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Location Based Financial Risk, Country Risk Rankings

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Abstract

In this paper we will study different types of macroeconomic crises, their causes, and effects to a country's economy, the aspects they all have in common, their differences, and how they affect one another. Some sample cases will be studied for each type of crises, during which we will identify the variables we want to use for our later analysis. In this process we will be heavily relying on the historical data on economic and financial events.

And we will propose a logit model to show a given country's exposure to sovereign debt crisis. In the analysis we take into account the country's inflation rate in a given year and cumulative price change during three years prior, external debt to GDP ratios, and any signals of other macroeconomic crises happening.

Finally, we will discuss the limitations and applications of the model.

The data used for analysis was obtained mostly from the World Bank Database, additions sources will be indicated in the References section.

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Introduction

“Nothing is different, but everything has changed”

Charles De Lint

People by their nature, tend to forget, they mainly focus on the here-and-now. As a result, we forget the past events, facts, causes and consequences and we think what we see and experience now is new, never happened before. Forgetting pain is a survival instinct and it's a powerful tool in doing so, it helps us get on our feet and try again in spite of our past failures. However, at the same time we forget much of the lessons we had learnt. And the same thing happens when we deal with different types of macroeconomic crises. Tulip mania of Dutch Golden Age in the early 17th century is considered the first recorded speculative bubble. However, economic incidents and financial speculations weakening a nation's economy had been happening since as early as ancient times. The Roman emperor Nero was one of the pioneers to debase his empire's currency by decreasing its silver content in 60 AD, in turn producing an annual inflation of around 1,000%. After so many years these events still follow the same pattern, governments print more money to make paying their debts easier, bubbles grow and burst and people keep doing the same mistakes over and over again. Reinhart and Rogoff described this phenomenon best in their book “This time is different”:

“The essence of this time is different is simple. It is rooted in the firmly held belief that financial crises are things happen to other people in other countries and other times. Crises do not happen to us, here and now. We are doing things better, we are smarter, we have learnt from past mistakes (which is not quite true). The old rules of valuation do not apply anymore”.

A short list of manifestations of the syndrome over the past century

The emerging market defaults of the 1930s

What people believed:

There won't be another World War, there is a greater political stability and strong global growth is sustained, developing countries don't have to much external debt.

In reality most of the countries participated in World War I had enormous of built up debts. Regions such as Latin America and Asia, which had escaped the ravages of the war, appeared to have very modest and manageable public finances. The 1920s were a period of relentless global optimism, very similar to the five-year boom that preceded the world-wide financial crisis that began in the USA in mid-2007.

What happened next:

In 1929, a global stock market crash triggered the Great Depression. Economic contraction slashed government resources as global deflation pushed up interest rates in real terms. What followed was the largest wave of defaults in history.

The debt crisis of the 1980s

What people believed:

Commodity prices are strong, interest rates are low, oil money is being "recycled", there are skilled technocrats in government, money is being used

for high-return infrastructure investments, and bank loans are being made instead of bond loans, as in the interwar period of 1920s and 1930s. With individual banks taking large blocks of loans, there will be incentive for information gathering and monitoring to ensure the money is well spent and debts are repaid.

After years of secular decline, the world experienced a boom in commodity prices in the 1970s. Commodity rich Latin America seemed destined to reap enormous profit as world growth powered higher and higher prices for scarce material resources. Global inflation in the developed world had led to a long period of anomalously low real interest rates in rich countries' bond markets. And last but not least, there had been essentially no new defaults in Latin America for almost a generation; the last surge occurred during the Great Depression.

Many officials and law makers spoke very approvingly of the loans from Western banks to developing countries. The banks were said to be performing an important intermediation service by taking oil surpluses from the Organization of Petroleum Exporting countries and "recycling" them to developing countries. Western banks came into loop because they supposedly had the necessary lending and monitoring expertise.

What happened next:

The 1970s built up, like so many before it, ended in tears. Steeply higher interest rates combined with a collapse of global commodity prices catalysed Mexico's default in August 1983, and shortly thereafter the defaults of well over a dozen other major emerging markets, including Argentina, Nigeria, Brazil, Philippines and Turkey.

The Debt Crises of the 1990s in Asia

What people believed:

The region has a conservative fiscal policy, stable exchange rates, high rates of growth and saving, and no remembered history of financial crises.

Asia was the darling of the foreign capital during 1990s. Across the region, (1) households had exceptionally high savings rates that the governments could rely on in case of financial stress, (2) governments had relatively strong fiscal positions so that most borrowing was private, (3) currencies were quasi-pegged to the dollar, making investments safe, and (4) it was thought that Asian countries never have financial crisis.

What happened next:

However, one huge weakness was Asia's exchange rate pegs against dollar, which were often implicit rather than explicit. These pegs left the region extremely vulnerable to a crisis of confidence. And, starting in the summer of 1977, that is precisely what happened.

The Debt Crises of the 1990s and early 2000s in Latin America

What people believed:

The debts are bond debts, not bank debts. (Note how the pendulum swings between the belief that bond debt is safer and the belief the bank debt is safer.) With orders of magnitude more debt holders in the case of bonds than in the case of international banks, countries will be much more hesitant to try to default because renegotiation would be so difficult. During the early 1990s, international creditors poured funds into the Latin American region that had

only just emerged from a decade of default and stagnation. The credit had been mainly channelled through bonds rather than bank loans, leading some to conclude that the debt would be invulnerable to renegotiation. By spreading debt claims out across a wide sea of bond holders, it was claimed, there could be no repeat of the 1980s.

Other factors were also at work, lulling investors. Many Latin American countries had changed from dictatorships to democracies, assuming “greater stability”. Mexico was not at risk because of the North American Free Trade Agreement, which came into force in January 1994. Argentina was not at risk because it had “immutably” fixed its exchange rate to the dollar through a currency board arrangement.

What happened next:

Eventually, the lending boom of 1990s ended in series of financial crises, starting with Mexico’s December 1994 collapse. What followed included Argentina’s \$95 billion default, largest in history at that time, Brazil’s financial crises 1998 and 2002 and Uruguay’s default in 2002.

The United States in the run-up to the financial crisis of the late 2000s (the second Great Contraction)

What people believed:

Everything is fine because of the globalization, the technology boom, our superior financial system, our better understanding of monetary policy, and the phenomenon of securitized debt.

What happened next:

Housing prices doubled and equity prices soared, all fueled by record borrowing from abroad. But most people thought the US could never have a financial crisis resembling that of an emerging market.

Banking Crises, Inflation

Banking Crisis

A banking crisis is a type of many financial crises that affect the activities of a bank or a number of them. These might include a bank run which causes a collapse of a single bank, however sometimes the panic spreads across the system and may take down several banks or even can cause a collapse of the whole financial system. A bank run occurs when a great number of bank's clients starts withdrawing their money from their deposits believing that the bank might fail. And this process is self-fuelling, the more the clients withdraw their money the more the bank gets illiquid, and the panic increases with a very quick pace. How bank runs might eventually cause a crisis of the financial system as a whole can be clearly highlighted in the case of the Great Depression, which ultimately turned into a global economic meltdown. The causes of the depression in 1929 were several different but complex inputs which served for an economic downturn, however the ultimate blow that put the economy on its knees was the stock market crash (black Tuesday) and subsequent bank runs. As the panic spread among consumers across the US, people suddenly became very cautious about their assets, especially the cash they had. Consequently, people started withdrawing their money from banks, that in turn motivated the others to do the same, the rate this

happened increased dramatically by every passing day. Since, as we already know, banks' main function is to convert short term deposits into long term investments, when people asked for their money all at the same time banks were not able to find enough cash to meet all withdrawal requests and became illiquid, thus went bankrupt. Within only a few weeks the whole banking system was already in the worst crisis it had ever seen.

Below you can see some examples of banking panics and systemic banking crises:

Type	Year	Location	Description
Crisis	1763	Amsterdam	Started by the collapse of Johann Ernst Gotzkowsky and Leendert Pieter de Neufville's bank, spread to Germany and Scandinavia
Crisis	1772 – 73	London and Amsterdam	Started by the collapse of the bankers Neal, James, Fordyce and Down
Panic	1792	New York	A financial credit crisis
Panic	1796 – 97	UK and US	Started after a land speculation bubble burst
Panic	1819	US	Culmination of the US's first boom-to-bust cycle
Panic	1825	UK	A pervasive recession in which many banks failed, almost including the Bank of England
Panic	1837	US	A recession with banking failures, followed by a 5 year depression
Panic	1847	UK	A minor banking crisis associated to the burst of the railway bubble
Panic	1857	US	A recession with banking failures
Panic	1866	Europe	
Panic	1873	US	A recession with banking failures, followed by a 4 year depression

Panic	1884	US and Europe	Particularly unusual panic that struck at the end of the recessions of 1882 – 85, instead of doing so at the beginning
Panic	1890	UK and Argentina	Caused by the insolvency of Bearings Banks, thus also known as Bearing Crisis. And most of their investments were made in Argentina
Panic	1893	US	A recession with banking failures
Crisis	1893	Australia	A systemic banking crisis
Panic	1896	US	A recession with banking failures
Panic	1901	US	A recession that started a fight over financial control of the Northern Pacific Railway
Panic	1907	US	A recession with banking failures
Crisis	1927	Empire of Japan	Known as Showa Financial Crisis that resulted in mass banking failures
Crisis, Panics	1929 – 39	Worldwide	The Great Depression – so far the worst the capitalism has seen
Bubble	1986 – 2003	Japan	Japanese asset price bubble
Crisis	1980s – 90s	US	Savings and loan crisis
Crisis	1988 – 92	Norway	A systemic banking crisis
Crisis	1990s	Finland	A systemic banking crisis
Crisis	1990s	Sweden	A systemic banking crisis
Crisis	1992	Peru	A systemic banking crisis
Crisis	1994	Venezuela	A systemic banking crisis
Crisis	1997	Asia	A financial crisis that mostly gripped East and Southeast Asia
Crisis	1999 – 02	Argentina	Collapse of Argentina's economy

Crisis	1998 – 99	Ecuador	A systemic banking crisis
Crisis	2002	Uruguay	A systemic banking crisis
Crisis	2003	Myanmar	A systemic banking crisis
Crisis, Panic	Late 2000s	Worldwide	The “second great depression”
Crisis	2009 – 10	Venezuela	A systemic banking crisis
Crisis	2017 – 18	Ghana	A systemic banking crisis

Table 1

Reasons why banks or financial systems fail

As we can see panics and financial system crises are very common throughout the history. Besides bank runs, a couple of other reasons may as well cause a failure in the banking system. Some of them are the following:

Regulatory failure.

This is one of the simplest ways in which banking crises occur just because a lack of governance. Sometimes agent and principal interest conflicts, even though the board of directors want to focus on the long term prosperity of the bank, the managers tend to take on very high risks to increase their short term earnings. But this is very likely to happen because of the very nature of the reward scheme the banks use. Yearly bonuses serve as a very strong incentive for bankers to increase their short-term profits no matter the cost and risk.

Stock market positive feedback loop (usually a boom and bust).

Sub-prime mortgage disaster of 2007 – 09 is the brightest example of banking system crash because of this reason. John Maynard Keynes once compared financial markets to a beauty contest, where investors are keen to pick what is attractive other investors. This statement has actually some truth in it and this behaviour creates dramatic rises and falls, as we know bubbles and busts, in turn the poorly leveraged banks will be thrown to huge losses.

Contagion.

The way we transfer funds and do business inter-continents and countries have been dramatically changed with development of technology in general. This in turns makes the whole system very contagious – an incident that occurs in one part of the world can be easily spread to the rest of the world.

Banking crises bring dramatic negative consequences on the economy overall, often resulting in an eventual financial and economic crisis in a given system. Repercussions may range in short- and long-term, domestically and globally, that underline the severe aftermath of irresponsible banking practices, bank runs and poor regulations by governments.

Consequences.

Domestic consequences.

Banks coordinate the nation's savings and investment in the economy: pooling money to capture higher returns for everyone and simultaneously funding businesses leveraging debt and equity. With this in mind, we can already picture the resulting disorder in the economy.

First of all, investment suffers. Illiquid banks are not anymore able to lend money to businesses that depend on loans for their operations. When they cannot raise the capital they need to execute their operations optimally, the production declines, prices soar. This happens with all debt-dependant industries throughout the economy, eventually declining the total output. Higher prices, lower output, consumers being uncertain about the future, all combined depress the economy further. Businesses now seek out the ways to cut costs which includes letting go some of their workers. Unemployment surges, tax revenues decline. The process can be reversed only after the consumer and investment confidence is recovered that takes a significant amount of time.

Global consequences.

We can expect what domestic consequences we will face intuitively, however complicated interdependence of the global market makes it a bit harder to predict the effects of a banking crises in a country in the global scope. Imports and exports play a large role in the wellbeing of most developed countries as well as the emerging ones, as a result the relative well-being of the trade partners plays critical role. This dependency can be well illustrated in the following graph, which shows the growth in GDP for world economies in 2009. The slow and negative growth demonstrates all the economic losses that resulted in part from the US financial crisis:

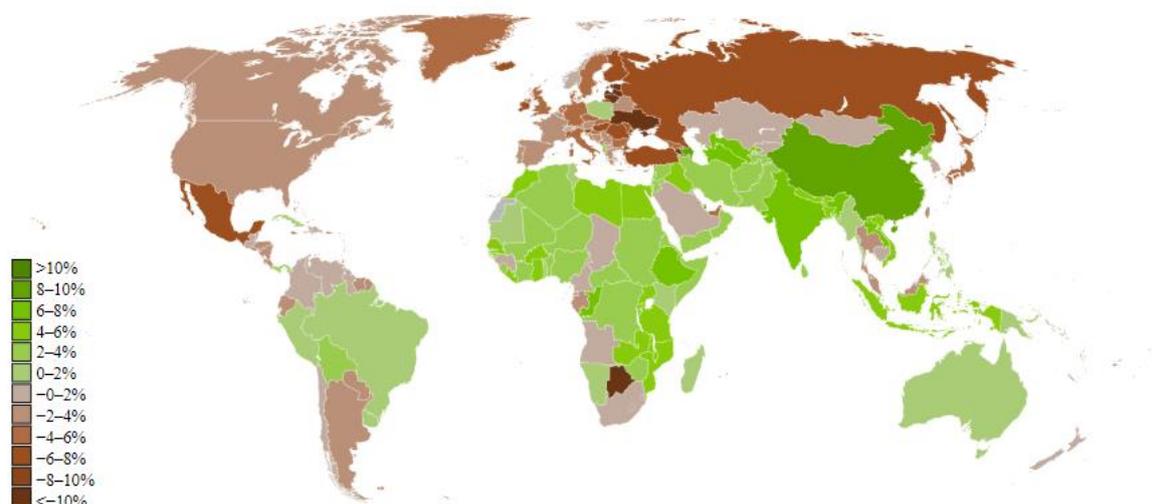


Figure 1. 2009 GDP Growth Rates

Some sample cases:

Finnish Banking Crisis.

