WORKING PAPER

An historical perspective on financial stability and monetary policy regimes:

A case for caution in central banks current obsession with financial stability

NORGES BANK RESEARCH

5 | 2018

MICHAEL D. BORDO

NORGES BANK

Working papers fra Norges Bank, fra 1992/1 til 2009/2 kan bestilles over e-post:
FacilityServices@norges-bank.no

Fra 1999 og senere er publikasjonene tilgjengelige på www.norges-bank.no

Working papers inneholder forskningsarbeider og utredninger som vanligvis ikke har fått sin endelige form. Hensikten er blant annet at forfatteren kan motta kommentarer fra kolleger og andre interesserte. Synspunkter og konklusjoner i arbeidene står for forfatternes regning.

Working papers from Norges Bank, from 1992/1 to 2009/2 can be ordered by e-mail
FacilityServices@norges-bank.no

Working papers from 1999 onwards are available on www.norges-bank.no

Norges Bank's working papers present research projects and reports (not usually in their final form) and are intended inter alia to enable the author to benefit from the comments of colleagues and other interested parties. Views and conclusions expressed in working papers are the responsibility of the authors alone.

ISSN 1502-819-0 (online)
ISBN 978-82-8379-033-7 (online)

An Historical Perspective on Financial Stability and Monetary Policy Regimes: A Case for Caution in Central Banks Current Obsession with Financial Stability[1]

Michael D. Bordo,
Rutgers University,
NBER and Hoover Institution, Stanford University

December 2017

Abstract

The global financial crisis (GFC) of 2007-2008 led to a call for central banks to elevate their financial stability mandate to the same level as their price stability mandate. It also led to a call for central banks to use their monetary policy tools as well as the tools of macro prudential policy to head off incipient credit driven asset price booms, which were viewed as the primary cause of the GFC. Others have questioned the elevation of the financial stability mandate and also the use of the tools of monetary policy for financial stability purposes.

To help resolve this debate I examine: the history of monetary policy and financial stability regimes in advanced countries in the past two centuries; the historical empirical evidence on the determinants, incidence, and costs of financial crises; and historical empirical evidence on the relationships between credit booms, asset price booms and financial crises for 15 countries in the past century.

My findings suggest that: financial crises are highly heterogeneous and have many causes, not just restricted to credit driven asset price booms; that the links between credit booms and serious financial crises are quite weak. Moreover, the coincidence of credit booms and serious financial crises is most evident in two "perfect storms": 1929-1933 and 2007-2008. In other words that they are rare events. This leads to the question whether such rare events should lead to a sea change in monetary policy and financial stability policy. The experience of financial repression in the decades following the Great Depression raises some serious doubts.

Keywords: monetary policy, financial stability, financial crises, credit driven asset price booms

JEL Classification: E3, E42, G01, N1, N2

---

[1] This Working Paper should not be reported as representing the views of Norges Bank. The views expressed are those of the author and do not necessarily reflect those of Norges Bank. This paper was written in preparation for a keynote dinner speech held at the Twelfth Meeting of the FSB Regional Consultative Group for Europe in Oslo, June 1 2017, on kind invitation by Mr. Jon Nicolaisen, Deputy Governor of Norges Bank and (then) co-chairman of the FSB-RCG for Europe. For help with the empirics in section 4 I am indebted to my colleague John Landon Lane and my Research Assistant Maria Sole Pagliari.

1. Introduction

It has been a decade since the Global Financial Crisis of 2007-2008 disrupted the world's financial system and the global real economy. The crisis led to a rethink on the role of central banks with respect to financial stability. Before the crisis the prevalent view was that if central banks maintained a credible commitment to maintain price stability and stabilize the business cycle then financial stability would follow. Asset price booms and busts could be dealt with after the fact (the Greenspan Doctrine) and a banking crisis could be dealt with by traditional lender of last resort means and fiscal resolution. The Great Financial Crisis changed that perspective because some authorities argued that price stability fostered the conditions for financial instability (Borio and Lowe 2002, Borio and White 2003), while others argued that financial innovation had led to excessive leverage and a bank credit driven asset price boom which central banks and other authorities did not foresee. As a consequence, the world's central banks and the international financial institutions have all made the case that financial stability should be granted extremely high importance to prevent the reoccurrence of another Great Financial Crisis.

Many have argued that the financial stability mandate should be elevated to the same level of importance as price stability and stability of the real macro economy. The definition of financial stability has also changed from the traditional role of the central bank as lender of last resort accompanied by supervision and regulation of the banking system (now referred to as micro prudential policy) to a new role to head off systemic risk to the entire financial system including non bank financial intermediaries and financial markets. The case has been made for new policy tools to head off systemic risk (referred to as macro prudential regulation). These tools include

setting financial institutions capital requirements, countercyclical capital buffers, loan to value ratios and margin requirements (Galati and Moessner 2014 and Smets 2014). Many of these tools were developed many decades ago and were used for different purposes. Indeed, some have argued that central banks stopped using these tools because they were a type of credit policy or fiscal policy which were a threat to central bank independence (Goodfriend 2014). In addition, some central banks have made the case for following Leaning Against the Wind (LAW) policies—raising the policy rate more than would be consistent with the macro fundamentals to head off an asset price boom that could turn into a bust and create a financial crisis and a recession[2]— as a complement to macro prudential policy. In opposition to this view others have argued that the costs of LAW policy in raising unemployment outweigh the benefits of a possible financial crisis and deep recession. They argued that macro prudential tools should be sufficient. Finally, there is a debate over who should have responsibility for the use of macro prudential tools: the central bank or some other Financial Stability Authority.

