



# An In-Depth Look at Deleveragings

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The purpose of this paper is to show the compositions of past deleveragings and, through this process, to convey in-depth, how the deleveraging process works.

The deleveraging process reduces debt/income ratios. When debt burdens become too large, deleveragings must happen. These deleveragings can be well managed or badly managed. Some have been very ugly (causing great economic pain, social upheaval and sometimes wars, while failing to bring down the debt/income ratio), while others have been quite beautiful (causing orderly adjustments to healthy production-consumption balances in debt/income ratios). In this study, we are going to review the mechanics of deleveragings by showing how a number of past deleveragings transpired in order to convey that some are ugly and some are beautiful. What you will see is that beautiful deleveragings are well balanced and ugly ones are badly imbalanced. The differences between how deleveragings are resolved depend on the amounts and paces of 1) debt reduction, 2) austerity, 3) transferring wealth from the haves to the have-nots and 4) debt monetization. What we are saying is that beautiful ones balance these well and ugly ones don't and what we will show below is how.

Before we examine these, we will review the typical deleveraging process.

## The Typical Deleveraging Process

Typically, deleveragings are badly managed because they come along about once in every lifetime and policy makers haven't studied them. As a result, they usually set policies like blind men trying to cook on a hot stove, through a painful trial and error process in which the pain of their mistakes drives them away from the bad moves toward the right moves. Since everyone eventually gets through the deleveraging process, the only question is how much pain they endure in the process. Because there have been many deleveragings throughout history to learn from, and because the economic machine is a relatively simple thing, a lot of pain can be avoided if they understand how this process works and how it has played out in past times. That is the purpose of this study.

As previously explained, the differences between deleveragings depend on the amounts and paces of 1) debt reduction, 2) austerity, 3) transferring wealth from the haves to the have-nots, and 4) debt monetization. Each one of these four paths reduces debt/income ratios, but they have different effects on inflation and growth. Debt reduction (i.e., defaults and restructurings) and austerity are both deflationary and depressing while debt monetization is inflationary and stimulative. Ugly deleveragings get these out of balance while beautiful ones properly balance them. In other words, the key is in getting the mix right.

Typically, in response to a debt crisis the going to these four steps takes place in the following order:

- 1) At first, problems servicing debt and the associated fall off in debt growth cause an economic contraction in which the debt/income ratios rise at the same time as economic activity and financial asset prices fall. We will call this phase an “ugly deflationary deleveraging”. Debt reduction (i.e., defaults and restructurings) and austerity without material debt monetization characterize this phase. During this period, the fall in private sector credit growth and the tightness of liquidity lead to declines in demand for goods, services and financial assets. The financial bubble bursts when there is not enough money to service the debt and **debt defaults and restructurings** hit people, especially leveraged lenders (banks), like an avalanche that causes fears. These justified fears feed on themselves and lead to a liquidity crisis. As a result, policy makers find themselves in a mad scramble to contain the defaults before they spin out of control. This path to reducing debt burdens (i.e., debt defaults and restructurings) must be limited because it would otherwise lead to a self-reinforcing downward spiral in which defaults and restructurings can be so damaging to confidence that, if let go, they might prevent faith and recoveries from germinating for years. Defaults and restructurings cannot be too large or too fast because one man's debts are another man's assets, so the wealth effect of cutting the value of these assets aggressively can be devastating on the demands for goods, services and investment assets. Since in order to reduce debt service payments to sustainable levels the amount of write-down must equal what is required so the debtor will be able to pay (e.g., let's say it's 30% less), a write-down will reduce the creditor's asset value by that amount (e.g. 30%). While 30% sounds like a lot, since many entities are leveraged, the impacts on their net worths can be much greater. For example, the creditor who is leveraged 2:1 would experience a 60% decline in his net worth. Since banks are typically leveraged about 12 or 15:1, that picture is obviously devastating for them. This is usually apparent from the outset of the deleveragings. Since the devastating forcefulness of the wave of defaults that occurs in a deleveraging is apparent from the outset, policy makers are typically immediately motivated to contain the rate of defaults, though they typically don't know the best ways to do that.

In reaction to the shock of the debt crisis, policy makers typically try **austerity** because that's the obvious thing to do. Since it is difficult for the debtor to borrow more, and since it's clear that he already has too much debt, it's obvious that he has to cut his spending to bring it back in line with his income. The problem is that one man's spending is another man's income, so when spending is cut, incomes are also cut, so it takes an awful lot of painful spending cuts to make significant reductions to debt/income ratios. Normally policy makers play around with this path for a couple of years, get burned by the results, and eventually realize that more must be done because the deflationary and depressing effects of both debt reduction and austerity are too painful. That leads them to go to the next phase in which “printing money” plays a bigger role. We don't mean to convey that debt reductions and austerity don't play beneficial roles in the deleveraging process because they do - just not big enough roles to make much of a difference and with too painful results unless balanced with “printing money/monetization”.

- 2) In the second phase of the typical deleveraging the debt/income ratios decline at the same time as economic activity and financial asset prices improve. This happens because there is enough “printing of money/debt monetization” to bring the nominal growth rate above the nominal interest rate and a currency devaluation to offset the deflationary forces. This creates a “beautiful deleveraging”. The best way of negating the deflationary depression is for the central bank to provide adequate liquidity and credit support and, depending on different key entities' need for capital, for the central government to provide that too. This takes the form of the central bank both lending against a wider range of collateral (both lower quality and longer maturity) and buying (monetizing) lower-quality and/or longer-term debt. This produces relief and, if done in the right amounts, allows a deleveraging to occur with positive growth. The right amounts are those that a) neutralize what would otherwise be a deflationary credit market collapse and b) get the nominal growth rate marginally above the nominal interest rate to tolerably spread out the deleveraging process. At such times of reflation, there is typically currency weakness, especially against gold, but

this will not produce unacceptably high inflation because the reflation is simply negating the deflation. History has shown that those who have done it quickly and well (like the US in 2008/9) have derived much better results than those who did it late (like the US in 1930–33). However, there is such a thing as abusive use of stimulants. Because stimulants work so well relative to the alternatives, there is a real risk that they can be abused, causing an “ugly inflationary deleveraging”.

- 3) When there is too much “printing of money/monetization” and too severe a currency devaluation (which are reflationary) relative to the amounts of the other three alternatives “ugly inflationary deleveragings” can occur. When these happen a) they either occur quickly in countries that don’t have reserve currencies, that have significant foreign currency denominated debts and in which the inflation rate is measured in their rapidly depreciating local currency, and b) they can occur slowly and late in the deleveraging process of reserve currency countries, after a long time and a lot of stimulation that is used to reverse a deflationary deleveraging.

By the way, **transfers of wealth** from the have to the have-nots typically occur in many forms (e.g., increased taxes on the wealthy, financial support programs such as those the “rich” European countries are providing to the overly indebted ones, etc.) throughout the process, but they rarely occur in amounts that contribute meaningfully to the deleveraging (unless there are “revolutions”).

Now let's take a look at some past deleveragings so we can see these things happening.

## Past Deleveragings

While there are dozens of deleveragings that we could have picked, we chose six – 1) the US in the 1930s, 2) the UK in the '50s and '60s, 3) Japan over the past two decades, 4) the US 2008-now, 5) Spain now and 6) the Weimar Republic in the 1920s – because they are both important and different in interesting ways. As you will see, while they are different because the amounts and paces of the four paths to deleveraging were different, “the economic machines” that drove the outcomes were basically the same.

We are going to begin by looking at the first five and then turn our attention to the Weimar Republic’s inflationary deleveraging.

We will break these down into three groups, which we will call:

- 1) “ugly deflationary deleveragings” (which occurred before enough money was “printed” and deflationary contractions existed and when nominal interest rates were above nominal growth rates),
- 2) “beautiful deleveragings” (those in which enough “printing” occurred to balance the deflationary forces of debt reduction and austerity in a manner in which there is positive growth, a falling debt/income ratio and nominal GDP growth above nominal interest rates), and
- 3) “ugly inflationary deleveragings” (in which the “printing” is large relative to the deflationary forces and nominal growth through monetary inflation and interest rates are in a self-reinforcing upward spiral).

## The Ugly Deflationary Deleveragings (i.e., when the economy was bad while the debt/income ratio rose)

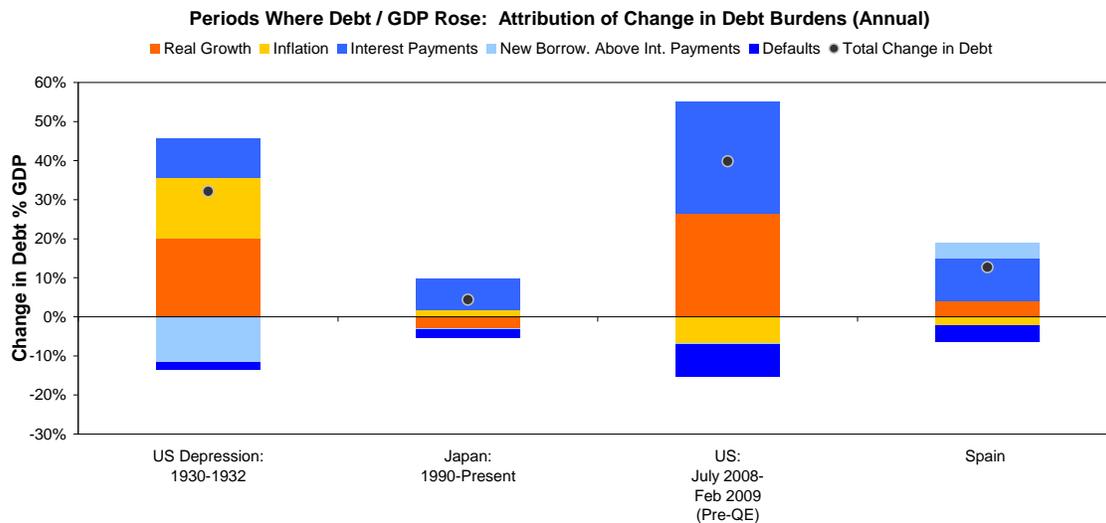
As shown below, in all of these cases, a) money printing was limited, b) nominal growth was below nominal rates, c) the currency was generally strong, and d) the debt/income ratios rose because of the combination of interest payment costs and nominal incomes falling or stagnating.

Monetary Policy in Deleveragings	US Depression: 1930-1932	Japan: 1990-Present	US: July 2008-Feb 2009 (Pre-QE)	Spain: 09/08-Present
Nominal GDP Growth - Gov't Bond Yield	-20.4%	-2.0%	-8.7%	-5.5%
Nominal GDP Growth	-17.0%	0.6%	-5.4%	-0.5%
GDP Deflator	-8.0%	-0.5%	2.0%	0.6%
Real	-9.0%	1.1%	-7.2%	-1.1%
Gov't Bond Yield, Avg.	3.4%	2.6%	3.4%	5.0%
M0 Growth % GDP, Avg. Ann.	0.4%	0.7%	3.1%	3.6%*
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	0.4%	0.1%	0.5%	2.0%*
FX v. Price of Gold (+ means rally v. gold), Ann	0.0%	-3.5%	-3.2%	-20.0%
FX v. USD (TWI for USA), Ann	2.9%	2.9%	40.2%	-4.9%
Total Debt level as % GDP: Starting Point	155%	403%	342%	348%
Total Debt level as % GDP: Ending Point	252%	498%	368%	389%
Change in Total Debt (% GDP)	96%	95%	27%	41%
Change in Total Debt (% GDP), Ann.	32%	4%	40%	13%

\*For ESP, showing ECB lending to ESP, not duration adjusted.

Sources: Global Financial Data & BW Estimates

The following charts attribute the changes in debt/GDP. More specifically, a black dot conveys the total annualized change in debt/GDP. Each bar breaks up the attribution of this change into the following pieces: changes in GDP (i.e., income) and changes in the nominal value of the debt stock. Income changes are broken into (1) real income changes and (2) inflation. A decline in real GDP shows up as a positive contribution to debt/GDP in the shaded region, while an increase in inflation shows up as a negative contribution. Changes in nominal debt levels are broken into (3) defaults, (4) the amount of new borrowing required just to make interest payments, and (5) whatever increases or decreases in borrowing that occur beyond that. So, defaults show up as negatives, while interest payments show up as positives and new borrowing beyond interest payments as positives or negatives (depending on whether new debt was created or paid down).