In the late 1980s in Finland debt-based economic boom emerged that caused the crash of the whole financial system of the country. Until the 1980s, the Finnish banking system was tightly regulated with the Bank of Finland controlling interest rates, and import and export of foreign currencies. But in the late 1980s the financial system got mostly deregulated and that led to a massive credit expansion largely based on foreign debt. The banks started to actively participate in profit - seeking, very high-risk operations such as taking-over companies in which they did not have any prior experience. The banks finally collapsed in September 1991.

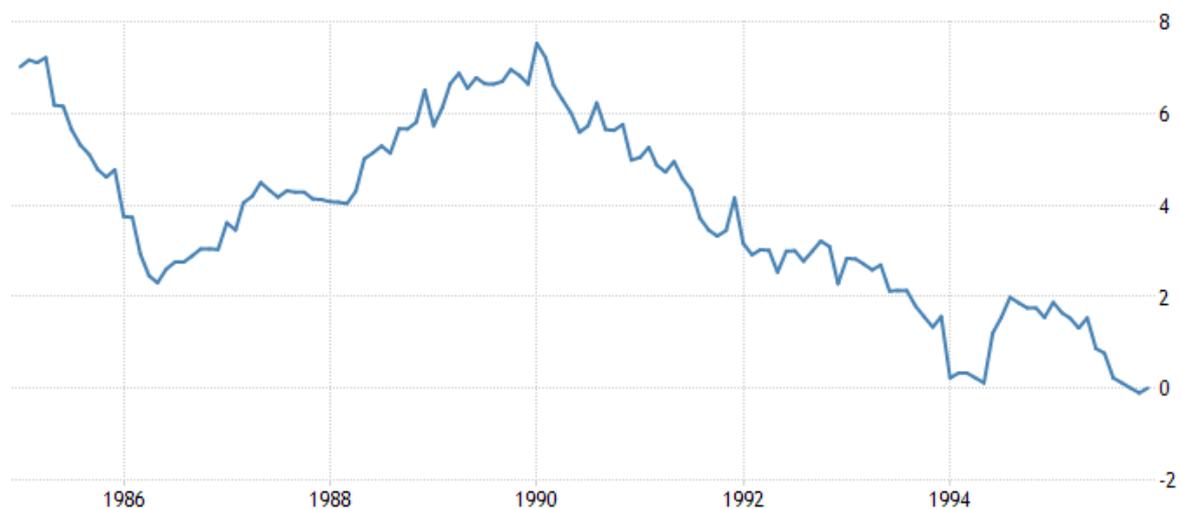


Figure 2. Inflation rate between 1985 – 1995, Finland (source: TRADINGECONOMICS.COM)

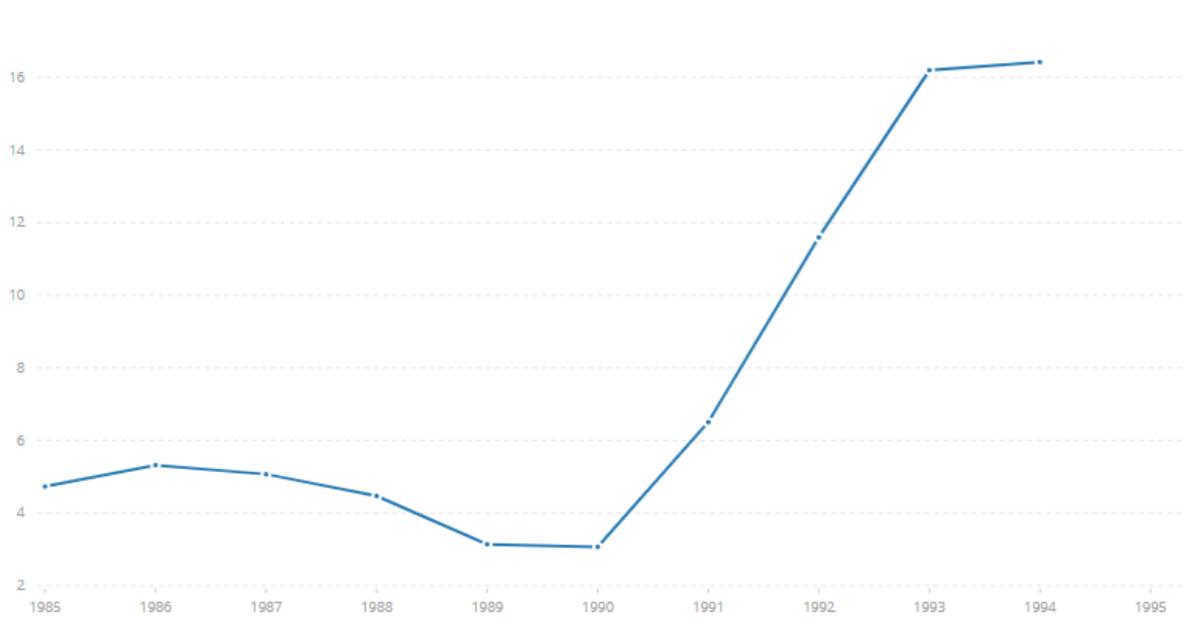


Figure 3. Unemployment rate between 1985 – 1995, Finland (source: WORLDBANK DATA)

Norwegian banking crisis 1988 – 92

This was the largest financial crisis that happened in Europe since the end of World War II. Things started falling apart after a major financial deregulation removed caps on lending rates. Banks in Norway started taking engaging in much riskier credit operations which resulted in a bank lending boom. Banks had no experience in competitive credit markets and inspections of creditability were very relaxed. What followed was lower household investments. In 1985 a significant drop in oil price caused in Norwegian deficit and devaluation of Krone. As public and private institutions started consolidating their books the recession began. In the following graph we can see how oil prices changed since 1946:

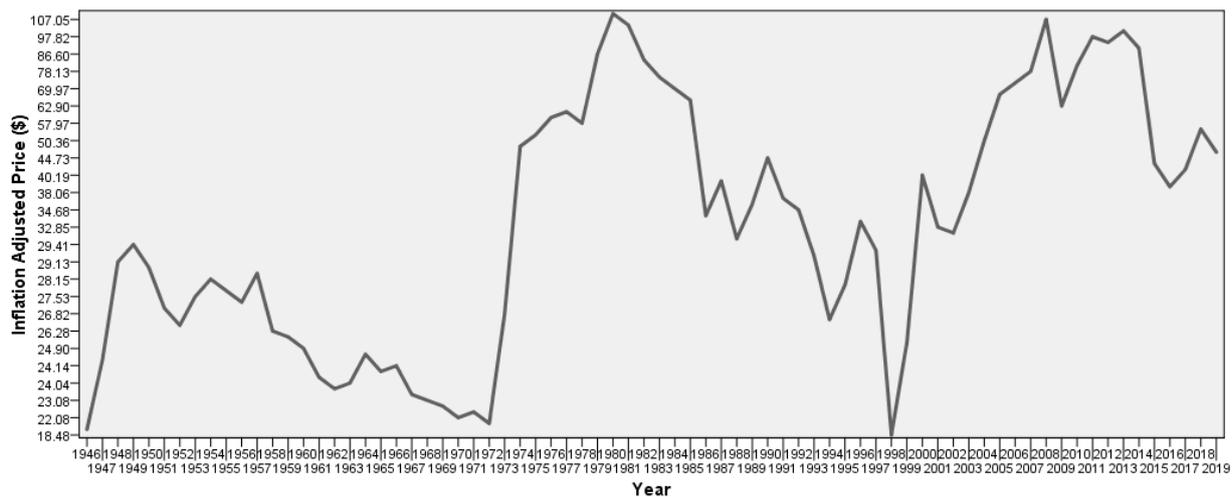


Figure 4. Oil price changes since 1946

As we can see, from 1972 on within 10 years, oil prices rose with a “boom” behaviour. The message here – the main source of income of a nation, be it a commodity, or oil, or gold and how their price change over time can serve as an important indicator when we analyse the vulnerabilities of a given economy.

1988 – 1990

At first smaller banks started to fail. Interbank credits started to freeze as the overnight rate increased. A shortage of capital put several banks in danger, most of which was saved through mergers with solvent banks.

1990 – 1992

Although the credible exchange rates were restored with the belief that the recession was over, with the reunification of Germany and the turbulence in the foreign exchange market Norwegian exchange rates rose to levels that was even higher than before. As the crisis span out of control, several large banks lost their all equity capital

resulting in major market freeze-ups. Many banks became insolvent and lending rates hit enormous highs.

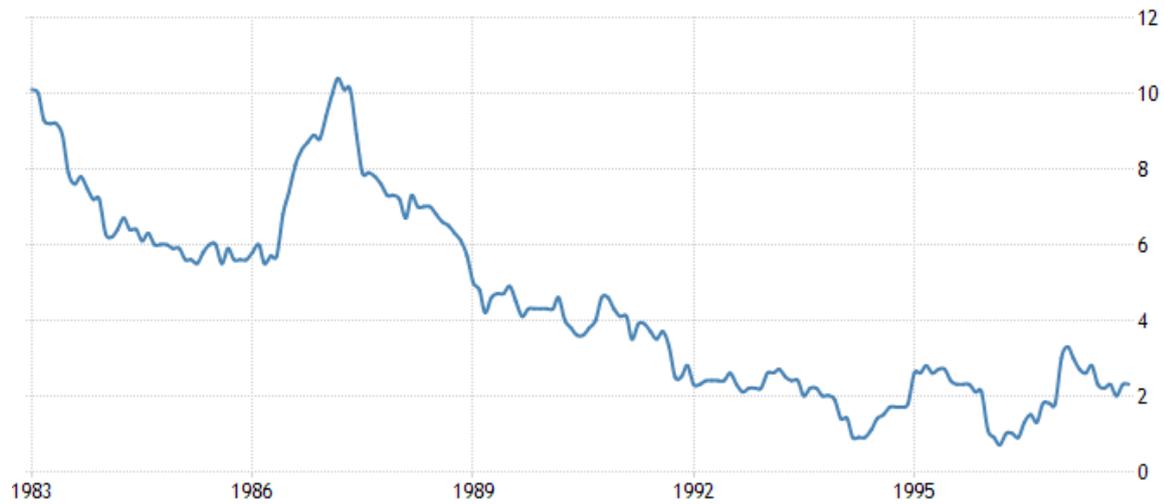


Figure 5. Inflation rate between 1983 – 1997, Norway (source: TRADINGECONOMICS.COM)

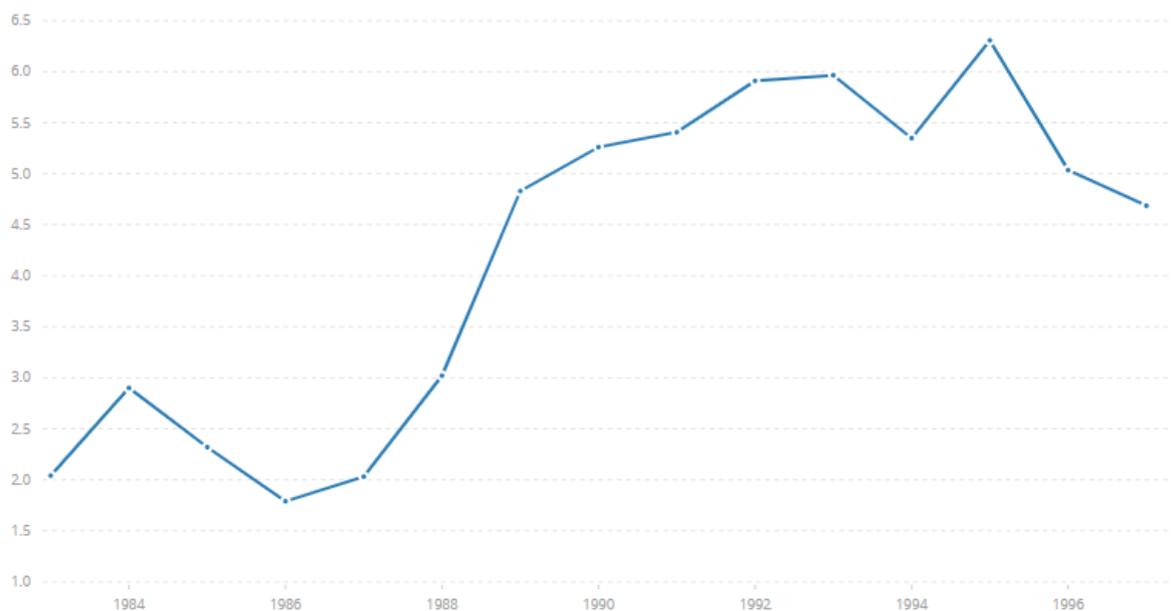


Figure 6. Unemployment rate between 1983 – 1997, Norway (source: WORLDBANK DATA)

Venezuelan banking crisis 1994

A huge banking crisis in Venezuela occurred in 1994 after a number of banks were taken over by the government. The first one to fail in January 1994 was the country's second largest bank Banco Latino. Two major banks which were accounted for 18% of the deposits later followed the trend. Banco de Venezuela was the tenth bank bailed out by the government at an estimated cost of USD\$ 294 m. Between January 1994 and August 1995 17 of the country's 49 commercial banks failed, wiping out 53% of the system's assets.

Banco Latino was "too big to fail". When it happened however, people lost confidence in the banking system of Venezuela and rushed to rescue their money not only from Banco Latino but also the other banks they suspected as weak. Within three weeks one third of the whole banking system was forced to shut down or kept running with heavy government financing. Almost \$2 billion flew out of the country.

Causes: Like it was the case of Peruvian crisis of 1992, political instability was one of the main reasons why that disaster happened. But the most important cause was the liberalization of the banking system disorderly. From 1989 on banks had been allowed to gamble their deposits freely. Under limited supervision they started lending to very risky ventures. We can see the real interest rate hike from negative 35 to positive 20 in only four years.

