louis Fed.



Fred the Frugal Eagle makes appearances periodically in area classrooms to encourage children to save and to learn about personal finance.

1,381,899 page views

of our econ ed web site, where podcasts, videos, online courses and other lessons on basic economics and personal finance are tailored for a variety of audiences: teachers at all levels, students at all levels and the general public.



Scott Wolla of the economic education department stars in many videos that help explain basic economic concepts.

**37,969 students** around the country enrolled in the Bank’s online economic education courses.

**\$233,515 raised** by employees during the annual United Way campaign.



**8,502 people** were following the St. Louis Fed on Twitter at the end of the year.

DIALOGUE  
WITH  
THE FED  
*Beyond Today's Financial Headlines*

**507 people** attended or watched via webcast three *Dialogue with the Fed* events, a new program that offers the general public an opportunity to discuss current financial topics with Fed experts.

One of our speakers, William R. Emmons, an economist in Banking Supervision and Regulation.



**121,455 page views** for our Regulatory Reform Rules web site, where people can track the Dodd-Frank Act rulemaking process.



**3.8 billion total notes processed** (counted, sorted, culled and authenticated)



64,899

**Total number of subscribers** (print and otherwise) to our publications.





CHAIRMAN’S MESSAGE



Serving on the board of directors of the Federal Reserve Bank of St. Louis has been a tremendous learning experience these past 3½ years. To be chairman of the board is both a great honor and responsibility.

My journey with the Fed began at my first board meeting in September of 2008 when Chairman Ben Bernanke was coincidentally visiting the St. Louis Fed. The weekend following this board meeting was when Lehman Brothers went bankrupt, and by the time I attended my second Fed board meeting, 30 days later, the System-wide balance sheet had grown by over \$1.5 trillion.

I have learned quite a bit about our Bank since then. First is understanding the critical impact the Federal Reserve System has on our nation and the world, as well as understanding the St. Louis Fed’s role in that System. The dramatic easing of monetary policy in the fall of 2008 averted, in my opinion, an economic depression. This courageous and effective response to the financial crisis was due to the independence of the Fed and the wisdom of its leadership. The St. Louis Fed plays a key role in both. By representing “Main Street,” the St. Louis Fed, along with its peer banks, provides the Board of Governors of the Federal Reserve System a local voice and legitimacy to counter tendencies to centralize and, hence, politicize monetary decision-making out of Washington, D.C. There is broad consensus that monetary policy needs to be independent from political pressures if it is to be effective and credible. The district banks, such as the St. Louis Fed, play a key role in ensuring this independence.


Beyond preserving independence, the 12 regional banks provide economic input from the local level—real-time, contextual information—from which the Federal Open Market Committee (FOMC) can wisely judge the state and mood of the economy, a perspective that is critical for effective monetary policy.

It is important to note the additional broad range of critical services the St. Louis Fed provides:

- As a world leader in economic research, the Bank makes possible vital understanding of the economy, knowledge that frames and illuminates decision-making on monetary policy;
- The Bank is a key service provider to the U.S. Treasury, coordinating a number of programs at the Treasury Department on behalf of the entire Federal Reserve System;
- The St. Louis Fed is a primary regulator of banking institutions in our geography, providing professional independent oversight to more than 100 banking entities in seven states; and
- Finally, the St. Louis Fed plays a contributing role in educating various local constituencies on the workings of the U.S. financial system, an understanding that has become increasingly important and sought after by our citizens during these stressful economic times.

The board of directors’ responsibility is to provide objective and experienced operational oversight over all of the above activities, as well as to provide input on local economic conditions. It is from that perspective that the board acknowledges the tremendous talent of all of those who work for the St. Louis Fed. The Bank runs like a well-managed business. It is a performance-based culture with a well-trained and well-educated workforce and with clear objectives and metrics to measure results.

On behalf of the board, thank you to all St. Louis Fed employees for serving our citizens so well.

Sincerely,  
  
Ward M. Klein  
Chairman of the Board of Directors

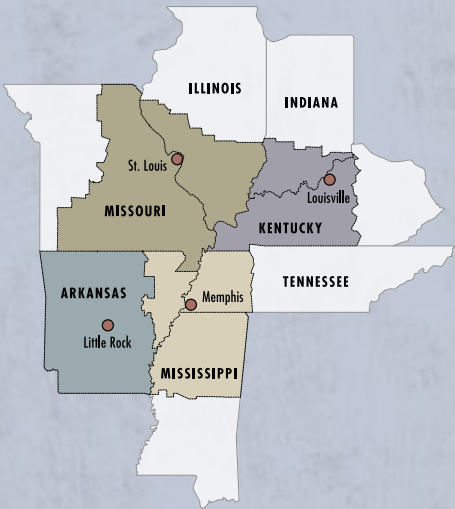
Boards of Directors  
Advisory Councils  
Bank Officers

We bid farewell and express our gratitude to those members of the boards of directors and of our advisory councils who retired recently.

From the Boards of Directors	From the Industry Councils
<b>St. Louis</b> Steven H. Lipstein J. Thomas May	<b>Health Care</b> Sister Mary Jean Ryan
<b>Little Rock</b> Phillip N. Baldwin Robert A. Young III	<b>Real Estate</b> John J. Miranda David W. Price
<b>Louisville</b> John C. Schroeder	<b>Transportation</b> Roger Reynolds

On the following pages are board members from each of the four offices: St. Louis, Little Rock, Louisville and Memphis. On each page are photos of a sampling of industries that are important to those particular areas of the District.