## The Beautiful Deleveragings (i.e., when the economy was growing in a balanced way with the debt/income ratio declining)

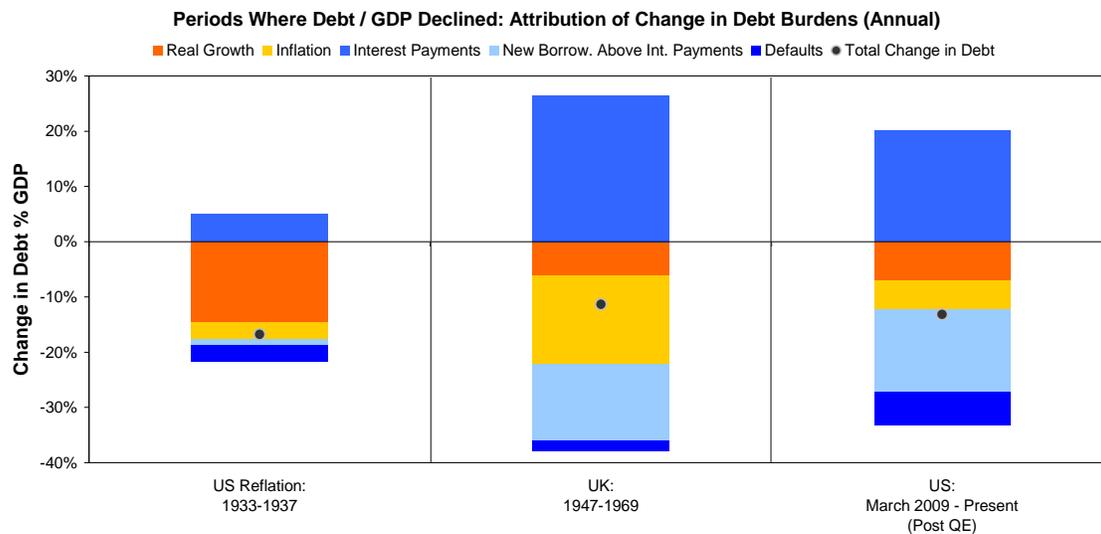
As shown below, in all of these cases, money printing and currency devaluations were sizable, nominal growth rates were pushed above nominal interest rates and the debt/income ratios fell. During the reflation periods, a recovery in nominal incomes lessened the debt/income burdens. Naturally, in cases in which the downturns that preceded these periods were very deep (e.g., 1930–32 in the US) the rebounds were greater.

Monetary Policy in Deleveragings	US Reflation: 1933-1937	UK: 1947-1969	US: March 2009 -Present (Post QE)
Nominal GDP Growth - Gov't Bond Yield	6.3%	1.6%	0.3%
Nominal GDP Growth	9.2%	6.8%	3.5%
GDP Deflator	2.0%	3.9%	1.4%
Real	7.2%	2.9%	2.0%
Gov't Bond Yield, Avg.	2.9%	5.2%	3.2%
M0 Growth % GDP, Avg. Ann.	1.7%	0.3%	3.3%
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	0.3%	0.0%	3.1%
FX v. Price of Gold (+ means rally v. gold), Ann	-10.0%	-1.4%	-18.9%
FX v. USD (TWI for USA), Ann	-1.6%	-2.3%	-4.8%
Total Debt level as % GDP: Starting Point	252%	395%	368%
Total Debt level as % GDP: Ending Point	168%	146%	334%
Change in Total Debt (% GDP)	-84%	-249%	-34%
Change in Total Debt (% GDP), Ann.	-17%	-11%	-13%

\*For ESP, ECB lending to ESP and ECB purchases of ESP assets is shown.

Sources: Global Financial Data & BW Estimates

The chart that follows shows the rates and compositions of the reductions in the debt/income ratios. The dots show the change in the debt/income ratios and the bars show the attribution of the sources of these reductions.



Note: In the US nominal growth has outpaced nominal government bond yields, but has been a bit below aggregate interest rates paid in the economy (given the credit spread component of private sector debt and that the fall in bond yields today flows through with a lag to the rate borne in the economy). As a result, the increase in debt/GDP from interest payments has been a bit higher than the reduction from nominal incomes (real + inflation), but the trajectory is for aggregate economy-wide interest rates to fall below nominal growth.

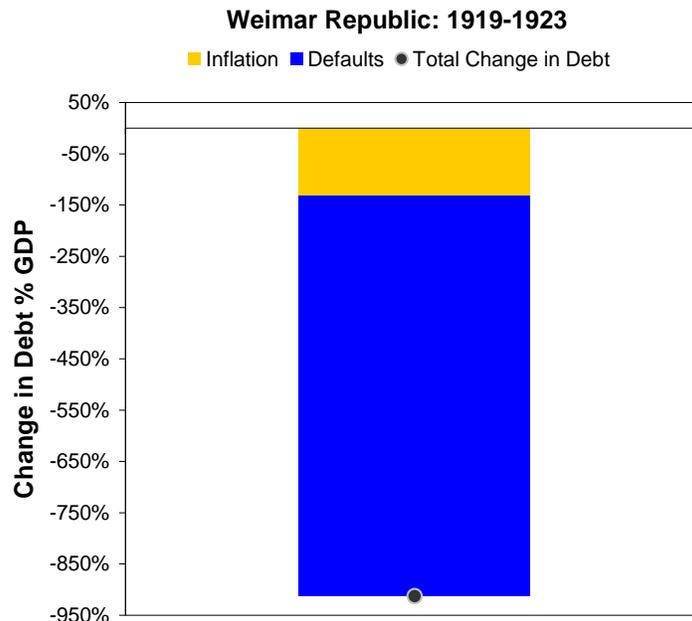
The Ugly Inflationary Deleveraging (i.e., when the economy was bad at the same time as there was hyperinflation that wiped out the debts)

While you can get the rough big picture of the dynamic from the numbers below, which summarize the hyperinflation of the Weimar Republic, the explanation that will follow later will make this picture clearer. This dynamic is basically the same as those in other inflationary deleveragings such as those in Latin America in the 1980s.

<b>Weimar Republic: 1919-1923</b>	
<b>Monetary Policy</b>	
Chg in FX v. Gold Over Period	-100%
Total % Chg in M0 Over Period	1.2 Trillion %
<b>Attribution of Change in Debt %GDP</b>	
Starting Total Govt Obligations %GDP	913%
Of Which:	
WWI Reparations	780%
Other Govt Debt	133%
Change in Total Govt Obligations %GDP	-913%
Of Which:	
WWI Reparations (Defaulted On)*	-780%
Other Govt Debt (Inflated away)	-133%

*\* The reparations were reduced from 269 billion gold marks at the start of 1921 to 132 that spring. After the Reich stopped paying reparations in the summer of 1922, the debts were restructured multiple times - to 112 in 1929, and then basically wiped out in 1932.*

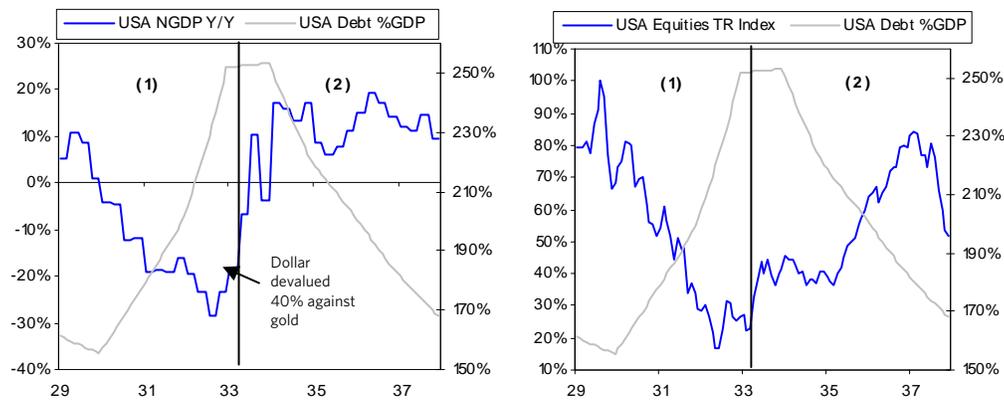
The attribution of the hyperinflation and default in reducing the debt is shown below:



## A Closer Look at Each

### United States Depression and Reflation, 1930-1937

As explained, the US Great Deleveraging in the 1930s transpired in two phases - a deflationary depression from 1930 through 1932, and a reflationary deleveraging from 1933 to 1937. The charts below show debt levels against nominal GDP growth year over year (left chart) and against the total return of stocks (right chart). Debt levels as % of GDP are on the right axis of each chart. The line shows where there was a significant amount of "money printing". The first phase is labeled (1) and the second phase is labeled (2). During the first phase (the "ugly deflationary depression" phase), income and credit collapsed, with nominal growth rates falling significantly below nominal interest rates, and the economy contracted while the debt/income ratio rose. As shown, it followed the stock market bubble bursting in September 1929. As a result of that private sector deleveraging, incomes collapsed, to the point that they were declining by nearly 30% per year at the end of 1932. Because of the fall in incomes, debt/GDP rose from roughly 150% to 250% of GDP (as shown on the left). Through this time stocks fell by more than 80% (as shown on the right). This first phase ended and the second phase began when the money printing started in March 1933. FDR broke the peg to gold and the dollar fell 40% from 21 dollars/ounce to 35 over the course of the year. This reflation also led to rising economic activity, and nominal growth to be above nominal interest rates. 1937 is when it ended in response to the Fed turning restrictive which caused a "re"cession (which is when the term was invented).



Sources: Global Financial Data & BW Estimates

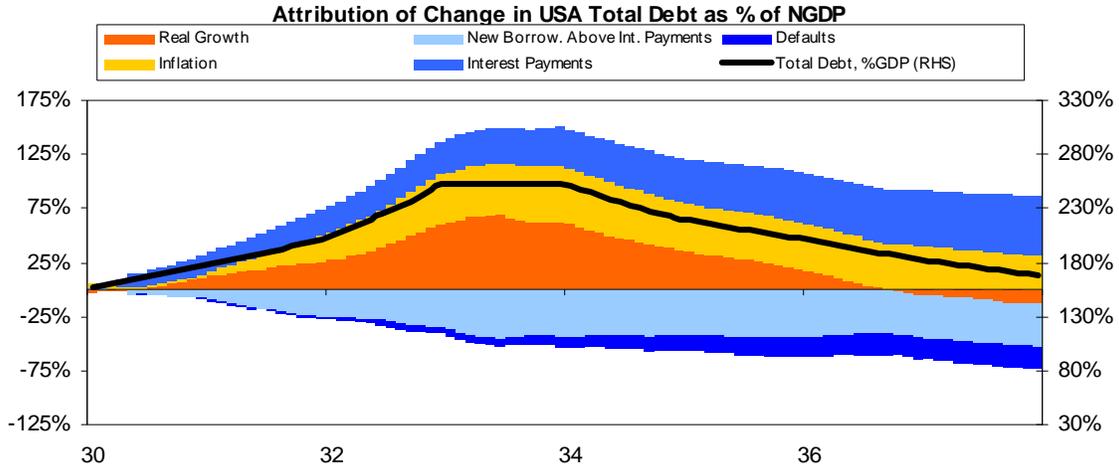
In March of '33, the Fed eased by devaluing the dollar against gold and kept interest rates low for many years. Most of the additional balance sheet expansion was to buy gold to keep the value of the dollar depressed. While the Fed made money easy through low rates and currency, it did not directly buy many risky assets (unlike today as we discuss further below).

The table below tells this story more precisely. During the “ugly deflationary depression”, incomes collapsed as nominal GDP fell 17% per year, about half from deflation and half from the collapse in real demand. As a result, nominal growth was 20.4% below nominal rates, and debt to GDP rose at a rate of 32% per year. Beginning March 1933, the government devalued the dollar against gold and from '33-'37 it increased money supply roughly 1.7% of GDP. Nominal growth recovered at a rate of 9.2% in this period, a combination of 7.2% real growth and moderate 2% inflation. Nominal GDP rose to 6.3% above rates. The private sector reduced its debt burdens, while government borrowing grew with incomes.