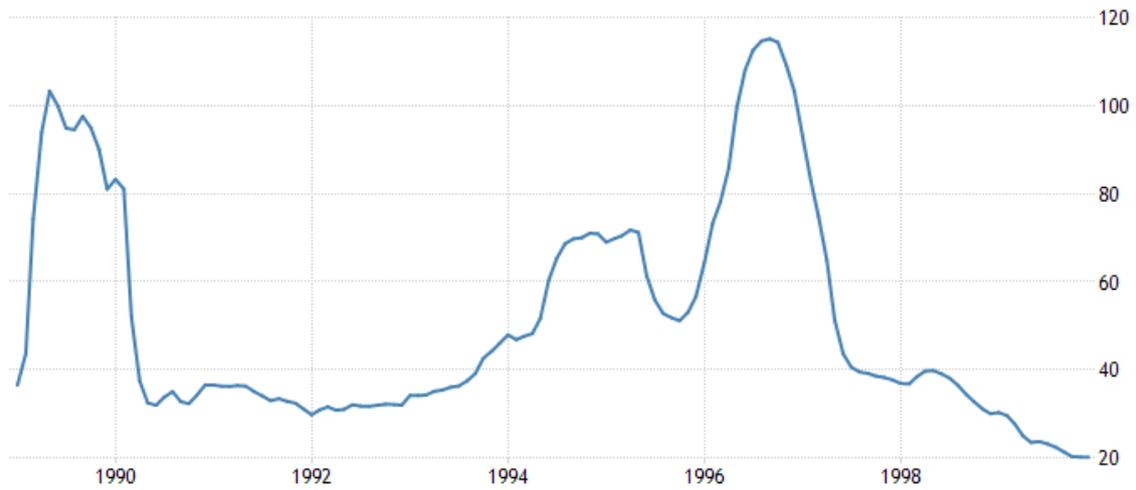


Figure 7. Inflation rate between 1989 – 1999, Venezuela (source: TRADINGECONOMICS.COM)

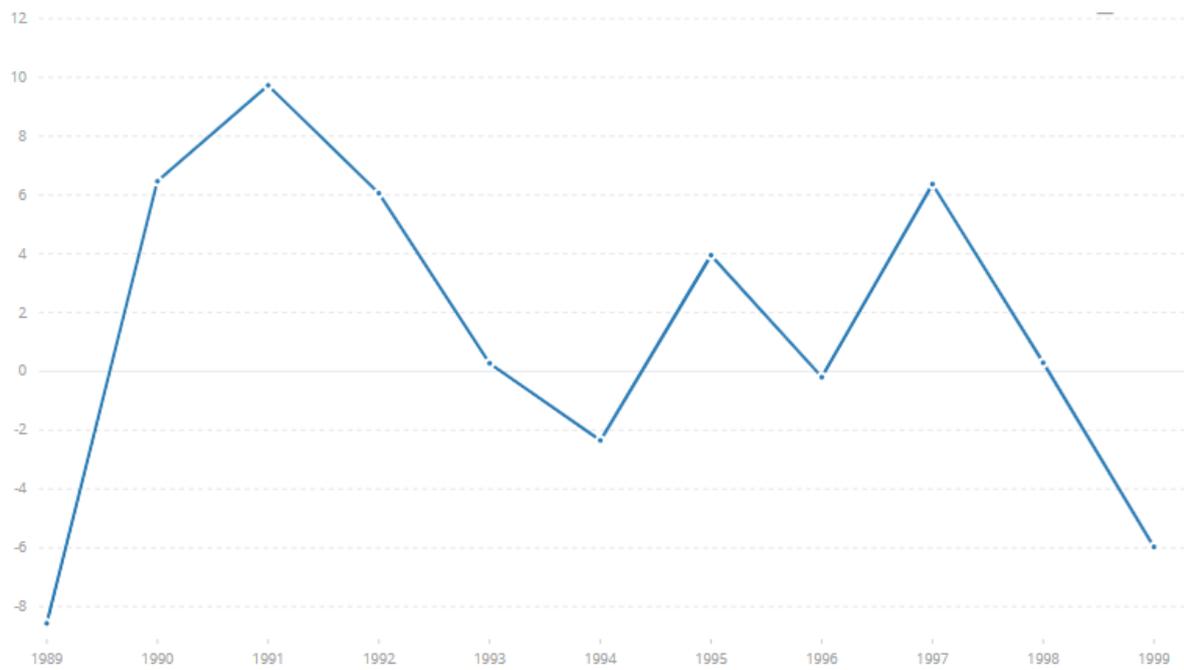


Figure 8. GDP growth (annual %) between 1989 – 1999, Venezuela (source: WORLDBANK DATA)

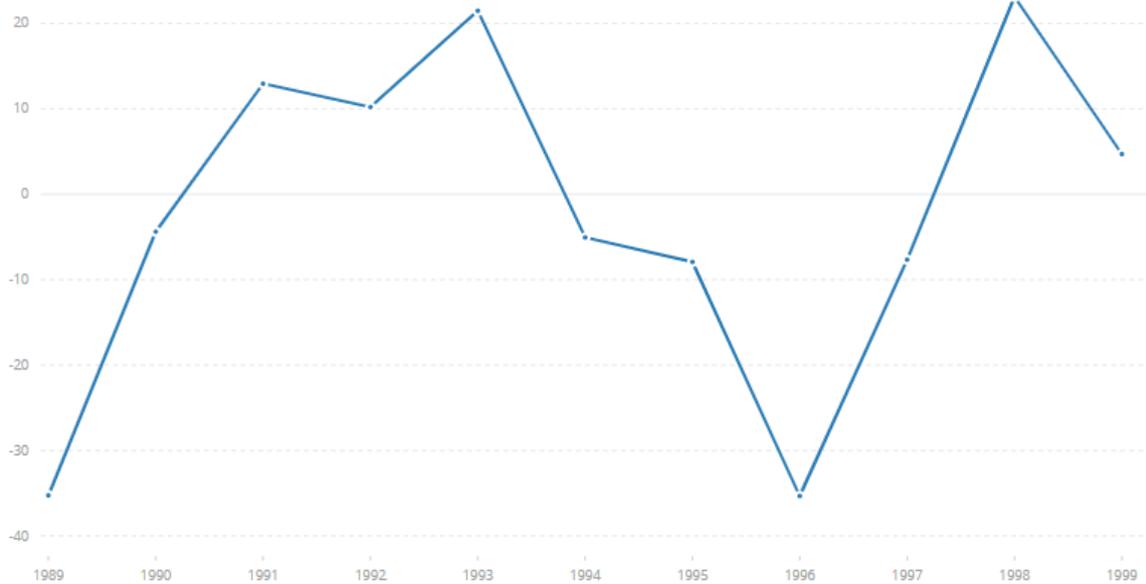


Figure 9. Real interest rate between 1989 – 1999, Venezuela (source: WORLDBANK DATA)

Capital Flow Bonanzas and Banking Crises

One common feature of the run-up to banking crisis is a sustained surge in capital inflows, for which Kaminsky and Reinhart used the term a “capital flow bonanza”. They portray a criterion to define capital flow bonanza episodes for 1960-2006, and examine the links between bonanza spells and banking crises.

From the dates of banking crises and capital flow bonanzas, two country-specific probabilities can be calculated: the unconditional probability of banking crisis and the probability of a banking crisis within a window of three years before and after a bonanza year or years – that is the conditional probability of a crisis. If capital flow bonanzas make countries more crisis prone, the conditional probability of a crisis should be greater than the unconditional probability.

The following table reproduces a subset of the results given by Reinhart and that are relevant to banking crisis. It presents aggregates of the country-specific conditional

and unconditional probabilities for three groups (all countries, high-income countries, and middle and low-income countries). The probability of a banking crisis conditional on a capital bonanza is higher than the unconditional probability.

Indicator	Percentage of Countries
Probability of a banking crisis	
Conditional on a capital flow bonanza (three year window)	18.4
Unconditional	13.2
Difference	5.2*
Share of countries for which the conditional probability is greater than the unconditional one	60.9

Table 2. Probability of a banking crises with and without the presence of capital flow bonanzas.

These findings on capital flow bonanzas are also consistent with other identified empirical similarities surrounding credit cycles. Mendoza and Terrones, who examine credit cycles in both advanced and emerging market economies using a very different approach from that just discussed, find that credit booms in emerging market economies are often preceded by surges in capital inflows. They also conclude that, although not all credit booms end in financial crisis, most emerging market crises were preceded by credit booms. They link credit booms to rising asset prices.

The real estate bubble in the United States that began to deflate at the end of 2005 occupies the centre stage as a culprit in the recent global financial crisis. But the Second Great Contraction is far from unique in that regard. Studies show that banking crisis tend to occur either at the peak of a boom in real housing price or right after the burst. Gerdrup presented a compelling narrative of the links between Norway's three

banking crises from the 1890s through 1993 and the booms and bursts in housing prices.

The table below illustrates the magnitudes and durations of the downturns in housing prices that have historically accompanied major banking crises in both advanced and emerging economies.

Country	Year of crisis	Peak	Through	Downturn duration	Magnitude of decline (percent)
Advanced Economies: The Big Five					
Finland	1991	1989:Q2	1995:Q4	Six Years	-50.4
Japan	1992	1991:Q1	Ongoing	Ongoing	-40.2
Norway	1987	1987:Q2	1993:q1	Five Years	-33.3
Sweden	1991	1990:Q2	1994:Q4	Four Years	-31.7
Asian economies: The big Six					
Hong Kong	1997	1997:Q2	2003:Q2	Six Years	-58.9
Indonesia	1997	1994:Q1	1999:Q1	Five Years	-49.9
Malaysia	1997	1996	1999	Three Years	-19.0
Philippines	1997	1997:Q1	2004:Q3	Seven Years	-53.0
South Korea	1997		2001:Q2	Four Years	-20.4
Thailand	1997	1995:Q3	1999:Q4	Four Years	-19.9

Other emerging economies					
Argentina	2001	1999	2003	Four Years	-25.5
Colombia	1998	1997:Q1	2003:Q2	Six Years	-51.2
Historic Episodes					
Norway	1898	1899	1905	Six Years	-25.5
United States	1929	1925	1932	Seven Years	-12.6
Current Cases					
Hungary	2008	2006	Ongoing	Ongoing	-11.3
Iceland	2007	2007	Ongoing	Ongoing	-9.2
Ireland	2007	2006	Ongoing	Ongoing	-18.9
Spain	2007	2007:Q1	Ongoing	Ongoing	-3.1
United Kingdom	2007	2007	Ongoing	Ongoing	-12.1
United States	2007	2005	Ongoing	Ongoing	-16.6

Table 3.

Two features stand out from the summary statistics presented in the table. First is the persistence of the cycle in real housing prices in both advanced and emerging markets, typically for four to six years. The second feature that stands out is that the magnitudes of the declines in real housing prices around banking crises from peak to trough are not appreciably different in emerging and advanced economies. This comparability is

quite surprising given that most macroeconomic time series exhibit drastically greater volatility in emerging markets.

Banking Crises in Repressed Financial Systems

Under financial repression, banks are vehicles that allow governments to squeeze more indirect tax revenues from citizens by monopolizing the entire savings and payments system, not simply currency. Governments force local citizens to save in banks by giving few, if any, other options. Then they stuff debt into banks via reserve requirements and other devices. This allows the government to finance a part of its debt at a very low interest rate. Financial repression thus constitutes a form of taxation. Citizens put money into banks because there are few safe options to keep their savings. Governments, in turn, pass regulations and restrictions to force banks to relend the money to fund public debt. Of course, in cases the banks are run by the government, the central government simply directs the banks to make loans to it.

Governments frequently can and do make the financial repression tax even larger by maintaining interest rate caps while creating inflation. For example, this is precisely what India did in the early 1970s when it capped the bank interest rate 5 percent and engineered an increase in inflation of more than 20 percent. Sometimes even that action is not enough to satisfy government' voracious need for revenue savings and they stop paying their debts entirely (a domestic default). The domestic default in turn forces banks to default on their own liabilities so that the depositors lose some or all their money. (In some cases, the government might have issued deposit insurance, but in the event of default it simply reneges on that promise, too.)

Why Recessions Associated with Banking Are So Costly

Severe financial crisis rarely occurs in isolation. Rather than being the trigger of a recession, they are more often amplification mechanism: a reversal of fortunes in output growth leads to a string of defaults on bank loans, forcing a pullback in other bank lending, which leads to further output falls and repayment problems, so on. Besides, banking crises are often accompanied by other crises including exchange rate crisis, foreign and domestic debt crisis, inflation crisis.

One of the most influential studies on how financial crises can impact on real activity was reported in 1983 by Bernanke, who argued that when nearly half of the banks failed in the early 1930s, it took the financial system a long time to rebuild its lending capacity. According to Bernanke, the collapse of the financial system was the major factor why the Great Depression persisted, on and off, for a decade rather than ending in a year or two like a normal recession does.

In later work with Mark Gertler, Bernanke presented theoretical model dealing detailing how the presence of imperfections in financial market due to asymmetric information between lender and borrowers can result in an amplification of monetary policy shocks. In the Bernanke-Gertler model, a decrease in wealth has an outsized effect on production as firms are forced to scale back their investment plans. Firms are forced to scale back on investments because, as their retained earnings fall, they must finance a larger share of their investment projects via more expensive external financing rather than cheaper internal funding. Recessions cause a loss in collateral that is then amplified through the financial system.

Kiyotaki and Moore trace out a similar dynamic in a richer intertemporal model. They show how a collapse in land prices can undermine a firm's collateral, leading to a pullback in investment that causes a further fall in land prices, and so on.

In his 1983 article, Bernanke emphasized that the collapse of the credit channel in recessions is particularly acute for small and medium sized borrowers who do not have name recognition and therefore have far less access than larger borrowers to bond and equity markets as an alternative to more relationship – oriented bank finance. Many subsequent papers published had confirmed that small and medium-sized businesses do suffer disproportionately during a recession, with a fair amount of evidence pointing to bank lending channel as a central element. There is indeed significant theoretical and empirical support for the view that a collapse in a country’s banking system can have huge implications for its growth trajectory.

We now turn to the empirical evidence. Given the vulnerability of banking systems to runs, combined with the theoretical and empirical evidence that banking crises are major amplifiers of recessions, it’s little wonder that countries experience greater difficulties in outgrowing financial crises than they do in escaping a long history of sovereign debt crises.

Banking Crises: An Equal-Opportunity Menace

As we will see later, the frequency of default (or restructuring) on external debt is significantly lower in advanced economies than in emerging markets. For many high-income countries, that frequency has effectively been zero since 1800. Even countries with a long history of defaults prior to 1800, such as France and Spain, present evidence of having graduated from serial default on external debt. The second column of the following table highlights the vast difference in the experience of sovereign default between emerging markets and high-income Western-Europe, North America and Oceania. The third column presents the analogous calculation for each country’s banking crises. A striking observation from the tables is that average length of time a country spends in a state of sovereign default is far greater than the average amount of time spent in financial crisis. A country can circumvent its external creditors for an

extended period. It is far costlier to leave a domestic banking crisis hanging, however, presumably due to the crippling effects on trade and investment.