All those listed on the following pages are current officeholders.



The Eighth Federal Reserve District is composed of four zones, each of which is centered around one of the four main cities: Little Rock, Louisville, Memphis and St. Louis.



St. Louis Board



**Chairman**  
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CEO  
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St. Louis



**Deputy Chairman**  
**Sharon D. Fiehler**  
Executive Vice President  
and Chief Administrative Officer  
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St. Louis



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Partner  
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Independent Bank  
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Little Rock Board



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and Chief Operating Officer  
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Little Rock, Ark.



**William C. Scholl**  
President  
First Security Bancorp  
Searcy, Ark.



**C. Sam Walls**  
CEO  
Arkansas Capital Corp.  
Little Rock, Ark.



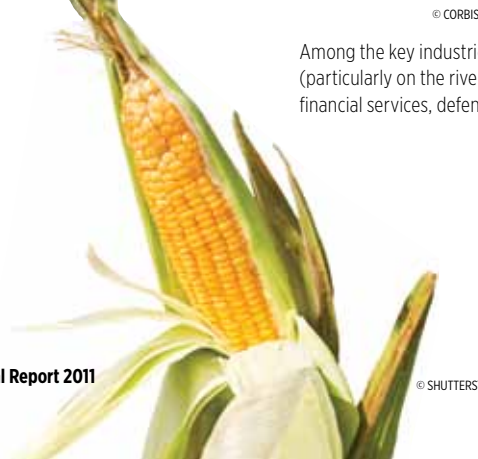
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Among the key industries in the St. Louis Zone of the Eighth District are transportation (particularly on the rivers), agriculture (and related specialties, such as bio-ag and bio-tech), financial services, defense and health care.



**Robert Hopkins**  
**Regional Executive**  
Little Rock Branch  
Federal Reserve Bank of St. Louis



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Major industries in the Little Rock Zone include agriculture (particularly rice), discount retail, energy (including the extraction of natural gas from shale) and aviation/aerospace.



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# Louisville Board



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**Barbara Ann Popp**  
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President  
The Malcolm Bryant Corp.  
Owensboro, Ky.



**David P. Heintzman**  
Chairman and CEO  
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Louisville, Ky.



**Jon A. Lawson**  
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**Gerald R. Martin**  
Vice President  
River Hill Capital LLC  
Louisville, Ky.



**Gary A. Ransdell**  
President  
Western Kentucky University  
Bowling Green, Ky.



**Kevin Shurn**  
President and Owner  
Superior Maintenance Co.  
Elizabethtown, Ky.

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Managing Member  
Blatteis Law Firm PLLC  
Memphis, Tenn.



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President of the Mississippi University  
for Women Foundation  
and Vice President for University  
Relations and Advancement at MUW  
Columbus, Miss.



**Roy Molitor Ford Jr.**  
Vice Chairman and CEO  
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Memphis, Tenn.



**Mark P. Fowler**  
Vice Chairman  
Liberty Bank of Arkansas  
Jonesboro, Ark.



**Lawrence C. Long**  
Partner  
St. Rest Planting Co.  
Indianola, Miss.



**Clyde Warren Nunn**  
Chairman and President  
Security Bancorp of Tennessee Inc.  
Halls, Tenn.



**Charlie E. Thomas III**  
Regional Director  
of External and Legislative Affairs  
AT&T Tennessee  
Memphis, Tenn.



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In the Louisville Zone, auto assembly plants and parts suppliers make up a critical industry. Health care (including pharmaceuticals) is also a major contributor, as are the appliance industry and coal mining.



**Maria G. Hampton**  
**Regional Executive**  
Louisville Branch  
Federal Reserve Bank of St. Louis



**Martha Perine Beard**  
**Regional Executive**  
Memphis Branch  
Federal Reserve Bank of St. Louis



The auto industry is growing in the Memphis Zone, right alongside such traditional drivers of the economy as cotton, paper and shipping.



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INDUSTRY COUNCILS

Council members represent a wide range of Eighth District industries and businesses and periodically report on economic conditions to help inform monetary policy deliberations.

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ADVISORY COUNCIL

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Southwest Tennessee  
Development District  
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Founder, Memorial Community  
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University of Missouri  
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IFF (formerly Illinois Facilities Fund)  
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COMMUNITY DEPOSITORY  
INSTITUTIONS ADVISORY COUNCIL

The members of this council, formed in 2011, meet twice a year to advise the Bank's president on the credit, banking and economic conditions facing their institutions and communities. The council's chairman also meets twice a year in Washington, D.C., with his counterparts from the 11 other Fed districts and with the Federal Reserve chairman.

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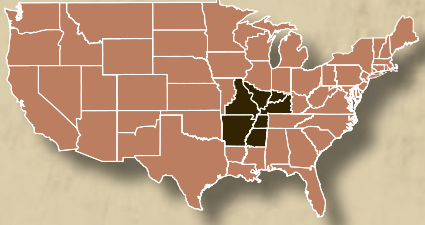


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