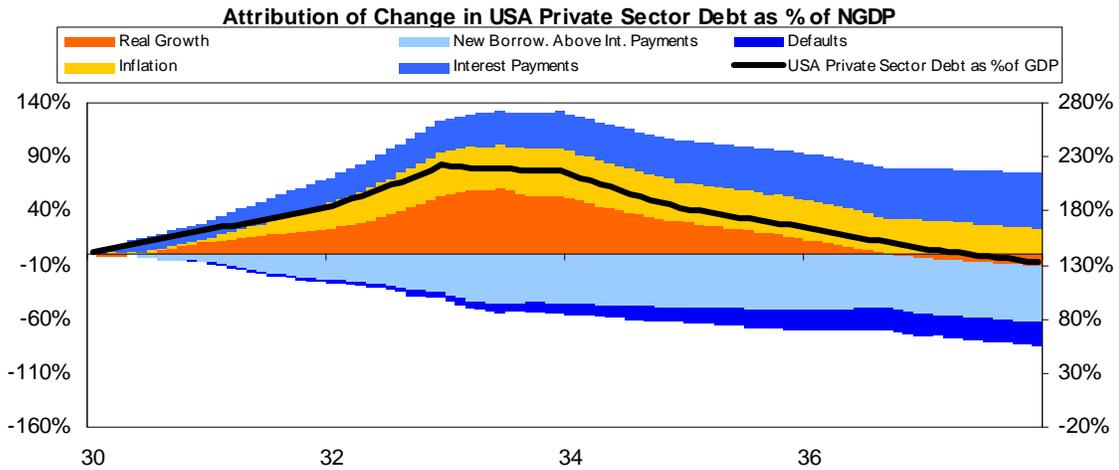
	US Depression: 1930-1932	US Reflation: 1933-1937	
<b>Overall Economy</b>			
Nominal GDP Growth, Avg. Y/Y	-17.0%	9.2%	Nominal growth falls to -17% because of deflation and negative real growth before recovering to 9.2%
Of Which:			
GDP Deflator	-8.0%	2.0%	
Real	-9.0%	7.2%	
Productivity Growth	-2.7%	3.9%	
Employment Growth	-6.3%	3.3%	
Of Which:			
Domestic	-15.2%	8.6%	
Foreign	-1.7%	0.6%	Nominal growth falls 20.4% below govt yields, but is 6.3% above government bond yields from 1933 through 1937
<b>Monetary Policy</b>			
Nominal GDP Growth - Gov't Bond Yield	-20.4%	6.3%	
Nominal GDP Growth	-17.0%	9.2%	
Gov't Bond Yield, Avg.	3.4%	2.9%	
M0 Growth % GDP, Avg. Ann.	0.4%	1.7%	Money printing increases from 0.4% of GDP to 1.7% of GDP
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	0.4%	0.3%	
FX v. Price of Gold (+ means rally v. gold), Ann	0.0%	-10.0%	
FX v. USD (TWI for USA), Ann	2.9%	-1.6%	The dollar devalues substantially against gold beginning in 1933
<b>Attribution of Change in Nominal Debt %NGDP</b>			
Total Debt level as % GDP: Starting Point	155%	252%	
Total Debt level as % GDP: Ending Point	252%	168%	
Change in Total Debt (% GDP)	96%	-84%	
Change in Total Debt (% GDP), Ann.	32%	-17%	Nominal debt levels rose at a 32% annual rate in 1930-1932 before falling 17% per year in 1933-1937
Of Which:			
Nominal GDP Growth	36%	-18%	
Real Growth	20%	-15%	
Inflation	15%	-3%	
Change in Nominal Debt	-3%	1%	
Net New Borrowing	-2%	4%	
New Borrow. Above Int. Payments	-12%	-1%	
Interest Payments	10%	5%	
Defaults	-2%	-3%	
Of Which:			
Government Sector	5%	1%	
Private Sector	27%	-18%	

Sources: Global Financial Data & BW Estimates

The chart below shows an over time picture of the same basic attribution shown earlier. Relative to GDP, total debt was the same in 1937 as in 1930. In between, it ballooned because of a contraction in incomes from deflation and negative real growth. The reversal of the debt burden was driven by a rise in incomes to 1930 levels in nominal terms. Borrowing for interest payments was mostly offset by paying down of debts.

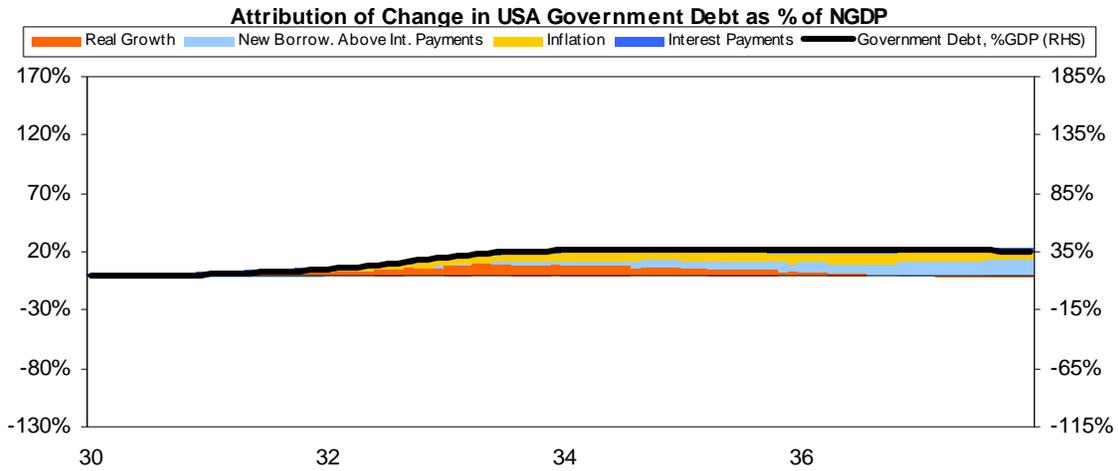


This reversal in incomes was also the primary driver of changes in debt burdens for the private sector, along with debt pay-downs. Defaults were a small driver.

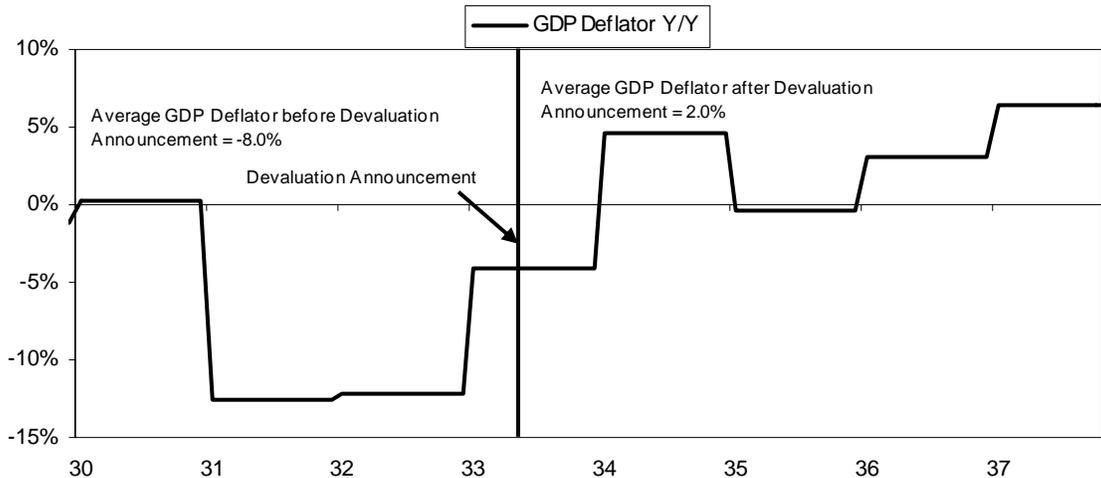


Sources: Global Financial Data & BW Estimates for charts above

The stock of government debt was small at the onset of the depression. Initially, this debt burden rose because of the collapse in income. Nominal government debt levels increased following 1933 because of larger fiscal deficits, while the income recovery cushioned the increase in these burdens.

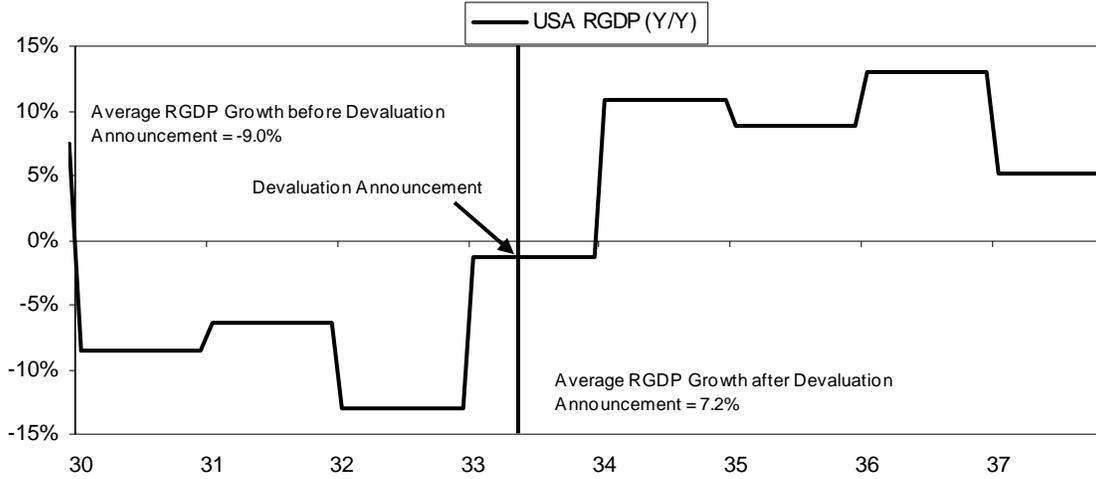


As shown below, the catalyst for the recovery was the printing and dollar devaluation against gold. Price levels turned at this point, from declining at an average rate of 8% to increasing roughly 2% per year. This is a good example of how printing negated deflation rather than triggering high inflation.

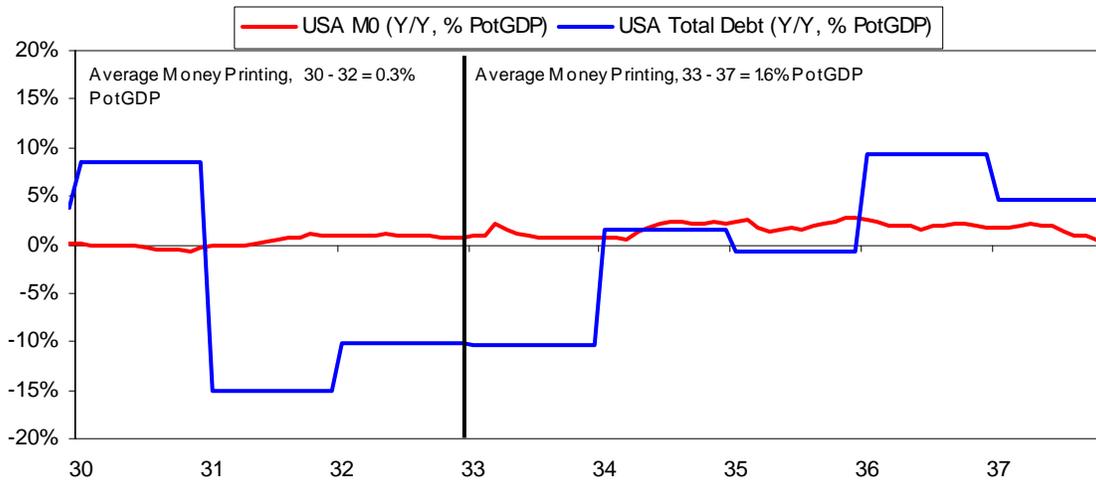


Sources: Global Financial Data & BW Estimates for charts above

As shown below, real economic activity also rebounded after the announcement.