Debt and Banking crises: prior to 2008		
Country	Share of years in default or rescheduling since 1800 or independence	Share of years in banking crisis since 1800 or independence
Africa		
Algeria	13.3	6.4
Angola	59.4	17.6
Central African Republic	53.2	38.8
Cote d'Ivoire	48.9	8.2
Egypt	3.4	5.6
Kenya	16.6	19.6
Mauritius	0.0	2.4
Morocco	15.7	3.8
Nigeria	21.3	10.2
South Africa	5.2	6.3
Tunisia	9.6	9.6
Zambia	27.9	2.2
Zimbabwe	40.5	27.3
Asia		
China	13.0	9.1
India	11.7	8.6
Indonesia	15.5	13.3
Japan	5.3	8.1

Korea	0.0	17.2
Malaysia	0.0	17.3
Myanmar	8.5	13.1
The Philippines	16.4	19.0
Singapore	0.0	2.3
Sri Lanka	6.8	8.2
Taiwan	0.0	11.7
Thailand	0.0	6.7
Europe		
Austria	17.4	1.9
Belgium	0.0	7.3
Denmark	0.0	7.2
Finland	0.0	8.7
France	0.0	11.5
Germany	13.0	6.2
Greece	50.6	4.4
Hungary	37.1	6.6
Italy	3.4	8.7
The Netherlands	6.3	1.9
Norway	0.0	15.7
Poland	32.6	5.6
Portugal	10.6	2.4
Romania	23.3	7.8
Russia	39.1	1.0
Spain	23.7	8.1
Sweden	0.0	4.8
Turkey	15.5	2.4
United Kingdom	0.0	9.2

Latin America		
Argentina	32.5	8.8
Bolivia	22.0	4.3
Brazil	25.4	9.1
Chile	27.5	5.3
Colombia	36.2	3.7
Costa Rica	38.2	2.7
Dominican Republic	29.0	1.2
Ecuador	58.2	5.6
El Salvador	26.3	1.1
Guatemala	34.4	1.6
Honduras	64.0	1.1
Mexico	44.6	9.7
Nicaragua	45.2	5.4
Panama	27.9	1.9
Paraguay	23.0	3.1
Peru	40.3	4.3
Uruguay	12.8	3.1
Venezuela	38.4	6.2
North America		
Canada	0.0	8.5
United States	0.0	13.0
Oceania		
Australia	0.0	5.7
New Zealand	0.0	4.0

Table 4.

The next table present a different perspective on the prevalence of banking crisis. The second column tallies the number of banking crises since a country's independence or 1800; the third column narrows the window the post – World War II era. Several features are worth nothing. For the advanced economies over the full span, the picture emerges is one of serial banking crises. The world's financial centers – The United Kingdom, The United States and France – stand out in this regard, with 12, 13 and 15 episodes of banking crises since 1800, respectively. The frequency of banking crises dropped markedly for the advanced economies and larger emerging markets alike after WW II. However, all except Portugal experienced at least one postwar crisis prior to the recent one.

Frequency Banking crises: prior to 2008		
Country	Number of Banking Crises since 1800 or independence	Number of Banking Crises since 1945 or independence
Africa		
Algeria	1	1
Angola	1	1
Central African Republic	2	2
Cote d'Ivoire	1	1
Egypt	3	2
Kenya	2	2
Mauritius	1	1
Morocco	1	1
Nigeria	1	1
South Africa	6	2
Tunisia	1	1

Zambia	1	1
Zimbabwe	1	1
Asia		
China	10	1
India	6	1
Indonesia	3	3
Japan	8	2
Korea	3	3
Malaysia	2	2
Myanmar	1	1
The Philippines	2	2
Singapore	1	1
Sri Lanka	1	1
Taiwan	5	3
Thailand	2	2
Europe		
Austria	3	1
Belgium	10	1
Denmark	10	1
Finland	5	1
France	15	1
Germany	8	2
Greece	2	1
Hungary	2	2
Italy	11	1
The Netherlands	4	1
Norway	6	1
Poland	1	1

Portugal	5	0
Romania	1	1
Russia	2	2
Spain	8	2
Sweden	5	1
Turkey	2	2
United Kingdom	12	4
Latin America		
Argentina	9	4
Bolivia	3	3
Brazil	11	3
Chile	7	2
Colombia	2	2
Costa Rica	2	2
Dominican Republic	2	2
Ecuador	2	2
El Salvador	2	2
Guatemala	3	2
Honduras	1	1
Mexico	7	2
Nicaragua	1	1
Panama	1	1
Paraguay	2	1
Peru	3	1
Uruguay	5	2
Venezuela	2	2
North America		
Canada	8	1

United States	13	2
Oceania		
Australia	3	2
New Zealand	1	1

Table 5.

Banking Crises, Capital Mobility, Financial Liberalization

Also consonant with the modern theory of crises is the striking correlation between freer capital mobility and the incidence of banking crisis, as shown in the figure below:

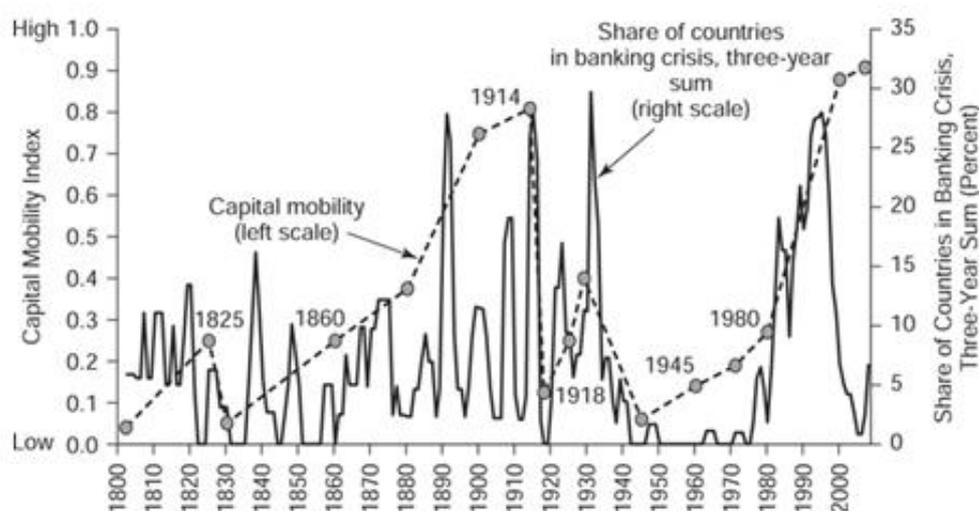


Figure 10.1. Capital mobility and the incidence of banking crises: All countries, 1800–2008.

The figure is highly aggregated, but a breakdown to regional or country-level data reinforces the message of the figure. Periods of high international capital mobility have repeatedly produced international banking crises, not only famously, as they did in the 1990s, but historically. The figure plots a three-year moving average of the share of all countries experiencing a banking crisis on the right-hand scale. On the left-hand scale we plotted the index of international capital mobility, using the same design

principle as Obstfeld and Taylor, both updated and cast back in time, to cover our full sample period. Although the Obstfeld-Taylor index may have its limitations, we feel it nevertheless provides a concise summary of complicated forces by emphasizing de facto capital mobility based on actual flows.

For the period after 1970, Kaminsky and Reinhart have presented a formal evidence of the link between crises and financial liberalization. In eighteen of the twenty-six banking crises they studied, the financial sector had been liberalized within the preceding five years, and often less. In the 1980s and 1990s, most liberalization episodes were associated with financial crises of varying severity. In only a handful of countries (for instance Canada) did liberalization of the financial sector proceed smoothly. Specifically, Kaminsky and Reinhart present evidence that the probability of a banking crisis conditional on financial liberalization having taken place is higher than the unconditional probability of a banking crisis. Using fifty-three-country sample for the period 1980-1995, Demirgüç-Kunt and Detragiache also show, in the context of multivariate logit model, that financial liberalization has an independent negative effect on the stability of the banking sector and this result is robust across numerous specifications.

The stylized evidence presented by Caprio and Klingebiel suggests that inadequate regulation and lack of supervision at the time of liberalization may play a key role in explaining why deregulation and banking crises are so closely entwined. Again, this is a theme across developed countries and emerging markets alike. In the 2000s the United States for all its this-time-is-different hubris, proved no exception, for financial innovation that is a variant of the liberalization process.

As the evidence from the crisis cases discussed above suggests, besides having some other causes, financial meltdowns and banking crises happen after a type of boom. Let

it be a real estate boom or a credit boom it always brings easy money with it and encourages people to spend way more than their means.

Currency crash / Hyperinflation

Causes

Hyperinflation by definition is when prices for goods rise more than 50 percent a month. It ignites when a government starts printing money to pay its expenses. As the money supply increases the prices start moving in the same direction. The other, rarer and less disastrous case is when increased demand outstrips the supply pushing prices up. Instead of tightening the money supply governments keep printing more money and with too much money around prices skyrocket. Once the consumers realize that prices are increasing too rapidly they try to buy more of goods now that fuels even more price hikes. That also effects the supply side, knowing that they will sell their good for a higher price tomorrow than today they tend to keep their goods in stock which decrease the supply further.

Consequences

To save themselves from paying more tomorrow people start stacking the goods in bulks, this in turn creates shortages. It starts with durable goods first, such as household machines, cars, as the things get worth customers start hoarding even the perishable goods such as milk and eggs. These daily supplies become very scarce.

People's life savings are now worthless as the inflation wiped away the value of the cash they hold. The elderly is the most vulnerable to this incident for this reason. In no time the banks and other institutional lenders go out of business, as now their loans lost most their value. Moreover, people no longer make deposit making banks run out of cash.

The value of the local currency plummets in foreign exchange markets. The importers of the nation go bankrupt as they no longer afford the ever increasing prices of foreign goods. Companies fold and unemployment soar. With the falling government tax revenues, it starts struggling to provide basic services, to pay its bills the government prints more money sending the inflation even deeper.

Hyperinflation can be advantageous only to two parties: The ones who had taken loans as they now owe to their lenders next to nothing, and the exporters exports becoming cheaper with the falling currency. Besides, the foreign currency they obtained from exports gains value against local currency with every passing day.

Cases

Hyperinflation of Germany in 1920s.

Hyperinflation in Germany in 1920s is arguably the best known example of this incident. To cover the expenses of the World War I, Germany started printing more money. By the time the war ended the number of Deutschmarks in circulation went from 13 billion to 60 billion. In addition to that, the government issued bonds which had the same effect as printing money. The sovereign debt went 5 billion to 156 billion marks.

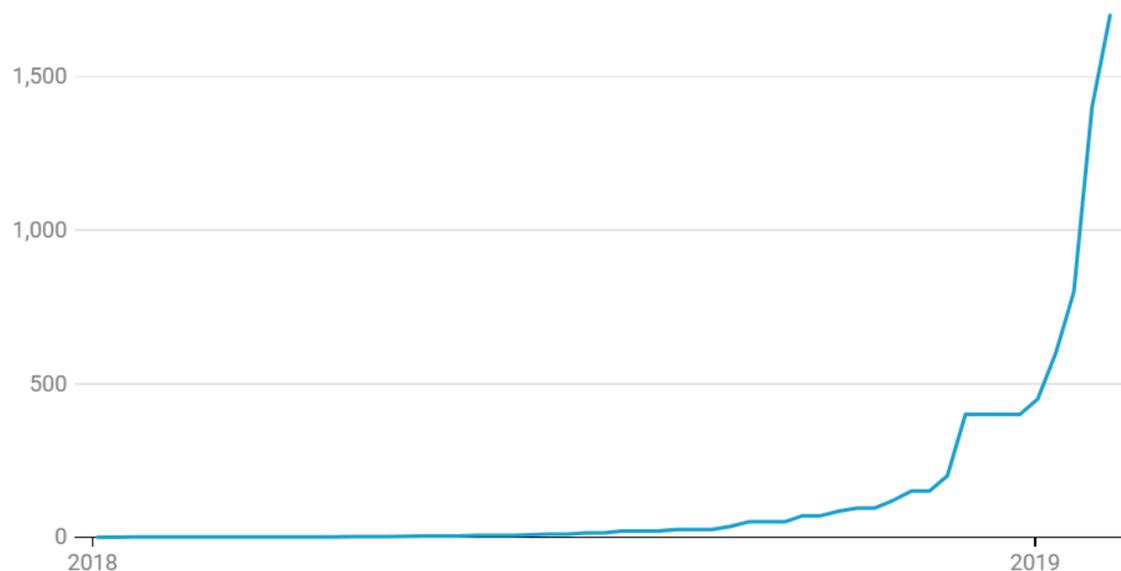
When the war ended, the allies saddled Germany with another 132 billion marks for war reparations. Production collapsed, that lead to shortages of goods. As there was excess amount of cash and almost no goods, prices for daily consumables doubled every 3.7 days. The inflation rate was 20.9 percent per day.

Hyperinflation of Venezuela, 2013 – 2014 to present

Imagine a store that none of its goods has a price tag, you only know what you are paying when the cashier calculates it for you. The price can be twice as much or more than it was an hour ago. And that's if you find anything in the store. This is the very

case in Venezuela right now. In 2013 price jump in Venezuela was 41 percent, and 63, 121, 481, 1642, 2880 percent in 2014, 2015, 2016, 2017 and 2018 years respectively. Currently, the government of Venezuela refuses to publish the current inflation rate in the country, however, Bloomberg's Venezuelan Café Con Leche Index suggests about 380,000 percent based on the price of a cup of coffee. Price for a cup of coffee has increased from 0.2 bolivars to 1,700 bolivars in January 2019 since a year ago.

Bloomberg created the Venezuelan Café Con Leche Index, using the price of a single cup of coffee, because Venezuela's government refuses to publish inflation statistics.



Based on the price of a coffee from a bakery in Caracas. In the year to the end of January 2019 the price rose from 0.45 to 1,700.00 bolivars. The currency devaluation in August 2018 means 1,700.00 new bolivars equal 170,000,000 old bolivars.

Source: [Bloomberg](#)

Figure 11.