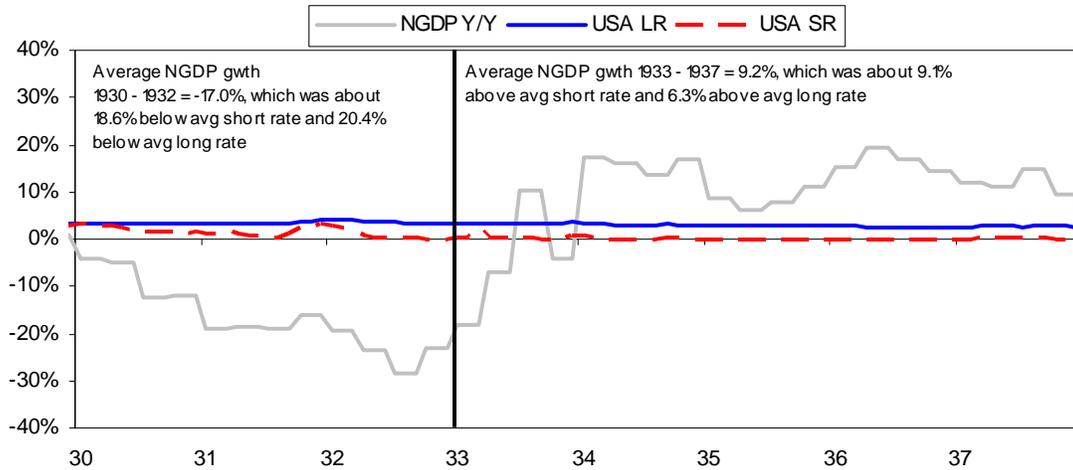


Credit stopped declining at this point and stabilized at low levels of creation, while money printing increased moderately.

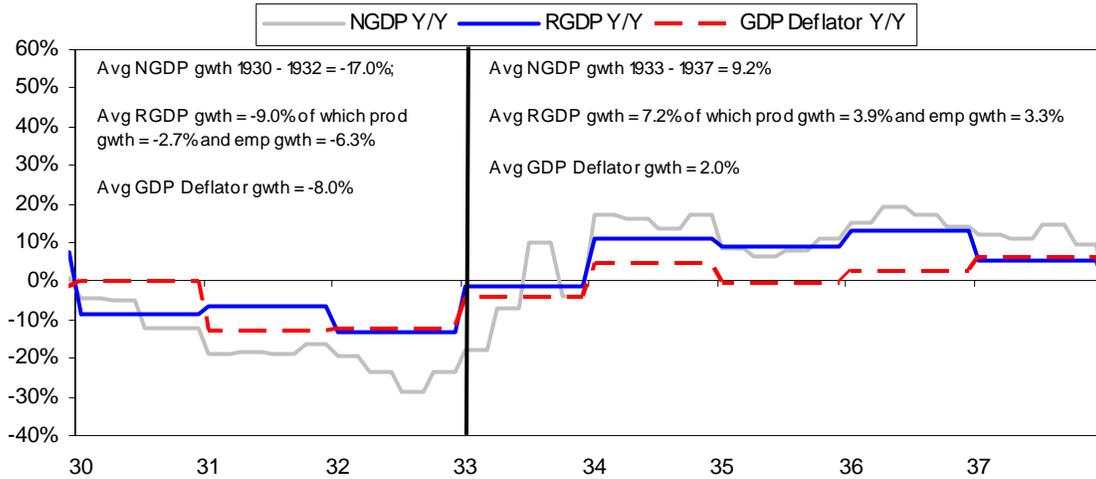


Sources: Global Financial Data & BW Estimates for charts above

With the different policy steps taken from 1933 through 1937, nominal GDP growth moved substantially above government rates, greatly reducing debt burdens.



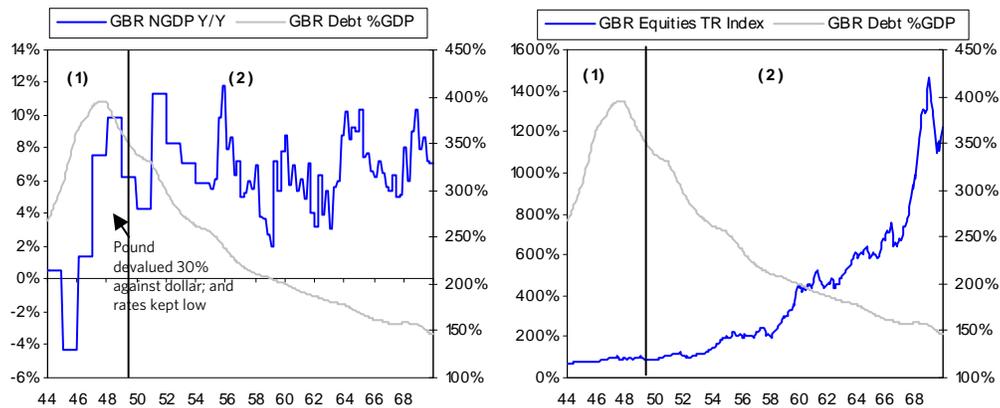
This nominal GDP growth consisted of strong real growth (from a depressed level) and moderate inflation.



Sources: Global Financial Data & BW Estimates for charts above

## UK Deleveraging, 1947-1969

The charts below show debt levels against nominal GDP growth year over year (left chart) and against the total return of stocks (right chart). Debt levels as % of GDP are on the right axis of each chart. The line shows where a significant amount of “money printing” occurred. The first phase is labeled (1) and the second phase is labeled (2). The UK acquired lots of debt both before and during World War II and entered a recession at the end of World War II, pushing debt burdens higher. As shown, from the end of 1943 to the end of 1947 debt levels rose from just above 250% of GDP to 400%. While in 1948 debt burdens dipped a bit with a recovery in incomes, in September 1949 the UK printed money and devalued the pound by 30% against the dollar and gold, at the same time also keeping short rates basically at zero. As a result nominal growth rose above nominal interest rates, debt levels fell by 250% and stocks rallied between 1948 and 1969.



Sources: Global Financial Data & BW Estimates

At the same time that the UK kept interest rates low with easy money during the period, there was a big currency devaluation in 1949 and the BOE increased asset purchases to about 1% GDP in 1950, both of which helped to keep nominal growth above nominal interest rates, which was the most important influence in lowering the debt/income ratio.

The table below shows how the most important part of this deleveraging occurred. We broke it up into two parts - from 1947 to 1959 and from 1960 to 1969 because they were a bit different.

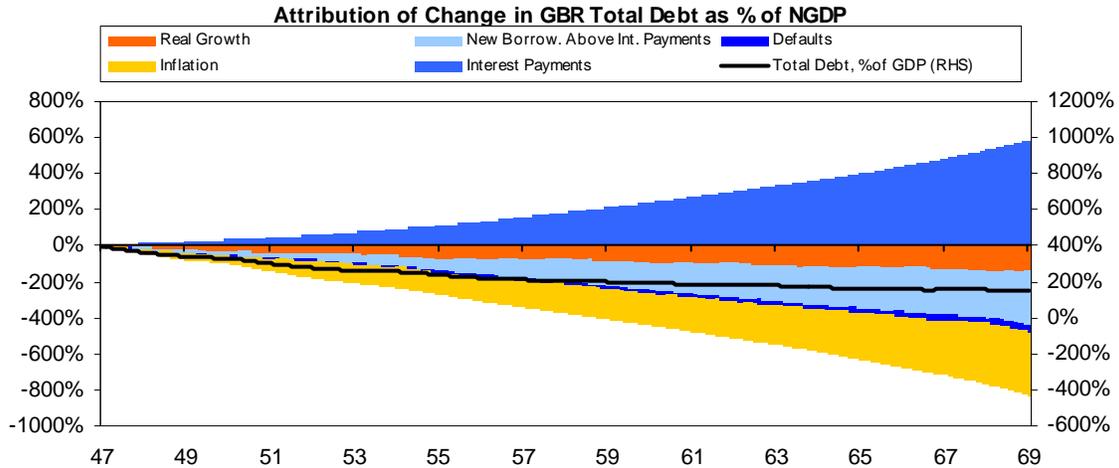
	UK: 1947-1959	UK: 1960-1969
<b>Overall Economy</b>		
Nominal GDP Growth, Avg. Y/Y	7.0%	6.8%
Of Which:		
GDP Deflator	4.0%	3.6%
Real	2.9%	3.1%
Productivity Growth	2.4%	2.6%
Employment Growth	0.5%	0.6%
Of Which:		
Domestic	5.6%	5.6%
Foreign	1.4%	1.2%
<b>Monetary Policy</b>		
Nominal GDP Growth - Gov't Bond Yield	2.8%	0.3%
Nominal GDP Growth	7.0%	6.8%
Gov't Bond Yield, Avg.	4.2%	6.5%
M0 Growth % GDP, Avg. Ann.	0.3%	0.4%
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	0.0%	0.1%
FX v. Price of Gold (+ means rally v. gold), Ann	-1.4%	-1.5%
FX v. USD (TWI for USA), Ann	-3.0%	-1.5%
<b>Attribution of Change in Nominal Debt %NGDP</b>		
Total Debt level as % GDP: Starting Point	395%	200%
Total Debt level as % GDP: Ending Point	200%	146%
Change in Total Debt (% GDP)	-195%	-54%
Change in Total Debt (% GDP), Ann.	-16%	-5%
Of Which:		
Nominal GDP Growth	-21%	-24%
Real Growth	-7%	-5%
Inflation	-14%	-19%
Change in Nominal Debt	5%	18%
Net New Borrowing	6%	21%
New Borrow. Above Int. Payments	-12%	-16%
Interest Payments	18%	37%
Defaults	-1%	-3%
Of Which:		
Government Sector	-9%	-3%
Private Sector	-7%	-2%

BOE keeps interest rates below nominal growth for more than two decades

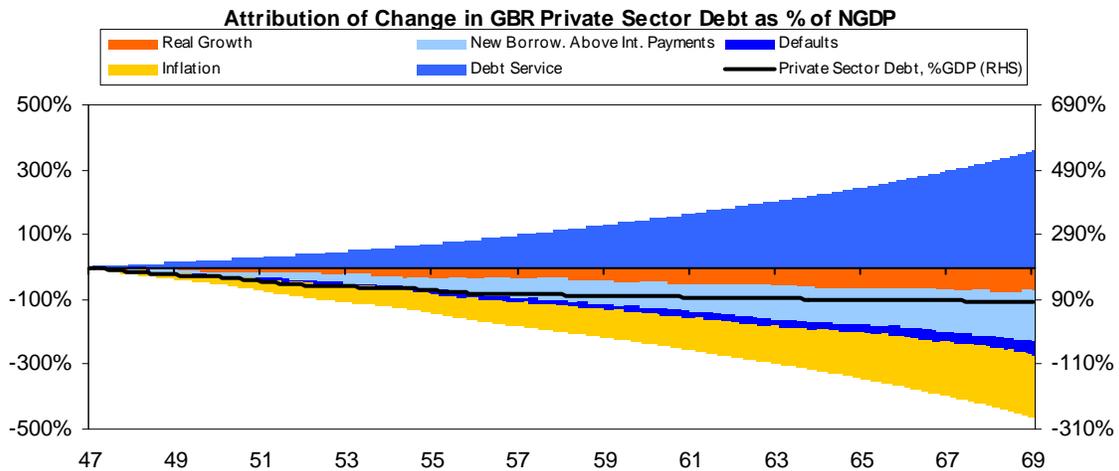
UK devalues the pound by 30% against the dollar in Sept. 1949 and pound falls further over the subsequent period

Sources: Global Financial Data & BW Estimates

As shown below, as a result of this mix in policies, the decline in total debt in the post-war period occurred via a rise in nominal GDP which outpaced more modest increases in the amount of new borrowing. Inflation of around 4% from 1947-1970 drove nearly 2/3 of the decline in debt to GDP that is attributable to GDP growth. Net new borrowing was small as borrowing for interest payments was offset by paying down debts. This is shown in the chart below.