The cause of this disaster in Venezuela is purely Political. Former president Hugo Chavez's office had price controls over food and medicine. However, the mandated prices were too low and that forced the local companies to run out of business. Seeking to save the day the government started paying for imports. In 2014 the oil prices plummeted eroding revenues of government owned oil companies. Having run out of cash the government started printing more money. Circumstances make

Venezuelans realize that saving money in local currency was as bad as throwing money away. People started converting their savings into foreign currencies, such as USD. That in turn served to lower the value of bolivar even further. In response to that the government issued currency control: it set a fixed exchange rate, and made it difficult to actually get a permission to convert bolivar to the US dollars. These all meant to stabilize the currency by shutting down the currency transactions.

However, US dollars were still available in the black market. As the crisis deepened, more and more people wanted to swap their money to US dollars, which pushed the prices in the black market even higher. That created a difference between the official conversion rate and the black market one. Soon an increasing number of ordinary people started engaging in unofficial currency market activities. People would cross the border, withdraw USD from their accounts in Colombia in official rate, come back to Venezuela and sell the currency they withdrew with a tidy profit.

Hyperinflation has been experienced by a very few economies, and it is difficult to stop it without cutting massive government spending and bringing political stability.

Public Debt and Sovereign Defaults

Public Debt

Public debts in the advanced economies have surged in early 2010s to levels that have not been recorded since the end of WWII. Through 2010, the average public debt/GDP ratio for all the advanced economies has surpassed the pre-WWII peaks reached during WWI and subsequently during the Great Depression.

As documented in Reinhart, Rogoff, and Savastano (2003) for emerging market countries, large public debt overhangs do not unwind quickly and it does very often painfully. In particular, debt-to-GDP ratios are rarely reduced entirely through consistent robust economic growth.

In a complementary analysis of private debt deleveraging episodes following systemic financial crises, Reinhart and Reinhart (2011) show that the debt reduction process goes on for an average of about seven years. Also, because of declining output and accumulating arrears on existing debts, private debt ratios usually continue to climb even until after two or three years after the height of the financial crisis – delaying the effective reduction of debt ratios.

Financial Crisis and Debt

Default and Banking Crises

A high incidence of global banking crises has been historically associated with high incidence of sovereign defaults on external debt.

The channels through which global financial turbulence could prompt more sovereign debt crises in emerging markets are numerous and complex. Some of these channels are as following:

- Banking crises in advanced economies drag down the global growth significantly. The slowing or outright contraction of economic activities hit the export especially hard, limiting the hard currency to the governments of emerging markets and making it difficult to serve their external debt.
- Weakening global growth has always been associated with declining world commodity prices. These reduce the profit of the primary

commodity exporters, and accordingly their ability to serve the external debt.

- Banking crises in global financial centres produce a “sudden stop” lending to countries at the periphery. Essentially, capital flows from the “north” dry up in a manner unrelated to the underlying economic fundamentals in emerging markets. With credit hard to get, economic activity in emerging market economies contracts and debt burdens press harder against declining governmental resources.
- Banking crises have historically been “contagious” in that investors withdraw from risk-taking, generalize the experience of one country to others, and reduce their overall exposure as their wealth declines. The consequences are clearly deleterious for emerging markets’ ability both to roll over and service external sovereign debt.
- Banking crises in one country can cause a loss in neighboring or similar countries, as creditors look for common problems.

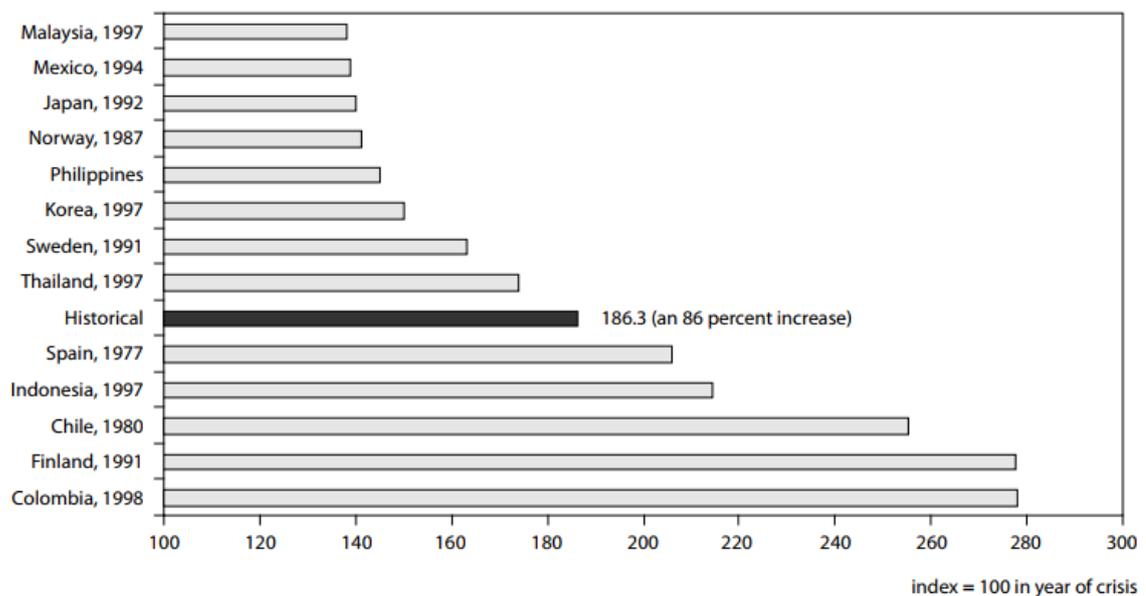


Figure 12. Cumulative increase in public debt in 3 years after a systemic banking crisis.

Default and Inflation

If a global surge in banking crises indicates a likely rise in sovereign defaults, it may also signal a potential rise in the share of countries experiencing high inflation.

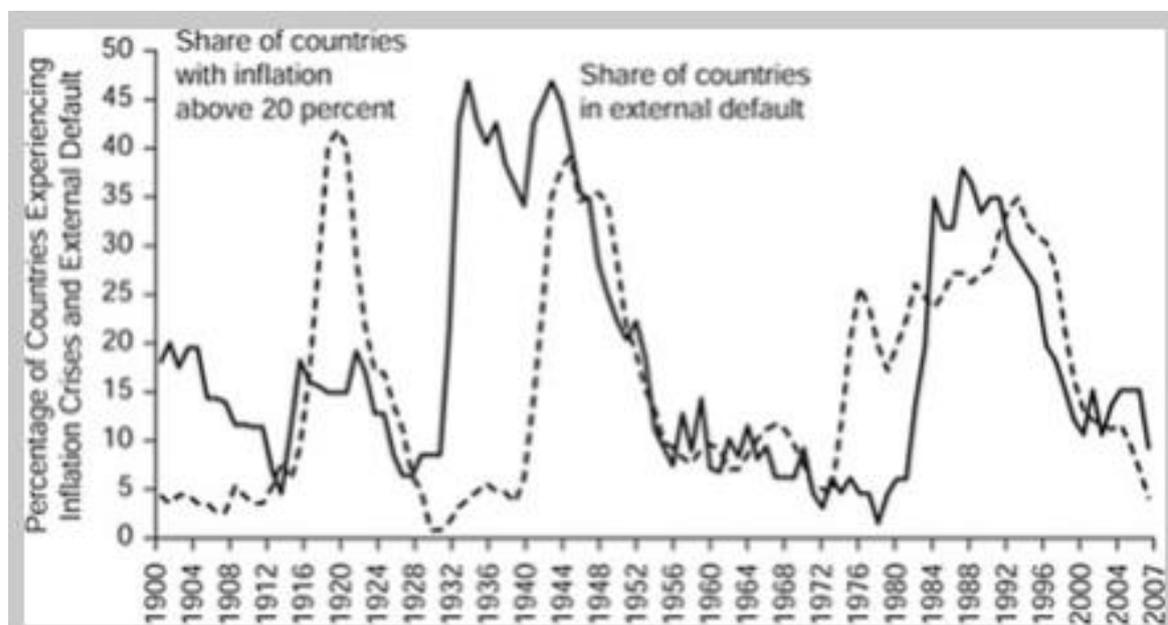


Figure 13. Default and Inflation

The above figure illustrates the striking positive co-movement of the share of countries in default on debt and the share experiencing high inflation. Because inflation represents a form of partially defaulting on governmental liabilities that are not fully indexed to prices or exchange rate.

Missing Link Explaining External Debt and High Inflation

Recognizing the significance of domestic debt can go way toward solving the puzzle why many countries default on (or restructure) their external debts at seemingly low debt thresholds. In fact, when previously ignored domestic debt obligations are taken into account, fiscal duress at the time of default is often revealed to be quite severe.

Loosely speaking, if a government abuses its currency monopoly by promiscuously printing currency, it will eventually drive the demand for the currency down so far

that it actually takes in less real revenue from currency creation than it would at a lower inflation rate.

Public Debt Surges and Sovereign Default and Restructuring

Public debt follows a length repeated boom and bust cycle; the bust phase involves a markedly higher incidence of sovereign debt crisis. Public sector borrowing surges as the crisis nears. In aggregate, debts continue to rise after default, as arrears accumulate and GDP contracts strikingly. *The figure below* plots the incidence of external default from 1826, when the newly independent Latin American economies first entered the global capital market, through 2010 against unweighted average debt/GDP ratio for all countries for which this type of data available. Upturns in the debt ratio usually precede the rise in default rates, as regressions for the world aggregates confirm. Periods of higher indebtedness are also associated with a higher incidence of inflation crises. Default through inflation has been more prevalent since the WW I, as fiat money became the norm and links to gold severed.

Sovereign Default Through History

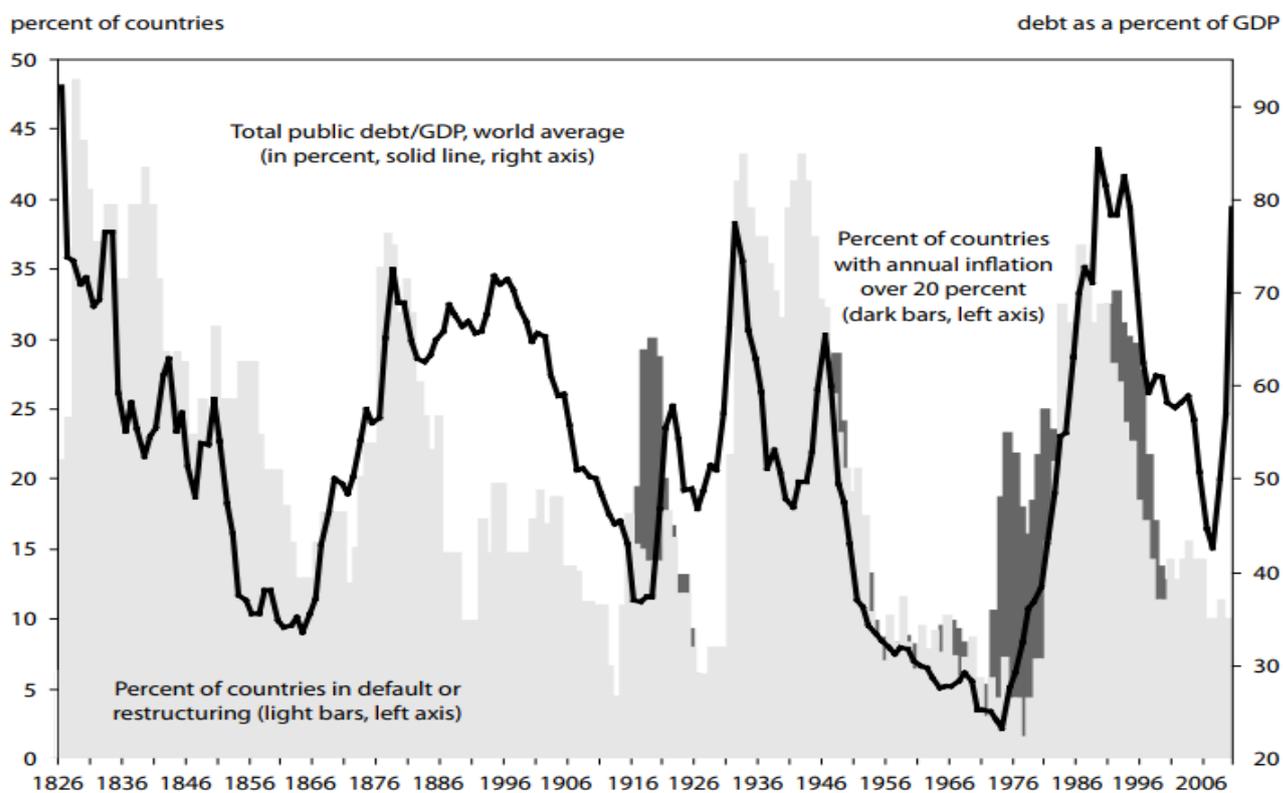


Figure 14.

Today's emerging market countries did not invent serial default, rather, a number of today's now-wealthy countries had similar problems when they were emerging markets. Serial default on external debt is, in a sense, the norm throughout every region in the world, including Asia and Europe.

The early history of Serial Default: Emerging Europe, 1300-1799

Country	Years of default	Number of defaults
Austria	1796	1
England	1340, 1472, 1594	2
France	1558, 1624, 1648, 1661, 1701, 1715, 1770, 1788	8

Germany (Prussia)	1683	1
Portugal	1560	1
Spain	1577, 1575, 1596, 1607, 1627, 1647	6

Table 6. Serial defaults, early history.

Spain's defaults established a record that yet remains unbroken. Indeed, Spain managed to default seven times in the nineteenth century alone after having defaulted six times in the preceding three centuries.

With its string of defaults in the nineteenth century Spain took the mantle for most defaulted country from France, which abrogated its debt obligations on eight occasions between 1500 and 1800. Because during episodes of external debt default French monarchs had a habit of executing major domestic creditors (an early and decisive form of "debt restructuring"), the population came to refer these episodes as "bloodletting". The French finance minister Abbe Terray, who served through 1768 and 1774, even opined that governments should default every hundred years to restore equilibrium.

Remarkably, however, despite the trauma the country experienced in the wake of the French revolution and the Napoleonic wars, France eventually managed to emerge from its status as a serial defaulter.

External Sovereign Default after 1980s. A Global Picture

Starting in the nineteenth century, the combination of the development of international capital markets and emergence of a number of new nation-states led to an explosion in international defaults.