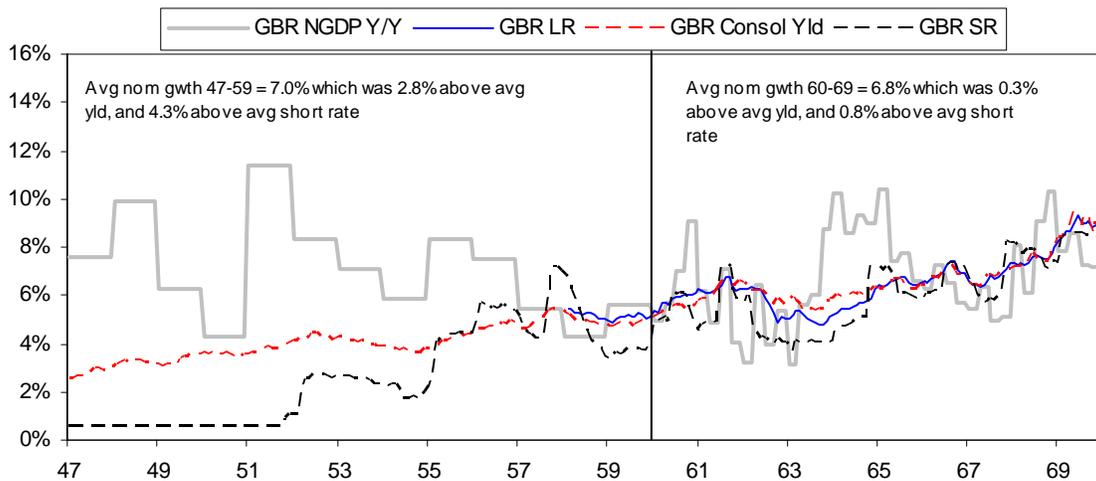
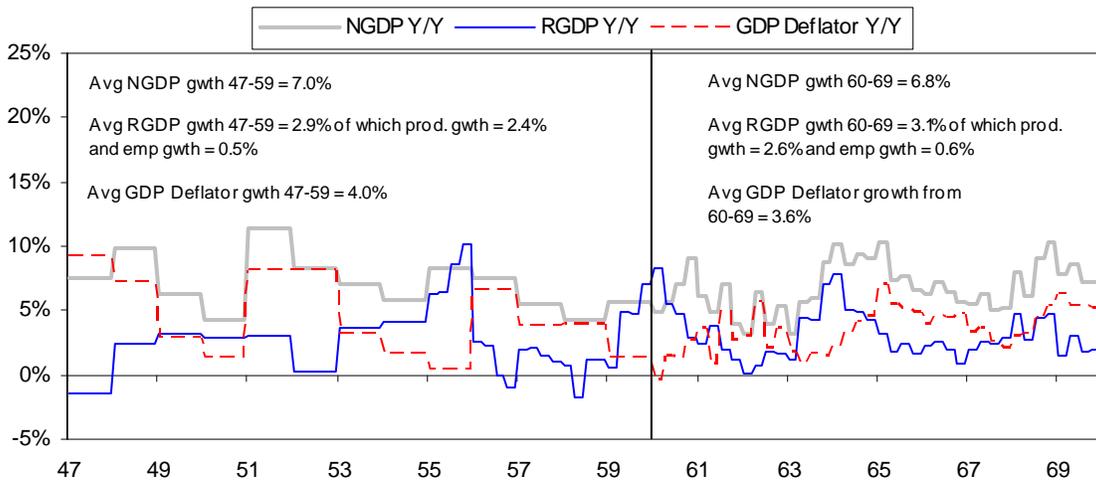
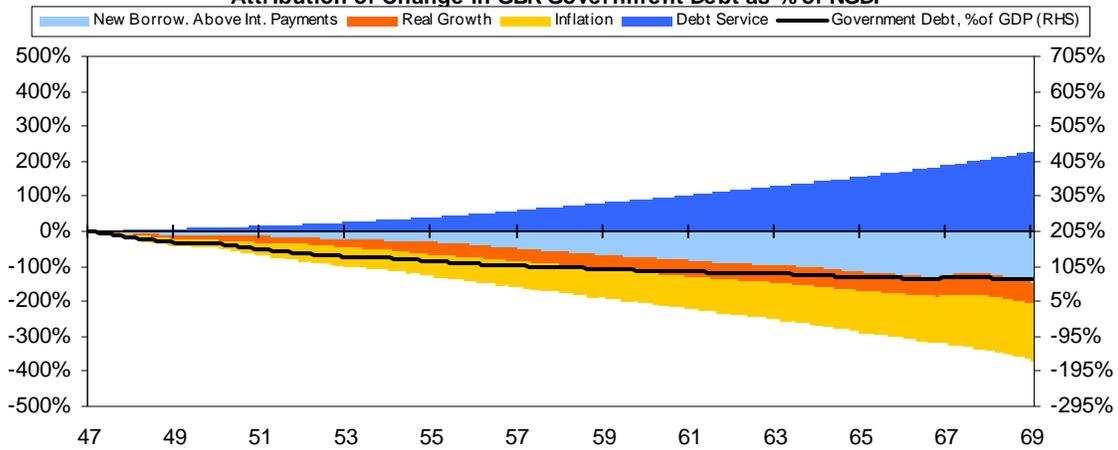


The same is true for both the government and the private sector. The net new borrowing by the government was relatively small through the period, particularly from 1947-1960. The charts below show the attributions of the changes in the debt ratios.



Sources: Global Financial Data & BW Estimates for charts above

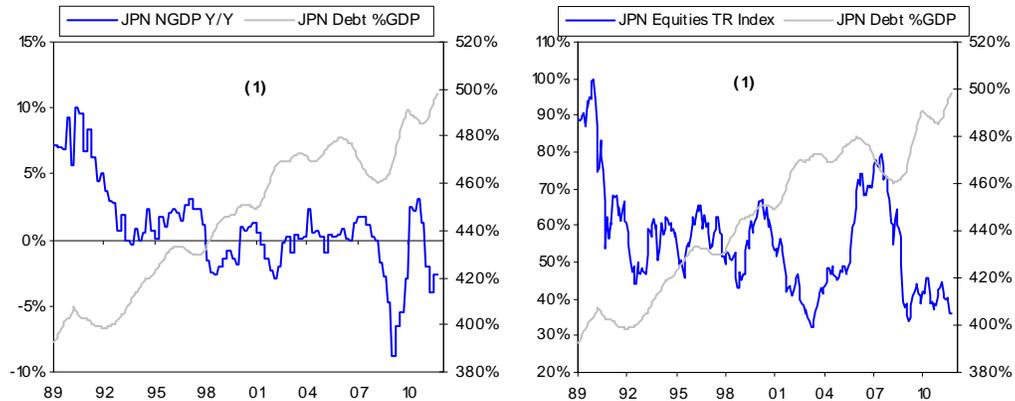
### Attribution of Change in GBR Government Debt as % of NGDP



Sources: Global Financial Data & BW Estimate for charts above

## Japan Deleveraging, 1990-Present

As shown below, Japan has been stuck in a moderate “ugly deflationary deleveraging” for over 20 years. In 1989 the private sector debt bubble burst and government sector debt/fiscal expansion began, but there was never adequate “money printing/monetization” to cause nominal growth to be above nominal interest rates and to have the currency devalue. While Japan has eased some, nominal income growth has been stagnant, with persistent deflation eroding moderate real growth. Meanwhile, nominal debts have risen much faster, pushing debt levels higher, from about 400% of GDP at the end of 1989 to 500% today. Equities have declined by nearly 70%.



The BOJ has “printed/monetized” very little in duration-adjusted terms throughout the deleveraging process, with most of the printing that it has done going to short-term cash-like assets of little duration. As result, it has failed to reflate and the government is building a terrible debt burden.

As shown in the table below, money creation has been limited at 0.7% of GDP per year, and the yen has appreciated 2.9% per year against the dollar. As a result, since 1990 real growth has averaged 1.1% with persistent deflation (averaging -0.5%). This has left nominal growth 2% below nominal interest rates which cumulatively has led to a large increase in the debt/income ratio. While the private sector has delevered modestly, Japan's total debt level has climbed from 403% to 498% because of government borrowing and deflation.

<b>Japan: 1990-Present</b>	
<b>Overall Economy</b>	
Nominal GDP Growth, Avg. Y/Y	0.6%
Of Which:	
GDP Deflator	-0.5%
Real	1.1%
Productivity Growth	1.0%
Employment Growth	0.0%
Of Which:	
Domestic	0.2%
Foreign	0.4%
<b>Monetary Policy</b>	
Nominal GDP Growth - Gov't Bond Yield	-2.0%
Nominal GDP Growth	0.6%
Gov't Bond Yield, Avg.	2.6%
M0 Growth % GDP, Avg. Ann.	0.7%
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	0.1%
FX v. Price of Gold (+ means rally v. gold), Ann	-3.5%
FX v. USD (TWI for USA), Ann	2.9%
<b>Attribution of Change in Nominal Debt %NGDP</b>	
Total Debt level as % GDP: Starting Point	403%
Total Debt level as % GDP: Ending Point	498%
Change in Total Debt (% GDP)	95%
Change in Total Debt (% GDP), Ann.	4%
Of Which:	
Nominal GDP Growth	-1%
Real Growth	-3%
Inflation	2%
Change in Nominal Debt	6%
Net New Borrowing	8%
New Borrow. Above Int. Payments	0%
Interest Payments	8%
Defaults	-2%
Of Which:	
Government Sector	8%
Private Sector	-4%

Deflation and weak growth

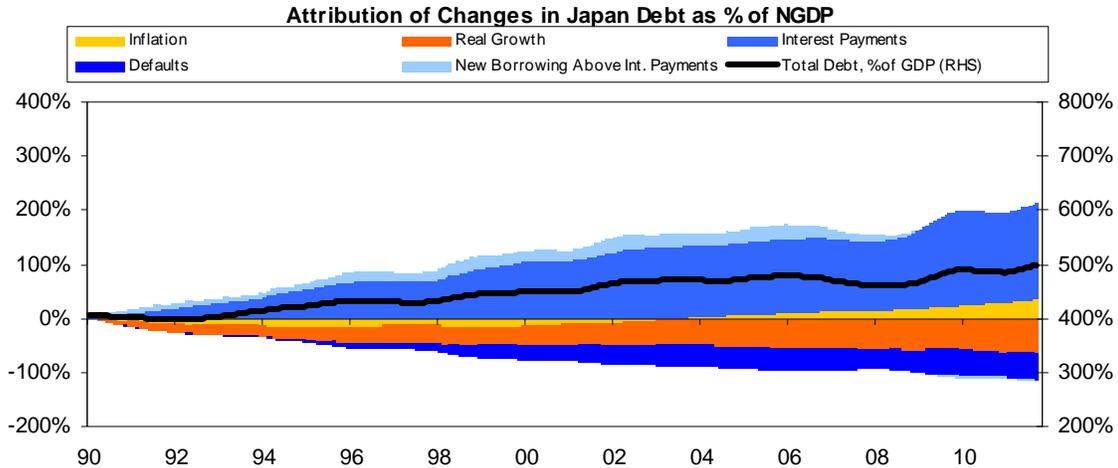
Nominal growth below nominal rates

Limited money creation, mostly into cash like assets

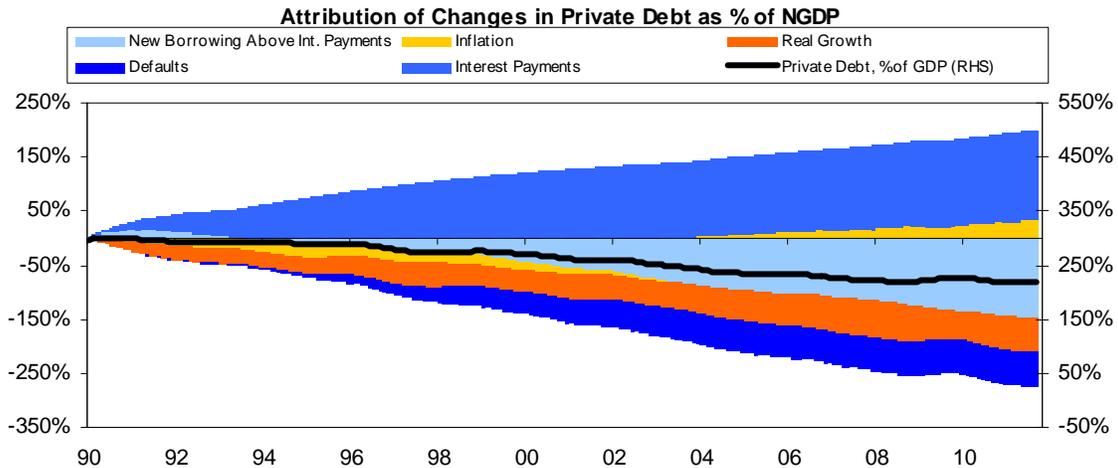
Currency appreciation

Debt burden has increased

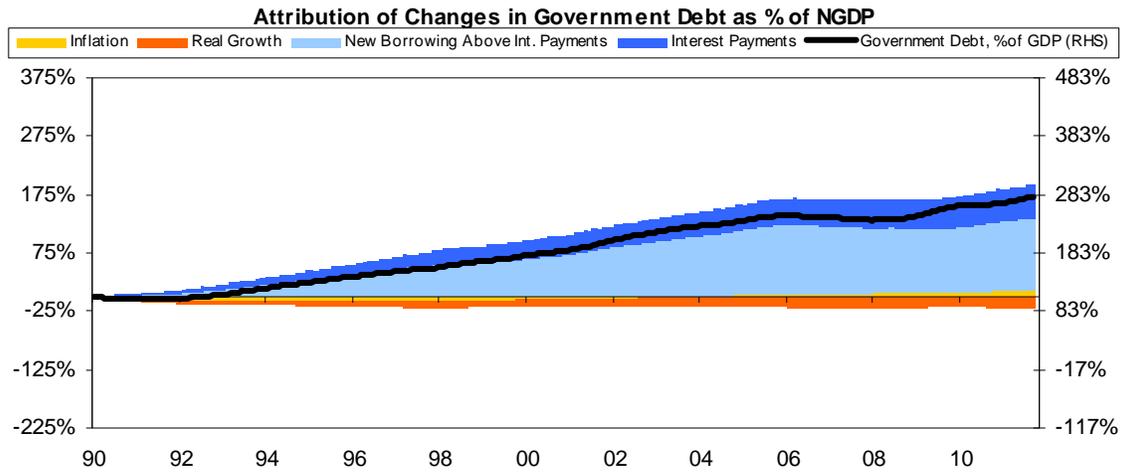
The charts below show how the Japan case developed over time, breaking out the cumulative contributions of different drivers to changes in debt burdens relative to incomes. In aggregate in the economy, new borrowing has merely covered continued debt service and no more. Persistent deflation has added to debt burdens, while defaults and real growth have reduced them.