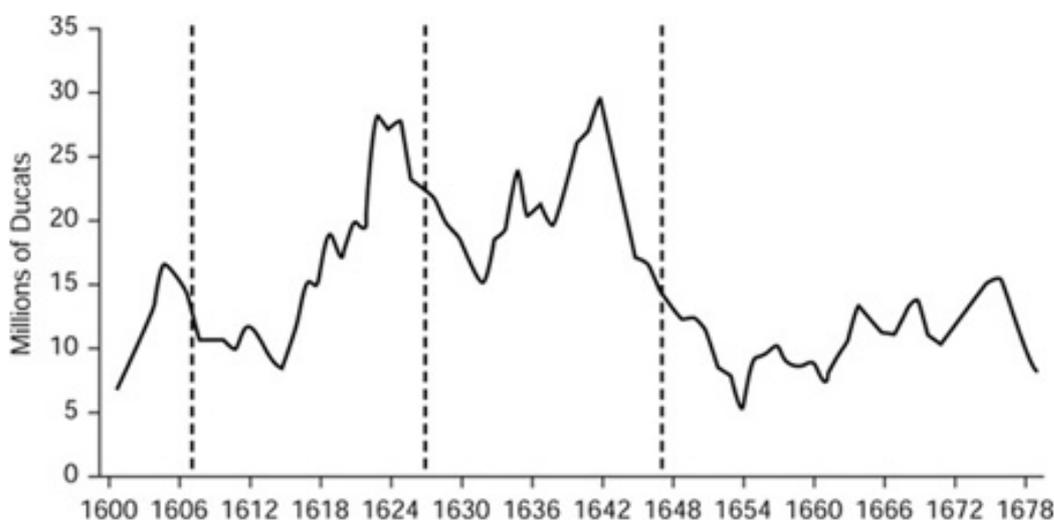


Figure 15. Spain: Defaults and Loans to the Crown, 1601-1679 (three year moving sum)

Note: Defaults of 1607, 1627, and 1647 are represented by vertical lines.

We have already established, from a theoretical perspective, debt rescheduling is effectively negotiated partial defaults. The issue here is so fundamental that we feel obligated to expand further, particularly underscoring why rescheduling is also akin to outright default from a perspective.

Practitioners rightly view rescheduling as negotiated partial defaults for two essential reasons. The first reason, of course, is that debt rescheduling often involves reducing interest rates, if not principal. Second, and perhaps more important, intentional debt

rescheduling typically saddles investors with illiquid assets that may not pay off for decades. This illiquidity is a huge cost for investors, forcing them to hold a risky asset, often with compensation far below the market price of the risk.

The Stylized facts of Domestic Debt and Default.

Domestic debt is a large portion of countries' total debt. For the sixty-four countries for which we have long-range time series, domestic debt averages almost two third of total public debt. For most of the sample, these debts have typically carried a market interest rate except during the era of financial repression after World War II.

Domestic and External Debt

The figure below plots the share of domestic debt in total public debt for 1900 – 2007. It ranges between 40 and 80 percent of total debt.

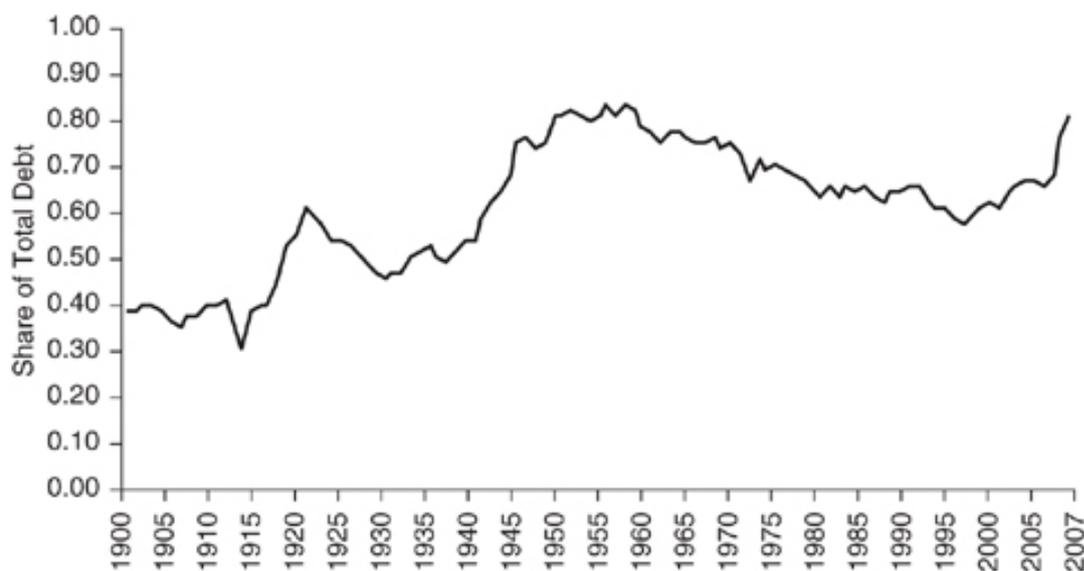


Figure 16. Share of domestic debt in total public debt

Next figures break this information into regions. The numbers in these figures are simple averages across countries, but the ratios are also fair representatives of many of the emerging markets in the sample (including now rich countries such as Austria, Greece and Spain when they were still emerging markets).

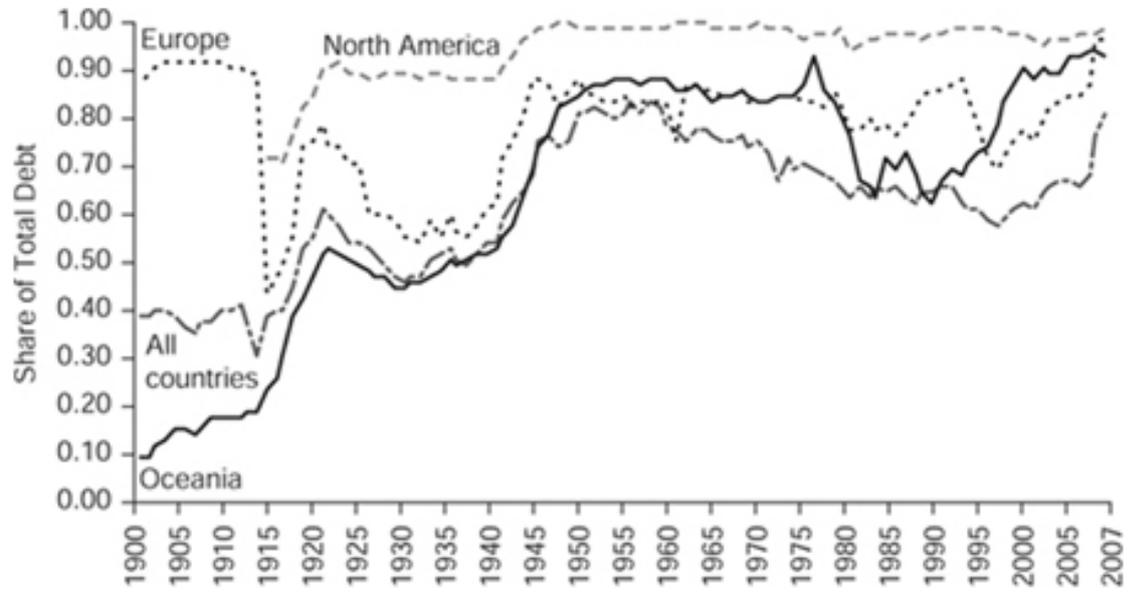


Figure 17. Advanced economies

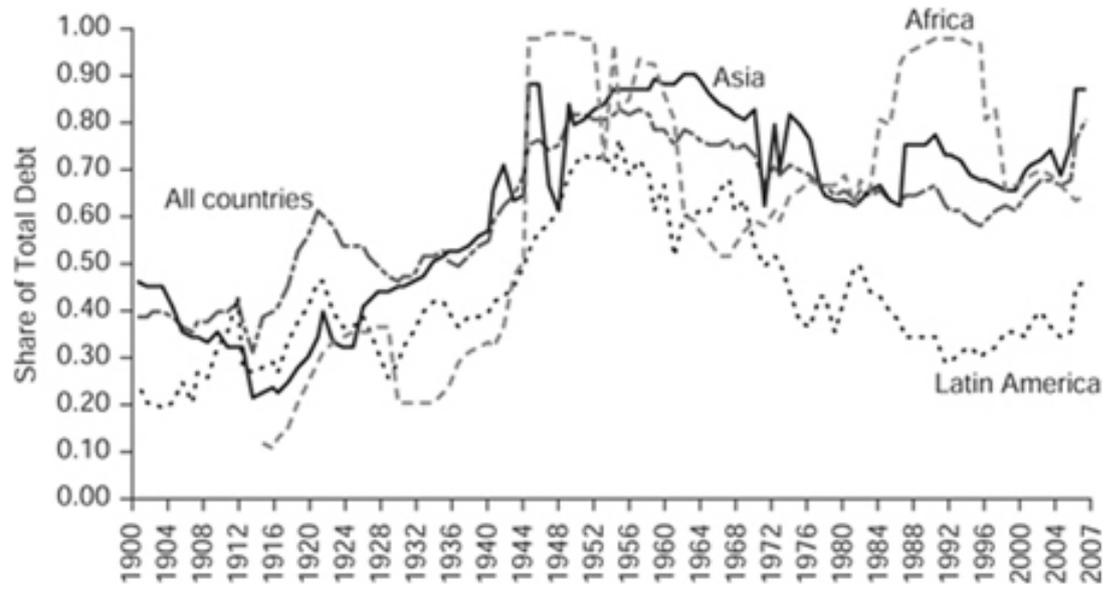


Figure 18. Emerging markets and economies

Of course, the experience has been diverse. For advanced economies domestic debt accounts for the lion's share of public sector liabilities. At the other extreme, in some emerging markets, especially in the 1980s and 1990s, domestic debt markets were dealt a brutal blow by many governments' propensity to inflate (sometimes leading to hyperinflation). For instance, following years after the hyperinflation of 1989 to 1990, domestic debt accounted for 10 to 20 percent of Peru's public liability. Yet this wasn't always the case.

Hidden debts – Private Debts that become Public

The uniqueness of the cases of Iceland and Ireland is only in the magnitude of their debts, not in the causes and patterns of the crisis. Writing about Chile's crisis in the early 1980s, Carlos Diaz-Alejandro (1985) asks us to consider a country that had liberalized its public domestic financial sector and was fully integrated into world capital markets.

The recorded public sector deficit was non-existent, minuscule, or moderate; the declining importance of ostensible public debt in the national balance sheet was celebrated by some observers.

The private sector was a different matter. Their spending persistently exceeded their income, giving rise to large current account deficits. The current account deficit was financed by large and persistent capital inflows, which is a different way of saying that the domestic largesse was supported by borrowing heavily from the rest of the world. This abundance of foreign capital made it easy for domestic banks to lend liberally to businesses and households. During the credit boom real estate and equity prices soared – so did debts. Growth seemed inevitable.

However, as Diaz-Alejandro explains, the pity of the boom is that

“little effort was spent on investigating the credentials of new entrants to the ever growing pool of lenders and borrowers ... particularly no inspection or supervision of bank portfolios existed... One may conjecture, however, that most depositors felt fully insured and foreign lenders felt that their loans to private sector were guaranteed by the State.”

The following graph illustrates the general government debt (domestic plus external) of Iceland and Ireland through 1925 and 2010

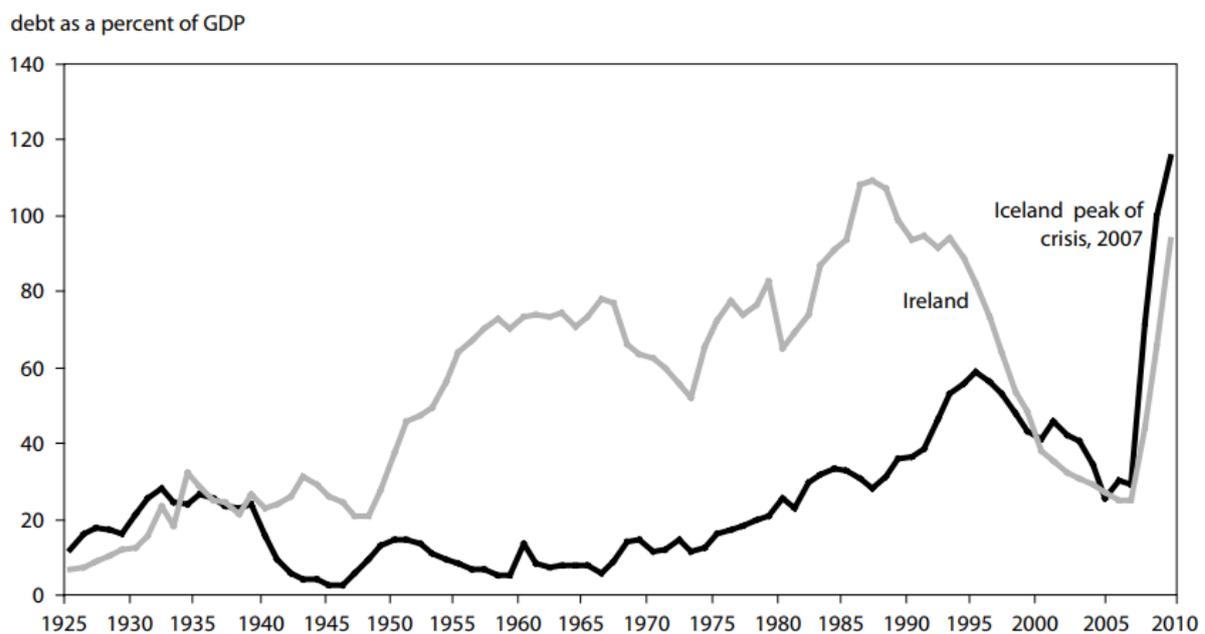


Figure 19.