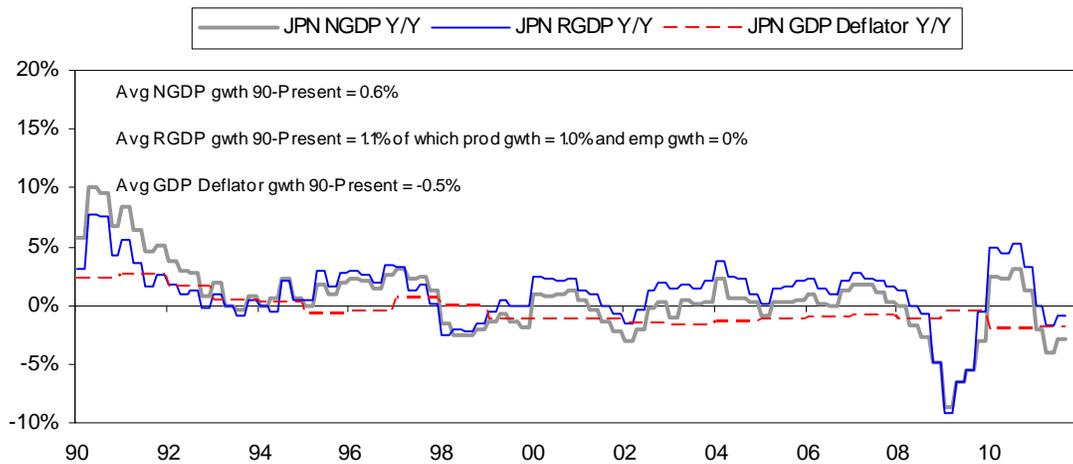
Debt levels for the private sector have fallen modestly. Defaults, real growth and paying down debt after paying interest have helped. Interest payments have been substantial and deflation has also added to debt burdens.



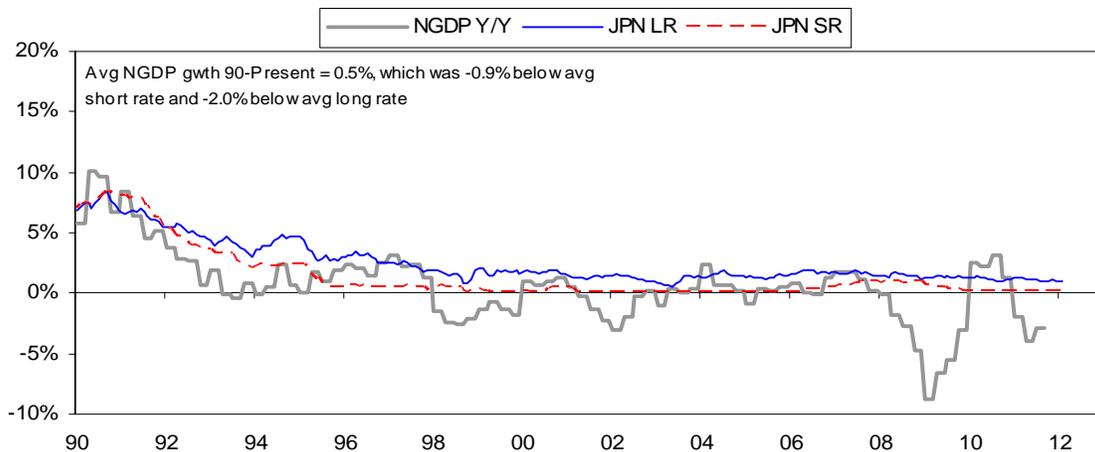
Government borrowing has gone up significantly, mostly to cushion the weak private sector.



Weak nominal GDP growth has resulted from the combination of mediocre real GDP growth and deflation.



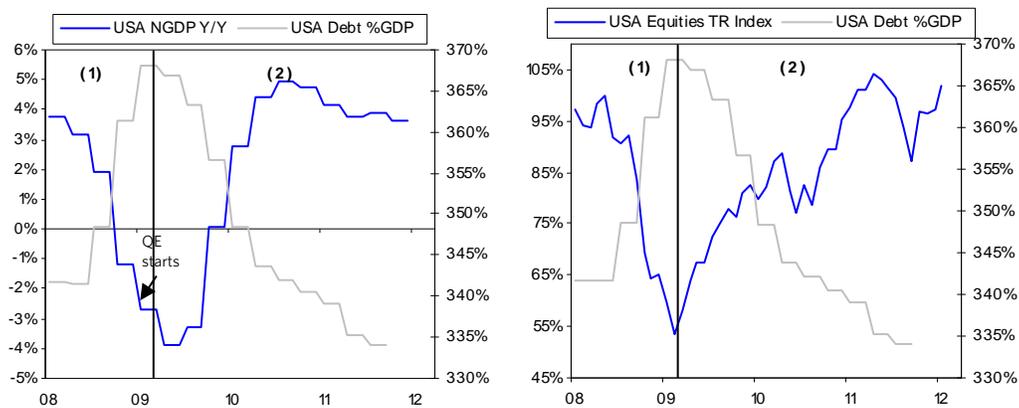
And nominal GDP growth rates have remained below Japanese government rates for most of this period, creating a persistent upwards pressure on debt burdens.



## US Deleveraging, 2008-Present

Like the US deleveraging in the 1930s, the lead-up consisted of a debt driven boom, and the deleveraging has transpired in two stages: a contraction in incomes followed by reflation and growth. However, because of a swift policy response from the Fed, which was prompt in guaranteeing debt and aggressively printing money, the contractionary period only lasted six months (versus over three years in the 1930s), and since then there has been reflation and debt reduction through a mix of rising nominal incomes, default and debt repayment.

As shown in the charts below, unlike both the US in the 1930s and Japan since 1990, the US has quickly entered a reflation and ended the “ugly deflationary deleveraging” phase of the process (which lasted from July 2008, just before Lehman fell, to March 2009, when the Fed instituted its aggressive program of quantitative easing to monetize the debts). During the “ugly” phase, incomes fell, debt burdens rose from about 340% GDP to 370% and stocks lost almost half their value. Because so much debt around the world is dollar denominated, the contraction in global credit and dollar liquidity created a squeeze for dollars, and the dollar strengthened significantly against a trade-weighted basket. Exports collapsed faster than domestic demand. Following the reflation that began in March 2009, incomes recovered, debt burdens fell below their initial starting level to around 335% and stocks recovered all of their losses. At this time, the credit markets are largely healed and private sector credit growth is improving. Thus far, this deleveraging would win our award of the most beautiful deleveraging on record. The key going forward will be for policy makers to maintain balance so that the debt/income ratio keeps declining in an orderly way.



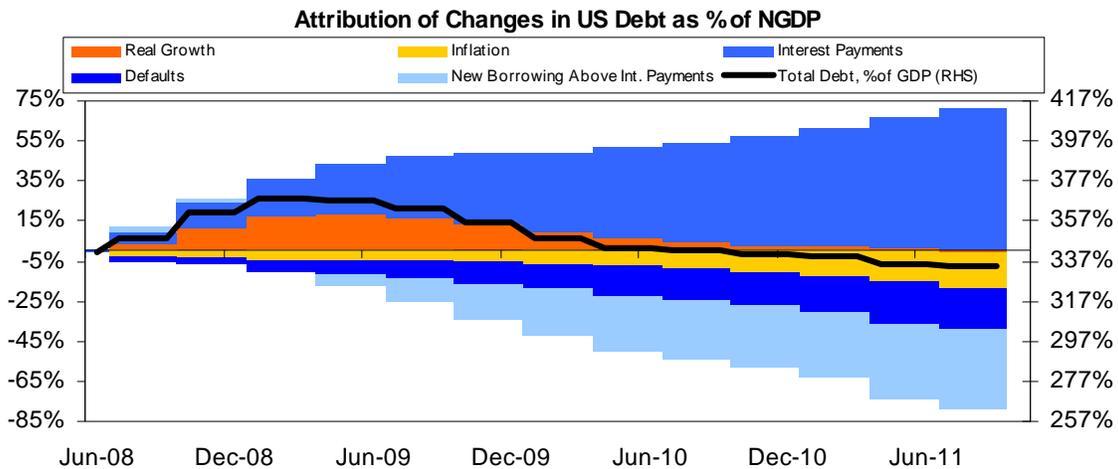
The magnitude of the easing by the Fed has been substantial. Not only did the Fed cut rates and backstop essential credit during the liquidity crisis, but it pursued one of the most aggressive easing policies by pushing money into risky assets. The Fed began to push money into the system with the announcement of a significant QE1 in March 2009 with the purchase of Treasuries and agency-backed bonds. The Fed further increased its holdings of longer duration government debt (mostly Treasuries) with QE2 starting in August 2010 and Operation Twist starting in the fall 2011. During these three periods, changes in asset holdings on a duration-adjusted basis (equivalent to 10-year duration) peaked at 8%, 5% and roughly 2% of GDP annualized pace respectively.

As shown below, during the contractionary period, nominal growth fell at an annualized rate of -5.4% due to a collapse in real activity between July 2008 and February 2009. Falling incomes sent the debt to GDP level higher, even as credit creation collapsed.

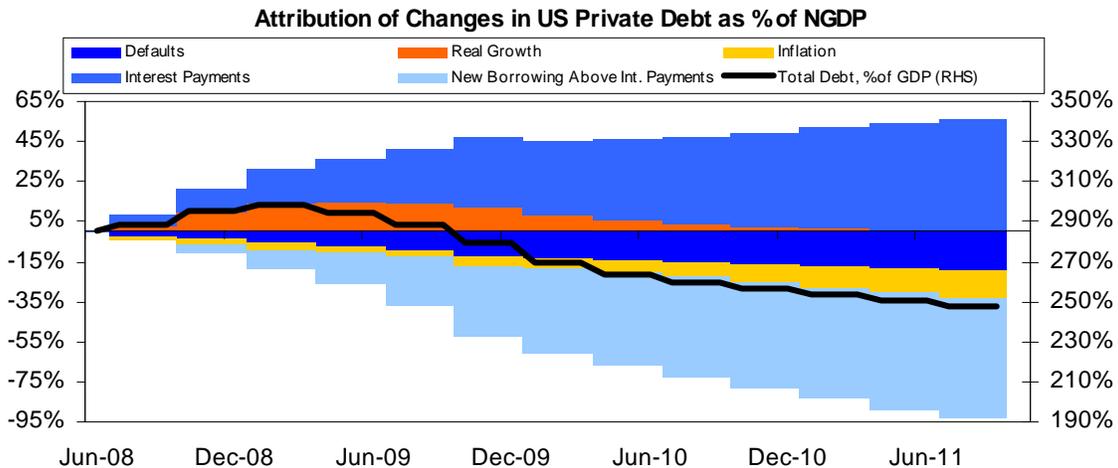
In March 2009, the Fed eased aggressively through QE, as discussed, buying government bonds and pushing a massive amount of money into the system (more than \$1.5 trillion). This push of money and the subsequent reflation of assets stimulated a recovery in economic activity, which rebounded at a rate of 3.5% per year. Nominal growth has been marginally higher than nominal government rates. Debt levels have fallen 13% of GDP per year, because the private sector has deleveraged while government borrowing has risen. Nominal growth contributed to an annualized 12% decline in the debt/income ratio, defaults contributed to a 6% reduction and repayments contributed to a 15% reduction while interest payments contributed to a 20% increase in the debt/income ratio.