As we can observe, this doesn't seem very problematic considering that the peaks of their debts are around 100 and 110 percent of their GDP. But when we look at the following table that shows the total external debt (public plus private) of the two countries, we can start seeing the problems Diaz-Alejandro explained:

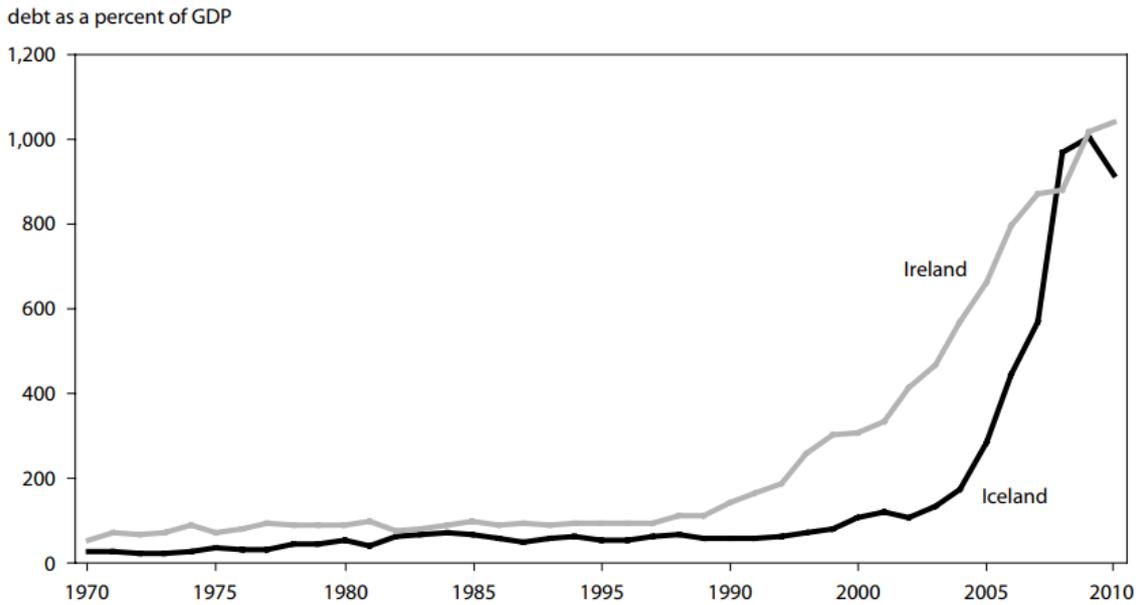


Figure 20.

Banking crises – Predictors of possible Sovereign Debt Problems

Banking crises most often either precede or coincide with sovereign debt crises. The reasons for this temporal sequence may be contingent liability story emphasized by Diaz-Alejandro (1985) and formalized in Velasco (1987), in which the government takes on massive debts from its private banks, thus undermining its own insolvency. The currency crashes that are an integral part of the “twin crisis” phenomenon documented by Kaminsky and Reinhart (1999) would also be consistent with this temporal pattern. If, as they suggest, banking crises precede currency crashes, the collapsing value of the domestic currency that comes after the banking crisis begins may undermine the solvency of both private and sovereign borrowers who are unfortunate enough to have important amounts of foreign-currency debts. As the table below suggests, it is not exclusively an “emerging-market” issue, as a higher incidence of sovereign default has followed the major financial crises.

Even absent large-scale bailouts, we have seen that largely owing to collapsing revenues, the government debts typically rise about 86 percent in the three years following a systemic financial crisis, setting the stage for rating downgrades and, in the worst scenario, default.

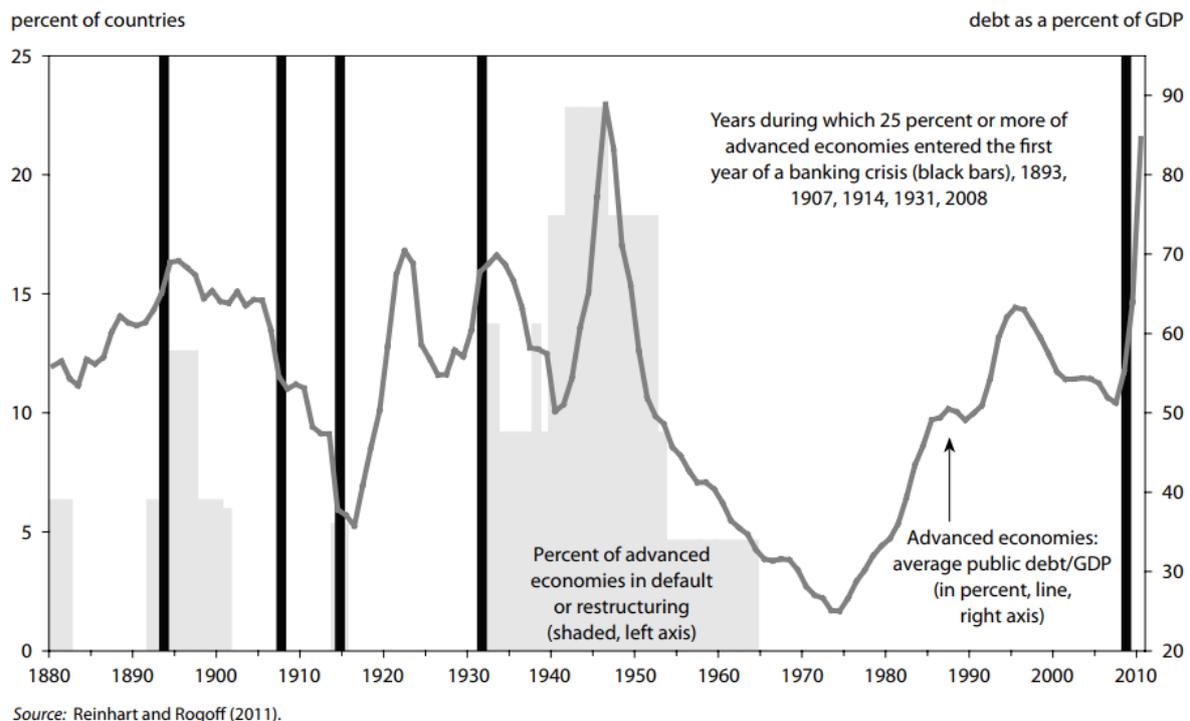


Figure 21.

Moreover, a causal chain from sovereign debt crisis to a banking crisis cannot be dismissed easily. Financial repression and international capital controls may give the government scope to coerce the otherwise healthy banks to buy government debt in significant quantities. A government default, in these circumstances, would directly impact the banks' balance sheets. The two crises may be more or less simultaneous. Even the banks are not overly exposed to government paper, the "sovereign ceiling" in which the corporate borrowers are rated no higher than their national governments may make banks' offshore borrowing very costly or altogether impossible. The result would be sudden stop that could give rise to a bank insolvency either immediately or subsequently.

Debt and Growth

The march from high indebtedness to sovereign default or restructuring is usually marked by episodes of drama, punctuated by periods of high volatility in financial markets, rising credit spreads, and rating downgrades. However, the economic impacts of high public indebtedness are not limited to such episodes of high drama, as rising public debts are not universally associated with rising interest rates and imminent expectations of sovereign default. Serious public debt overhangs may also cast a shadow on economic growth, even when the sovereign's solvency is not called into question.

The main findings of Reinhart and Rogoff (2010a) are the following:

- First, the relationship between government debt and real GDP growth is weak for debt/GDP ratios below 90 percent. Above the threshold of 90 percent, median growth rates fall by one percent, and average growth falls considerably more. The threshold for public debt is similar in advanced and emerging-market economies and applies for both the post-World War II period and as far back as the data permits (often well into 1800s)
- Second, emerging markets face lower thresholds for total external debt (public and private) – which is usually denominated in a foreign currency. When total external debt reaches 60 percent of GDP, annual growth declines by 2 percent. For higher levels, growth rates are cut roughly in half.
- Third, there is no apparent contemporaneous link between inflation and public debt levels for the advanced economies as a group (although some countries, such as the US, have experienced higher inflation when debt/GDP is high). The story is entirely different for emerging economies where the inflation rises sharply as the debt increases.

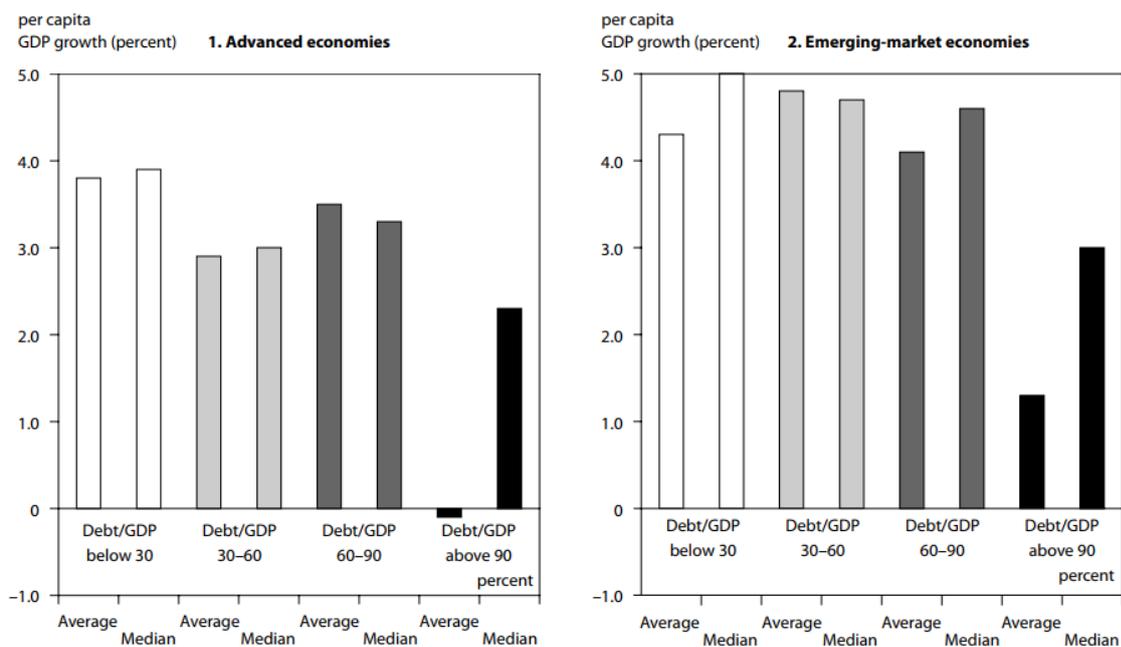
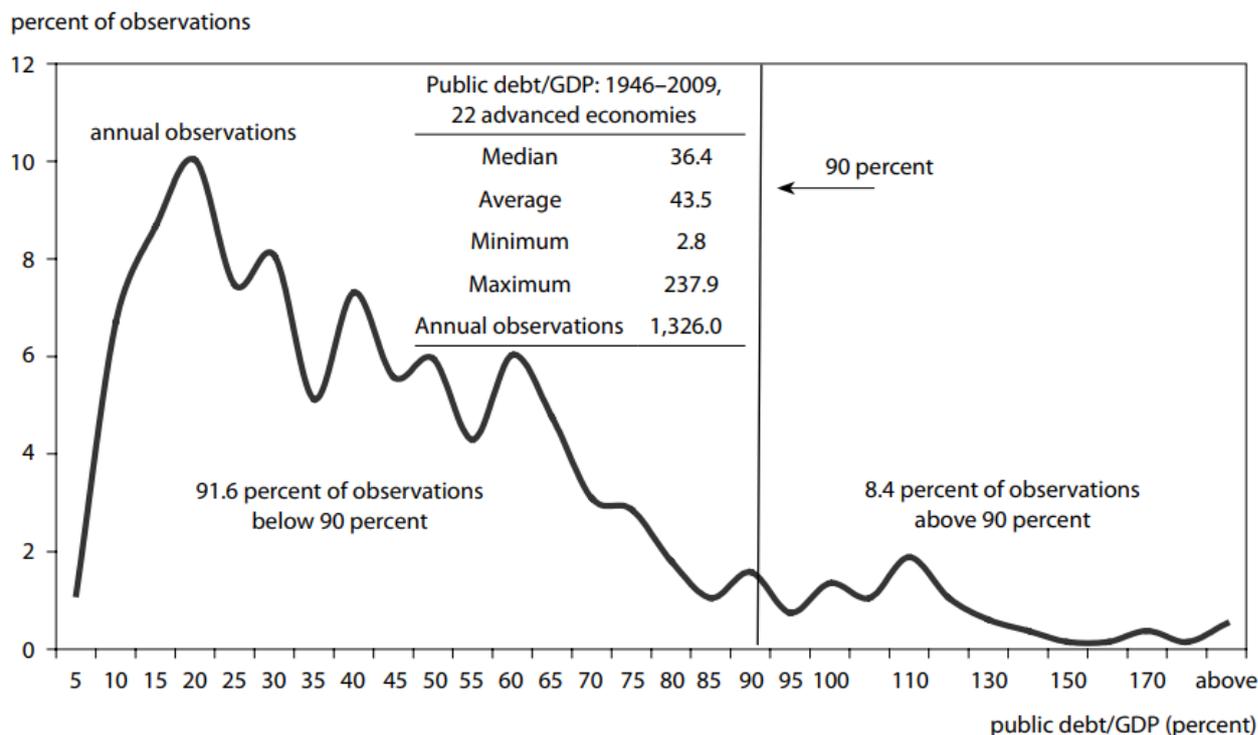


Figure 22.

Debt Threshold and Nonlinearities: The 90 Percent Benchmark

Thresholds and nonlinearities play a key role in understanding the relationship between debt and growth that should not be ignored in casual interpretations.

Anyone who has done some work with data is well aware that mapping a vague concept, such as “high debt” or “overvalued exchange rates to a workable definition for interpreting the existing facts and informing the discussion requires making arbitrary judgements about where to draw lines. In the case of debt, we worked with four buckets: 0 to 30 percent, 30 to 60 percent, 60 to 90 percent, and over 90 percent. The last one turned out to be the critical one for detecting a difference in growth performance, so we single it out for discussion here.



Notes: The advanced economy sample is the complete IMF grouping (Switzerland and Iceland were added). It includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Figure 23.

The figure shows the public debt to GDP ratio as well as pooled descriptive statistics for the advanced economies over the post-World War II period. The median public debt/GDP ratio is 36.4 percent, about 92 percent of the observations fall below the 90 percent threshold. In effect, about 76 percent of the observations were below the 60 percent Maastricht criteria.

Put differently, out “high vulnerability” region for lower growth comprises only about 8 percent of the sample population. The standard considerations about type I and type II errors apply here.

We don’t pretend to argue that growth will be normal at 89 percent level and suddenly subpar (about 1 percent lower) at 91 percent debt/GDP any more than a car crash is unlikely at 54 miles an hour and near certain at 56 miles an hour. However, mapping

the theoretical notation of *vulnerability regions* to bad outcomes by necessity involves defining thresholds, just as traffic signs show the speed limit of 55 miles an hour.

Nonlinear Relationship

In Reinhart and Rogoff (2010a), they summarized their results as:

... the relationship between real GDP growth and government debt below the 90 percent level of debt/GDP ratios is very weak. But, above 90 percent median growth rates fall by one percent, and average growth fall considerably more.

Debt and Growth Casualties

As we have discussed, we examine average and median growth and inflation rates contemporaneously with debt. Temporal casualty tests are not part of the analysis. The application of many of the standard methods for establishing temporal precedence is complicated by the nonlinear relationship between debt and growth.

But where do we place the evidence on casualties? For low-to-moderate levels of debt there may or may not be one; the issue is an empirical one which merits study. For high levels of debt, the evidence points in bi-directional casualties.

Growth-to-debt: There's a little room to doubt that severe economic downturns, irrespective of whether their origins was a financial crisis or not, will, in most instances, lead to higher debt/GDB levels either contemporaneously or with a lag. There is, of course, a vast literature on cyclically adjusted fiscal deficits making exactly this point.

Debt-to-growth: A unilateral casual pattern from growth to debt, however, does not accord with the evidence. Public debt surges are associated with a higher incidence of debt crisis. This temporal pattern is analysed in Reinhart and Rogoff (2008) and in the accompanying country-by-country analyses cited therein. In the current context, even

a cursory reading of the recent turmoil in Greece and other European countries can be importantly traced to the adverse impacts of high level of government debt on country risk and economic outcomes. At a very basic level, a high public debt burden implies higher future taxes (inflation is also tax) or lower future government spending, if the government is expected to repay its debts.

The Aftermath of High Debt: The 1930s and World War II

Up until very recently, financial markets and policymakers had all but forgotten that defaults and restructuring are not alien to the advanced economies.

Default, Restructuring, and Forcible Conversions in the 1930s

The following table lists the known “domestic credit events” of the Great Depression. Default on or restructuring of external debt also often accompanied the restructuring or default of domestic public debt. All the allied governments, with the exception of Finland, defaulted on their World War I debt to the US as the economic conditions deteriorated during the 1930s.

Selected episodes of domestic debt default or restructuring, 1920 – 1940s:

Country	Date	Commentary
Australia	1931/1932	The Debt Conversion Agreement Act in 1931/32 appears to have done something similar to the later New Zealand included conversion.
Bolivia	1927	Arrears of interest lasted until at least 1940.
Canada (Alberta)	April 1935	The only province to default which lasted about 10 years

China	1932	First of several “consolidations”, monthly cost of domestic service was cut in half. Interest rates reduced to 6 percent (from over 9 percent) – amortizations periods were about doubled in length.
Greece	1932	Interest in domestic debt was reduced by 75 percent since 1932; domestic debt was about $\frac{1}{4}$ of total public debt.
Mexico	1930s	Service on external debt was suspended in 1928. During the 1930s, interest payments included “arrears of expenditure and civil and military pensions”.
New Zealand	1933	In March 1933 the New Zealand Debt Conversion Act was passed providing for voluntary conversion of internal debt amounting to 113 million pounds to an interest rate of 4 percent for an ordinary debt and 3 percent for the tax free debt. Holders had the option of dissenting, but interest in the dissented portion was made subject to an interest tax of 33.3 percent.
Peru	1931	After suspending service on external debt on May 29, Peru made “partial interest payment” on domestic debt.
Romania	February 1933	Redemption of domestic and foreign debt was suspended (except for three loans).

Spain	October 1936 – April 1939	Interest payments on external debt were suspended, arrears on domestic public debt accumulated.
United States	1933	Abrogation of gold clause. In effect, the US refused to pay Panama the annuity in gold due to Panama according to 1903 treaty. The dispute was settled in 1936 when the US paid the agreed amount in gold balboas.
United Kingdom	1932	Most of the outstanding World War I debt was consolidated into 3.5 percent perpetual annuity. This domestic debt conversion was apparently voluntary. However, some of the World War I debts to the United States were issued under domestic (UK) law (and therefore classified as domestic debt) and these were defaulted on following the end of the Hoover 1931 moratorium.
Uruguay	November 1, 1932 – February, 1932	After suspending redemption of external debt on January 20, redemptions on domestic debt were equally suspended.
Austria	December 1945	Restoration of schilling (150 limit per person); remainder placed in blocked accounts. In December 1947, large amounts of previously blocked schillings were invalidated and rendered worthless; temporary blockage of 50 percent of deposits.

Germany	June 20, 1948	Monetary reform limiting 40 deutsche mark per person; partial cancellation and blocking of all accounts
Russia	1947	The monetary reform subjected privately held currency to a 90 percent reduction
	April 10, 1957	Repudiation of domestic debt (about 153 billion rubles at the time)

Table 7.

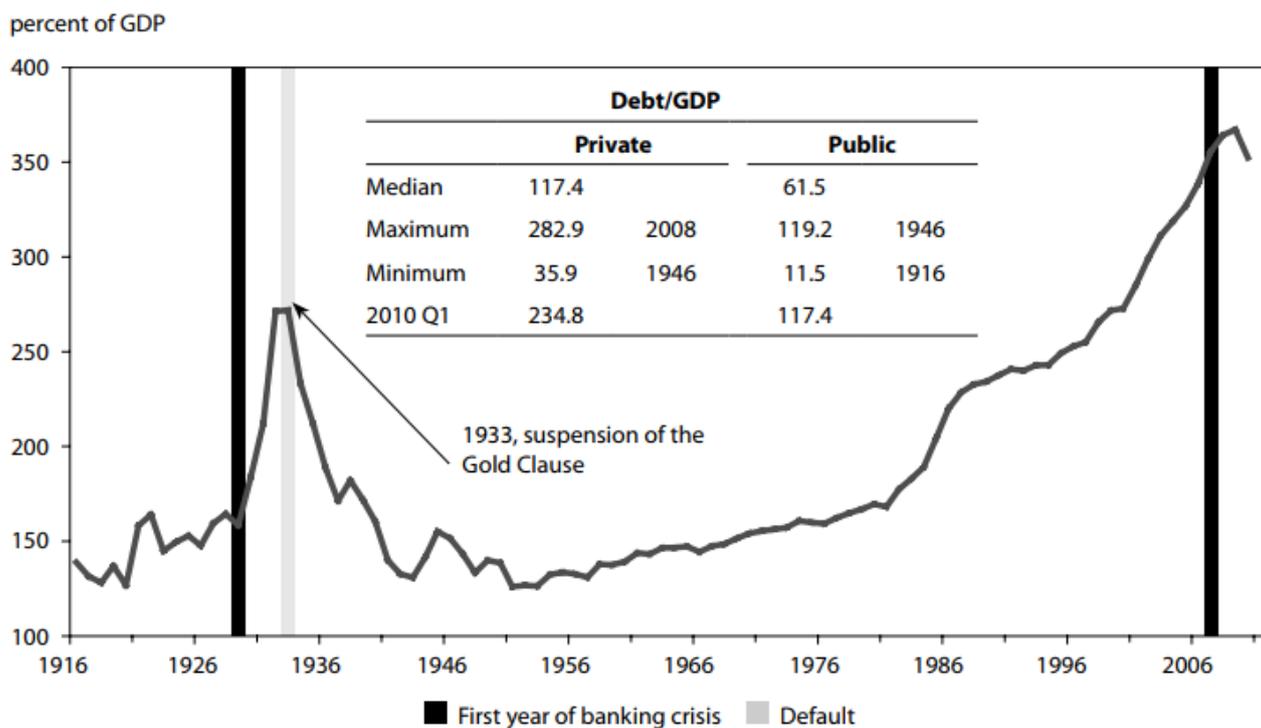
Generally, the aims of debt restructuring are (1) redesign the value of the stock of existing debts (haircuts) (2) reducing the debt servicing costs (by cutting or capping interest rates) and (3) minimizing rollover risk by lengthening the maturities or shifting into nonmarketable debt. Financial repression achieves all three goals of debt restructuring – albeit that the first (reducing the value) is achieved more gradually than in open restructurings. Thus, as argued in Reinhart and Rogoff (2009), financial repression – a hallmark of the 1940s -70s is nothing other than a subtle form of debt restructuring.

Legislation or “moral suasion” limiting the range and amounts of nongovernment debt domestic assets financial institutions can hold; limiting further holdings of foreign assets; and requiring financial institutions to hold more government debt were all part of the “financially repressed landscape”. A whole range of interest rate ceilings (for example, on deposits) made holding low-yielded government bonds also more palatable for individuals as well as institutions. Pension funds have historically provided “captive audience par excellence” for placing vast sums of government debt at questionable rates of return (often negative ex post in real terms). It is worth noting that the real ex post interest rate on public debt (appropriately weighted by the type of the instrument) was negative for the US debt for 25 percent of the time during 1945-

1980, while comparable share for the United Kingdom was nearly 50 percent, as Reinhart and Sbrancia document.

Some take away.

One need to look no further than the stubbornly high unemployment rates in the United States and other advanced economies to be convinced of the importance of developing a better understanding of the growth prospects for the decade ahead. We have presented evidence suggesting that the high levels of debt dampen growth. One can argue that the United States can tolerate higher levels of debt more than other countries can without having its solvency called into question. That is probably so. We have shown in our earlier work that a country's credit history plays a prominent role in determining what levels of debt it can sustain without landing on sovereign debt crisis. More to that the consequences of higher debt levels for growth will be different for the United States than for other advanced economies. The following figure which plots total (private and public) credit market debt outstanding for the United States during 1916 to 2010 Q1, makes this point clear. Despite considerable deleveraging by the private financial sector, total debt remains near its historic high in 2008. Total public-sector debt during the first quarter of 2010 is 117 percent of GDP; since 1916 it has been higher only during one-year stint at 119 percent in 1945. Perhaps soaring US debt levels will not prove to be a drag on growth in the decades to come. However, if history is any guide, that is a very risky proposition, and overreliance on US exceptionalism may only prove to be one more example of The This Time is Different Syndrome.



Notes: Beginning in 2010 Q1, almost all Fannie Mae and Freddie Mac mortgage pools are consolidated in Fannie Mae's and Freddie Mac's balance sheets and, thus, are included in the debt of government

Figure 24.

Putting data in use

In the chapter we heavily rely on the historical data on main economic indicators. Above discussions help us identify which indicator can help us predict occurrence of a crisis. Specifically, we will generate a logit model that forecasts the probability of a country defaulting on its external debt.

Observations

We have seen in the cases in this paper that almost every major crisis in financial sector followed by sovereign default. For this reason, the first variable we wanted to include in the model is the presence of a major crisis prior to a default. Inflating the debt away

is one of the very common ways governments use to decrease their debt burden, which in turn makes the inflation rate subject to a further investigation in default studies. The inflation rate of a single year may not tell a lot, that's why we included the cumulative price change during three years before the default occurred. Our observations included 15 default cases that followed another macroeconomic crisis, 3 financial crisis cases that did not result in a sovereign default, 2 default cases before which any other type of macroeconomic crises had happened. Besides 6 observations where neither a default nor another major financial or economic crisis occurred.

Test Results

After the first round regression analysis using the open source software gretl, 4 observations have been removed due to very high amounts of cumulative price change that would offset the model.

The following picture shows the test results:

Model 2: Logit, using observations 1-21
 Dependent variable: default
 Standard errors based on Hessian

	coefficient	std. error	z	p-value
const	-2.53418	1.64085	-1.544	0.1225
crisi	3.35236	1.39123	2.410	0.0160 **
debtogdp	0.00398828	0.0137329	0.2904	0.7715
inflation	0.00451203	0.0658064	0.06857	0.9453
cuminf	0.0152299	0.0353258	0.4311	0.6664

Mean dependent var	0.619048	S.D. dependent var	0.497613
McFadden R-squared	0.408669	Adjusted R-squared	0.050377
Log-likelihood	-8.252083	Akaike criterion	26.50417
Schwarz criterion	31.72678	Hannan-Quinn	27.63761

Number of cases 'correctly predicted' = 18 (85.7%)
 f(beta*x) at mean of independent vars = 0.225
 Likelihood ratio test: Chi-square(4) = 11.406 [0.0224]

	Predicted	
	0	1
Actual 0	6	2
1	1	12

Excluding the constant, p-value was highest for variable 3 (inflation)

Figure 25. Gretl regression analysis results.

Generated Logit model

The following logit model is generated using the test results:

$$Y^* = \beta_0 + \beta_1 * V_1 + \beta_2 * V_2 + \beta_3 * V_3 + \beta_4 * V_4$$

$P = e^{Y^*} / (e^{Y^*} + 1)$ – defines the probability that a given country defaults on its debt.

Where:

$\beta_0 = -2.53418$	
$\beta_1 = 3.35236$	V_1 - presence of a crisis prior to default (binary 0 or 1)
$\beta_2 = 0.003988$	V_2 – total external debt to GDP ratio, current
$\beta_3 = 0.004512$	V_3 – Inflation Rate, current
$\beta_4 = 0.01523$	V_4 – Cumulative Inflation during the last three years

Model in Practice

We used the model to calculate the sovereign default risk of some sample countries, and the results are as follows:

Country	China	Italy	Uzbekistan	Spain	Russia	India	Argentina
V1	0	0	0	0	0	0	0
V2	47	132	23	97.1	13.5	68.7	86.2
V3	2.7	0.8	14.3	1.5	4.7	3.18	57.3
V4	8	2.72	38.2	6.1	14.96	14.2	127.5
y*	-2.2127216	-1.96273	-1.7961484	-2.04727	-2.23129	-2.02959	0.009948
p (%)	9.861388794	12.3172	14.23205647	11.43281	9.697519	11.6131	50.2487

As we can see from the results, the model considers higher levels (even more than 100%) of external debt to GDP ratios sustainable providing lower levels of inflation. However, if the inflation is significantly high even below 90% debt to GDP ratios pose significant risk. In every case we considered the V1 equal to zero as we have not observed any prior macroeconomic crisis. To get more accurate result we need to use the probability of any macroeconomic crisis that might happen to a country as the input of V1.

Limitations of the model

Firstly, as the historical data on each observation we examined for the regression analysis was not widely available, in some cases we had use different sources for the same indicator, and their complete accuracy being under question, the model may assess the risk of country with some inaccuracy. Specifically, we could only reach 85.7% confidence interval.

Moreover, major part of our observations was the cases in which a sovereign default followed a systemic or a banking crisis. Which in turn makes the model a bit “crisis sensitive” – a small change in V1 can increase the probability of a country to default on its debt significantly.

Conclusion

Crises episodes we have studied in this paper suggest striking similarities to each other. We cannot claim that these episodes repeat themselves throughout the time, but the way these events occur remains unchanged with some exceptions. Every time when there's a bubble people want to ensure themselves that is not one of the cases had happened before, and when they find out that they were wrong they panic. Bank runs occur, countries default. These are natural parts of capitalism. However, if we always keep the past events, the lessons from them in our minds we can behave differently when we see signals to one or other type of crisis.

Obviously, the model we generated has its flaws and limitations, but in spite of these disadvantages it can still help us to be more times right than blindly being wrong.

References

Appendix