	US: July 2008-Feb 2009 (Pre-QE)	US: March 2009 -Present (Post QE)
<b>Overall Economy</b>		
Nominal GDP Growth, Avg. Y/Y	-5.4%	3.5%
Of Which:		
GDP Deflator	2.0%	1.4%
Real	-7.2%	2.0%
Productivity Growth	-2.4%	2.3%
Employment Growth	-4.8%	-0.3%
Of Which:		
Domestic	-1.3%	1.8%
Foreign	-4.1%	1.7%
<b>Monetary Policy</b>		
Nominal GDP Growth - Gov't Bond Yield	-8.7%	0.3%
Nominal GDP Growth	-5.4%	3.5%
GDP Deflator	2.0%	1.4%
Real	-7.2%	2.0%
Gov't Bond Yield, Avg.	3.4%	3.2%
M0 Growth % GDP, Avg. Ann.	3.1%	3.3%
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	0.5%	3.1%
FX v. Price of Gold (+ means rally v. gold), Ann	-3.2%	-18.9%
FX v. USD (TWI for USA), Ann	40.2%	-4.8%
<b>Attribution of Change in Nominal Debt %NGDP</b>		
Total Debt level as % GDP: Starting Point	342%	368%
Total Debt level as % GDP: Ending Point	368%	334%
Change in Total Debt (% GDP)	27%	-34%
Change in Total Debt (% GDP), Ann.	40%	-13%
Of Which:		
Nominal GDP Growth	20%	-12%
Real Growth	26%	-7%
Inflation	-7%	-5%
Change in Nominal Debt	20%	-1%
Net New Borrowing	28%	5%
New Borrow. Above Int. Payments	0%	-15%
Interest Payments	29%	20%
Defaults	-8%	-6%
Of Which:		
Government Sector	20%	6%
Private Sector	20%	-20%

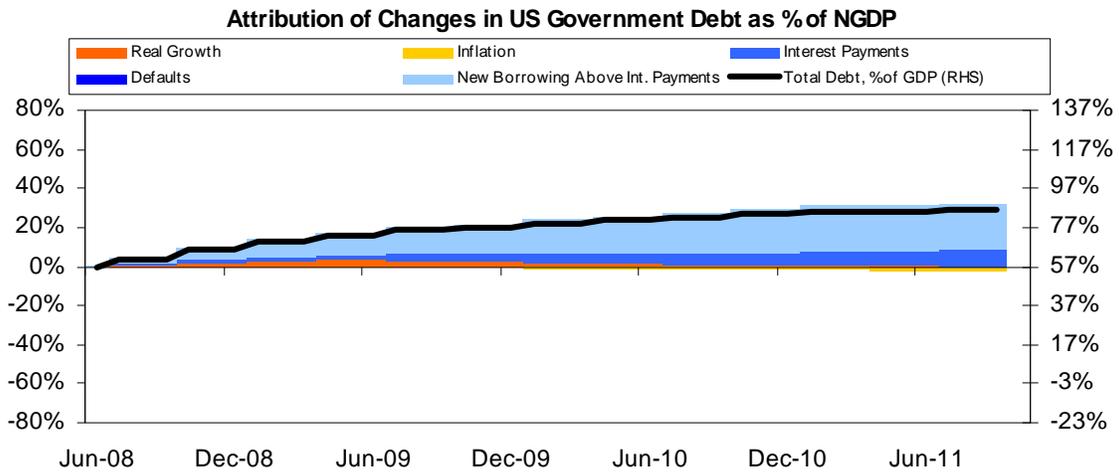
As shown, debt levels increased during the contraction phase but declined in response to reflation so that they are now down a bit from the starting point. With debt levels so high, interest payments have been a significant burden, but they have been offset by a mix of paying down debts, moderate inflation and defaults, with debt repayment the largest component.



The private sector has reduced its debt level by 37% GDP. Debt repayment has been the biggest factor here, with defaults and inflation also making contributions, more than offsetting the interest burden.

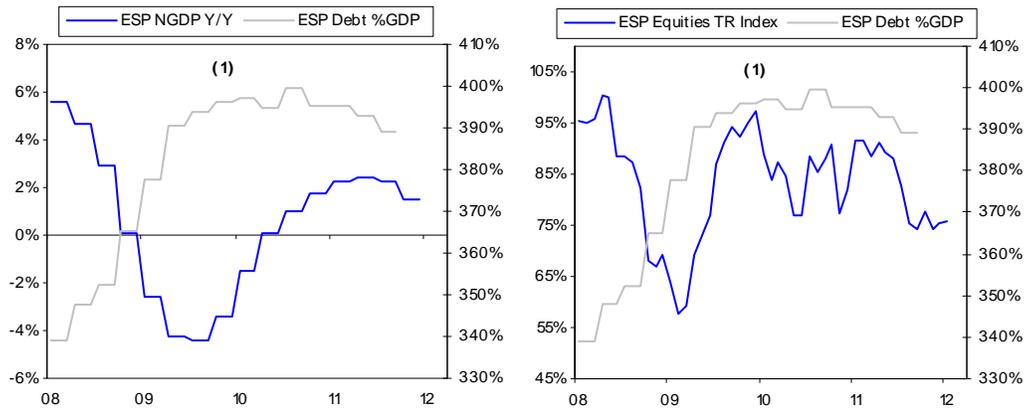


Private sector debt repayment has been somewhat (less than half) offset by government borrowing beyond interest payments.



## The Recent Spain Deleveraging, 2008-Present

As shown below, Spain has been going through the first and “ugly deflationary” phase of the cycle and has not yet moved on because it can’t “print/monetize”; it is dependent on the ECB to do this. As shown, incomes also began to fall in Spain from July 2008 and debts rose from that point from about 365% to close to 400%. Debt burdens have since stabilized but are still higher than at the start of the deleveraging. Equities initially fell nearly 45% and are still 25% below July 2008 levels.



Though Spain has not been able to print money directly, the ECB has pushed a significant amount of money into Spain by buying its bonds and providing liquidity to its banks which prevented a more severe deleveraging. It provided this support in the summer of 2010 and again in the fall of 2011, when credit tightened. During both these periods, peak purchases by the ECB pushed money into Spanish risky assets at a rate of more than 10% of Spanish GDP (adjusted to a 10-year duration). The push of money has come from a mix of sovereign and covered bond purchases, and shorter-term loans, such as the recent LTRO. Despite this printing the ECB has not pushed Spanish sovereign spreads and interest rates down enough so that nominal growth is above nominal rates (as shown later).

Understandably, in Spain the policy response has been much slower than in the US because the policy options are limited, most importantly because Spain cannot print money. And understandably, Spain has seen its credit spread climb and rising debt service costs have sent debt/income levels much higher. Unlike in our other cases, Spain's government bond yield has a substantial credit risk component because of Spain's inability to print.

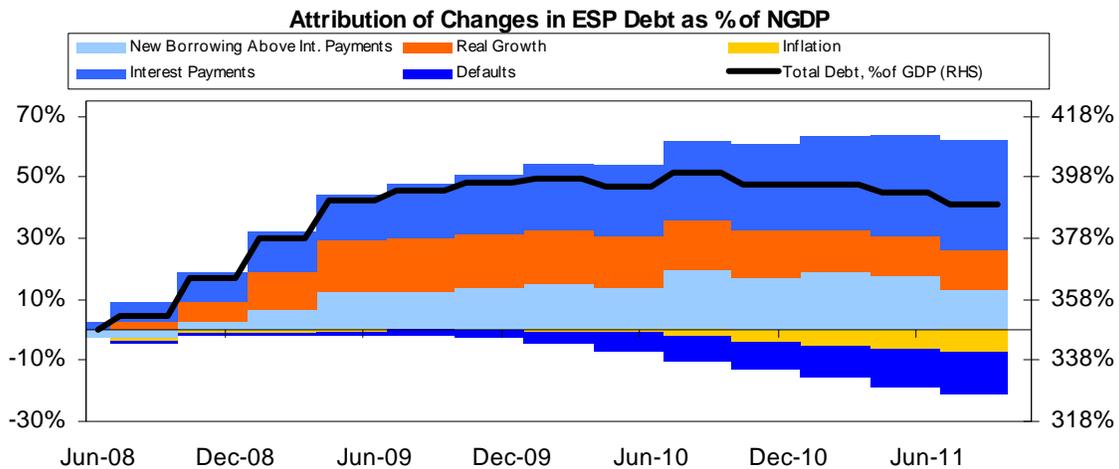
Nominal growth has been negative during the Spanish deleveraging because inflation has been 0.6% and real growth has been -1.1%. As a result, nominal growth has been 5.5% below government bond yields. The euro has devalued 20% against gold on an annualized basis, but much less against the dollar as all major currencies have devalued against gold.

<b>Spain: 09/08-Present</b>	
<b>Overall Economy</b>	
Nominal GDP Growth, Avg. Y/Y	-0.5%
Of Which:	
GDP Deflator	0.6%
Real	-1.1%
Productivity Growth	1.9%
Employment Growth	-3.1%
Of Which:	
Domestic	-1.7%
Foreign	1.2%
<b>Monetary Policy</b>	
Nominal GDP Growth - Gov't Bond Yield	-5.5%
Nominal GDP Growth	-0.5%
Gov't Bond Yield, Avg.	5.0%
M0 Growth % GDP, Avg. Ann.	3.6%*
Central Bank Asset Purchases & Lending, 10yr Dur., Ann.	2.0%*
FX v. Price of Gold (+ means rally v. gold), Ann	-20.0%
FX v. USD (TWI for USA), Ann	-4.9%

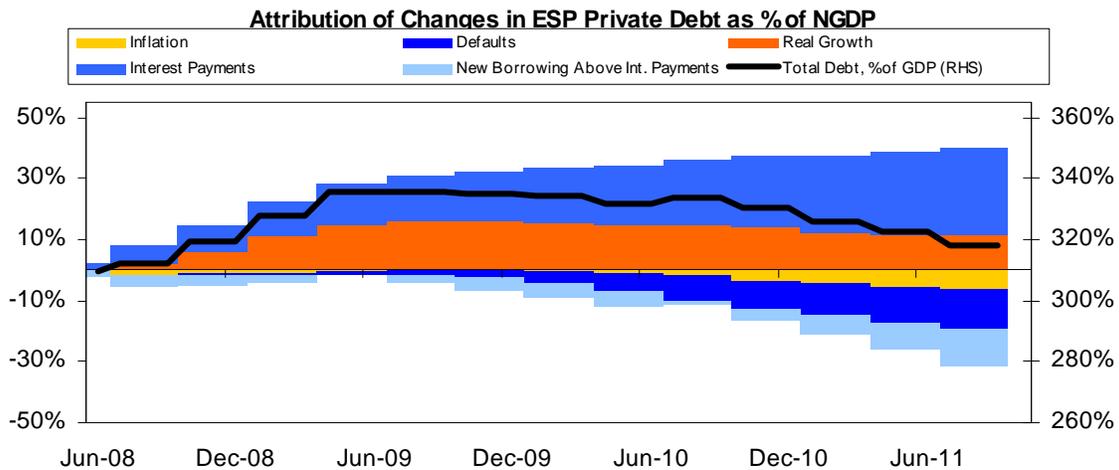
<b>Attribution of Change in Nominal Debt %NGDP</b>	
Total Debt level as % GDP: Starting Point	348%
Total Debt level as % GDP: Ending Point	389%
Change in Total Debt (% GDP)	41%
Change in Total Debt (% GDP), Ann.	13%
Of Which:	
Nominal GDP Growth	2%
Real Growth	4%
Inflation	-2%
Change in Nominal Debt	11%
Net New Borrowing	15%
New Borrow. Above Int. Payments	4%
Interest Payments	11%
Defaults	-4%
Of Which:	
Government Sector	10%
Private Sector	3%

\*For ESP, ECB lending to ESP and ECB purchases of ESP assets is shown.

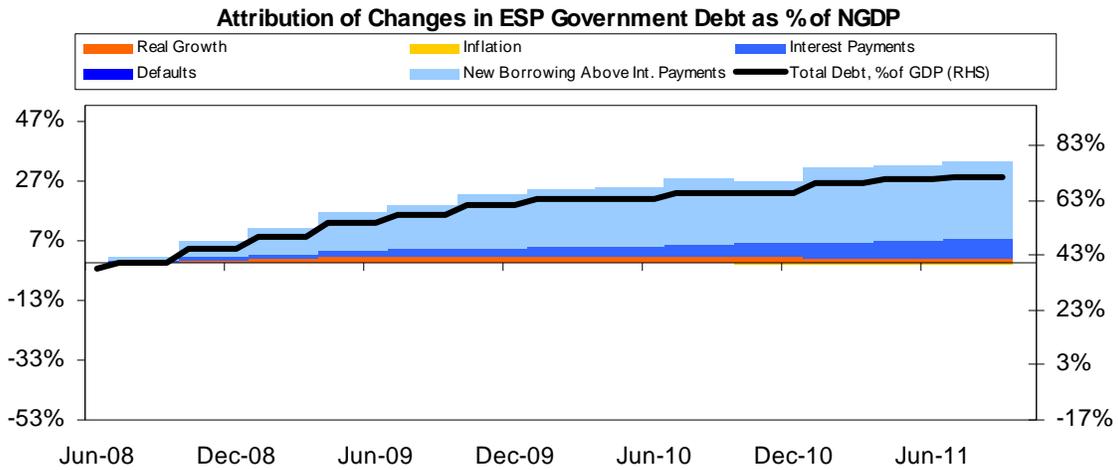
As shown below, Spain's debt level has increased due to a high and rising interest burden, new borrowing above interest payments and negative real growth. Rising interest payments are the largest component here as higher Spanish credit spreads have increased debt service costs. Inflation and defaults have moderately reduced debt burdens.



While the private sector has been repaying debt, even with debt repayment, private sector debt levels are above where they were in June 2008 (though they have recently declined) because of borrowing for interest payments and negative real growth.



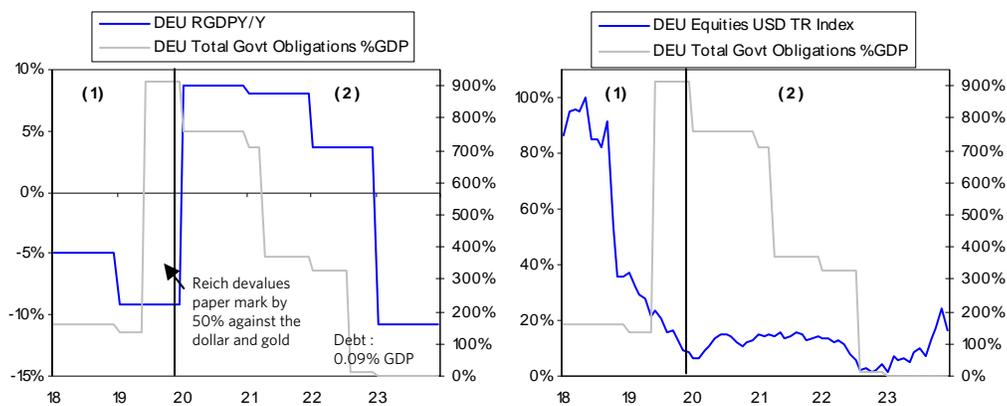
The government has levered up during the period. Government debt was relatively low at the start of the crisis and still remains a fraction of aggregate debt in Spain.



At this time, while the ECB's moves have helped, the prospects remain poor for Spain because, with monetary policies where they are, nominal growth will remain weak and too much of the adjustment process will depend on austerity and debt reduction.

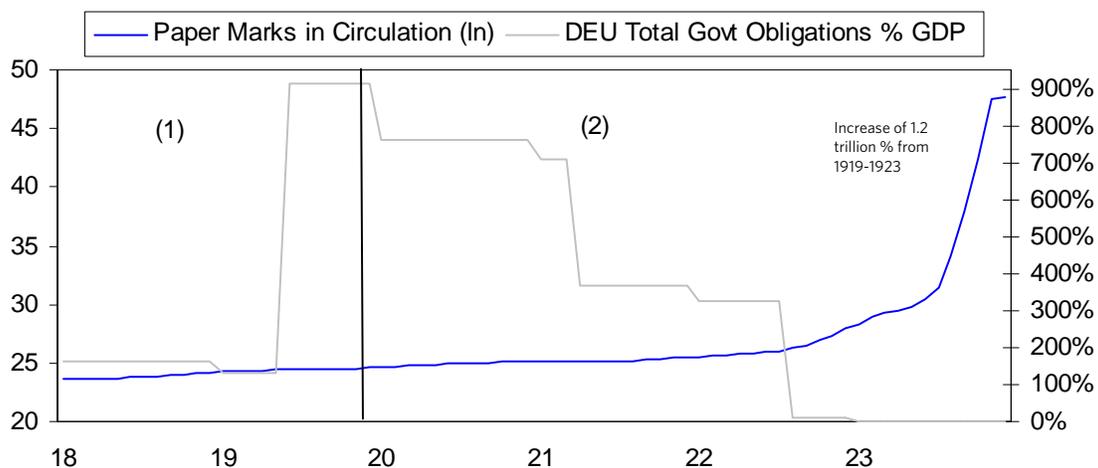
## Germany's Weimar Republic: 1918-23

Weimar Germany is a case where hyperinflation and default eroded the punishingly high debt burdens. In 1918, the government ended the war with a debt to GDP ratio of about 160% after their considerable borrowing to finance war spending. Total government obligations rose to an extraordinary level of 913% GDP after the Allied parties imposed reparation payments on Germany to be paid in gold.<sup>8</sup> 1918 and 1919 was a period of economic contraction, with real incomes falling 5% and 10% in those two years. The Reich then spurred a recovery in incomes and asset prices at the end of this period by devaluing the paper mark against the dollar and gold by 50% between December 1919 and Feb 1920. As the currency fell, inflation took off. Between 1920 and 1922, inflation eroded government debts denominated in local currency, but made no impact on the reparation debt since it was owed in gold. But in the summer of 1922, the Reich stopped making payments on reparations, effectively going into default.<sup>9</sup> Over a series of negotiations lasting until 1932, the reparation debts were restructured and effectively wiped out. The currency depreciation led creditors to favor short-term loans and to move money out of the currency which required the central bank to buy more debt in order to fill in the void. This spiral led to hyperinflation that peaked in 1923 and left local government debt at 0.09% GDP.



Sources: Global Financial Data & BW Estimates

The Reichsbank increased its printing after the 1919/20 devaluation and the printing accelerated in 1922 and 1923. By the end of the hyperinflation in 1923 the Reichsbank had increased the money supply by 1.2 trillion percent between 1919 and 1923.



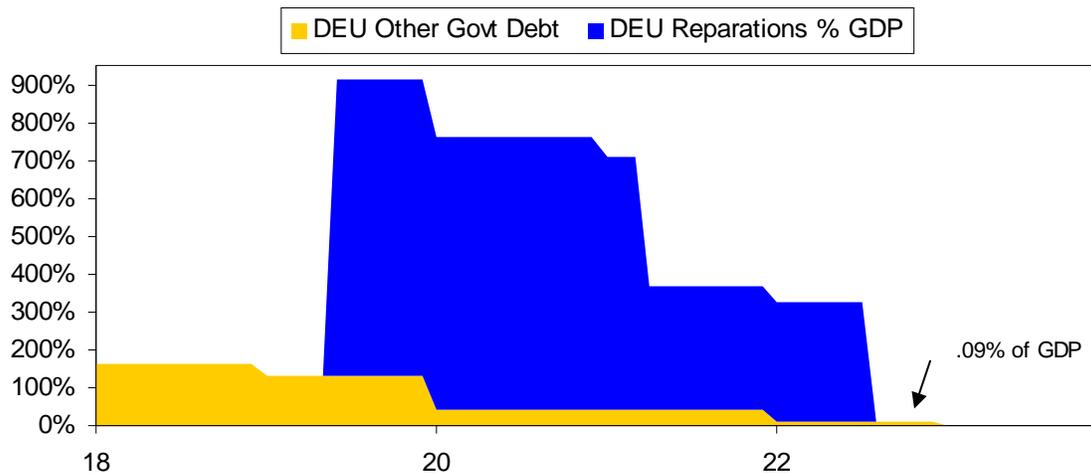
<sup>8</sup> We show the debt level rising after the 1919 Treaty of Versailles made clear the reparations would be huge; the exact amount was initially set by the start of 1921 at 269 billion gold marks and then subsequently restructured.

<sup>9</sup> In the spring of 1921 the Allied Reparations Commission restructured the reparations, cutting them by half to 132 billion marks, but this debt still remained extremely high at about 325% GDP. After the Reich stopped paying reparations in the summer of 1922, the debts were restructured multiple times - to 112 in 1929, and then basically wiped out in 1932.

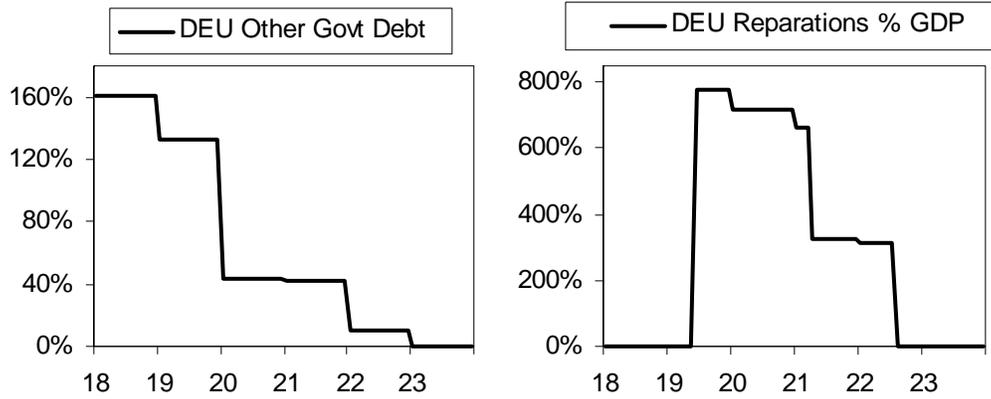
The case of Weimar is one of the most extreme inflationary deleveragings ever. At the end of the war, the Reich government was forced to choose between a shortage of cash and economic contraction or printing to stimulate incomes. The government chose to print and devalue to stimulate the economy, beginning with a 50% devaluation at the end of 1919 that brought the economy out of recession. Eventually, a loss of confidence in the currency and an extreme amount of printing led to hyperinflation and left the currency basically worthless. As shown below, the currency fell essentially 100% against gold and printing was exponential. Starting debt of 913% fell to basically zero. Non-reparations government debt of 133% GDP in 1919 was wiped out by inflation. Gold-based reparation of 780% GDP effectively went into default in the summer of 1922 when reparation payments were halted. We summarize this in the table below and then go through the pieces.

<b>Weimar Republic: 1919-1923</b>	
<b>Monetary Policy</b>	
Chg in FX v. Gold Over Period	-100%
Total % Chg in M0 Over Period	1.2 Trillion %
<b>Attribution of Change in Debt %GDP</b>	
Starting Total Govt Obligations %GDP	913%
Of Which:	
WWI Reparations	780%
Other Govt Debt	133%
Change in Total Govt Obligations %GDP	-913%
Of Which:	
WWI Reparations (Defaulted On)*	-780%
Other Govt Debt (Inflated away)	-133%

The next chart shows the aggregate government obligations owed and its two pieces, the gold-based reparations and other government debt:



As discussed, the non-reparations government debt was eroded rapidly through inflation. While the reparations were not technically imposed until 1921, they effectively existed shortly after the war and it was mostly a question of negotiating how big they would be (the official amount was settled at the start of 1921 and then reduced that spring by about 50%, still a huge sum). Because the reparations were denominated in gold, they held their value until Germany ceased payments in 1922. They were then restrutured several times over the next decade until they were effectively wiped out.



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