This paper provides some intuition on this subject from an historical perspective of the evolution of central banks and the record on the incidence and causes of financial crises and other aspects of financial stability (credit booms, stock market boom busts and house price boom busts). I present some brief narrative and empirical evidence for the past two centuries across several monetary policy regimes; the classical gold standard, the interwar gold exchange standard, Bretton Woods, the Managed Float; and the Post Great Financial Crisis regime.

[2] Bordo and Jeanne (2002), long before the crisis, argued that a central bank with good information that an asset price boom had a high probability of turning into a bust and creating a crisis and a serious recession, should follow preemptive policy to defuse the boom.
We were ambiguous as to whether the central bank should use its policy rate or another authority could use different tools.

The history of central banks reveals that four sound principles of central banking have evolved and survived the test of time. These are: 1) price stability 2) macro stability 3) an effective lender of last resort combined with 4) sound banking structure, supervision and regulation.

Macro prudential policy was not on the list except during and after wars and the Great Contraction of 1929-33. The advent of the financial safety net ,e. g. deposit insurance, after the Great Depression in the 1930s led to a change in the nature of financial crises from banking panics, which involved a scramble for high powered money (liquidity), to banking crises which involved fiscal resolutions of insolvent institutions (Bordo and Meissner 2016). Moreover, financial repression in response to the financial meltdown of the Great Depression set the stage for financial innovation, deregulation and the back drop to the GFC 80 years later.

Finally, I present some descriptive empirical evidence from the history of financial crises, credit booms, and asset price booms and busts. This evidence suggests that the financial crisis experience is very heterogeneous. Many financial crises associated with serious recessions were not associated with prior credit driven asset price booms and busts. Financial crises have had many causes. Indeed, only two episodes stand out as serious financial crisis related recessions accompanied by credit driven asset price booms: the perfect storms of the Great Contraction 1929-33 and the GFC 2007-2008. Moreover, it is not even clear that the Great Contraction of 1929-33 was a credit driven asset price boom gone wrong as argued by Eichengreen and Mitchener (2004)[3]. It more likely reflected two very serious frailties of the policy environment: the failure of Federal Reserve monetary policy; and adherence to the gold standard. Thus, from my perspective central banks should be cautious in a) elevating the

[3] See Bordo (2003)

financial stability mandate to the same level as price stability and macro stability; b) following LAW policies; c) taking on macro prudential responsibilities.

2. The Policy Debate over Financial Stability and Monetary Policy

Even well before the GFC Hyman Minsky (1977) and officials at the BIS (Borio and Lowe 2002, Borio and White 2003) worried about global financial imbalances precipitating a large financial crisis like the Great Depression. They worried that a credit driven asset price boom fueled by a long period of low policy rates would eventually trigger a serious financial crisis. They focused on a financial or credit cycle which exhibited long swings reminiscent of Kondratieff cycles. The credit cycle is based on the evolution of three components: the detrended ratio of total credit to GDP and detrended housing and equity prices. Econometric evidence for this view was provided in a number of papers by Alan Taylor and coauthors (Taylor 2012, Schularick and Taylor (2012), Jordà, Schularick and Taylor (2016a,b)). Jordà, Schularick and Taylor (2013) provide evidence based on data for 16 countries since 1870 that rapid credit growth leads to financial crises associated with deep and long-lasting recessions.

During the Great Moderation period after the Great Inflation (from the mid-1980s to 2001) the BIS worried that the tech boom of the 1990s could be seen as such an event. They also were concerned about housing booms in several European countries and later in the US. They urged central banks to use their policy tools to defuse the asset booms before they burst. In the years before the GFC Federal Reserve and other officials disagreed with the BIS view. They argued that it was difficult to tell if an asset price boom reflected real fundamentals (productivity, demographics) or was a bubble. If it was the former, tightening monetary policy could kill off a

productivity boom and trigger an unnecessary recession. They followed the Greenspan Doctrine to not defuse an asset price boom but rather to clean up its effects afterwards (Bernanke and Gertler 1999). In the 1990s Alan Greenspan was reluctant to head off the tech boom because he (correctly) believed that it really did reflect a productivity boom[4] .The subsequent stock market crash in 2001, like most of them, had only minor effects on the real economy. The subprime mortgage housing boom was a different story, it largely reflected important policy mistakes made by successive U.S. administrations to encourage affordable housing and actions by the U.S. GSEs (Fannie Mae and Freddy Mac) (Rajan 2011, Poole 2016). Other important causes include financial innovation—the development of complicated derivatives to facilitate it and other financial instruments which greatly boosted leverage, the inability of financial regulators to either understand or act upon what was happening in mortgage finance, a savings glut from China and other countries to finance the U.S. housing boom, and unusually low Federal Reserve policy rates from 2002 to 2005 to prevent the onset of Japan style deflation (Taylor 2007). The resulting very serious Global Financial Crisis, which in many ways echoed what happened in 1931, led monetary policy makers to take unprecedented lender of last resort and monetary policy actions which were successful in ending the crisis. Since then the BIS explanation of the crisis as the result of a credit driven asset price boom has convinced most officials. The key policy recommendation from this approach is to develop and use the tools of macro prudential policy to head off in advance the type of systemic risks that led to the crisis.

The ensuing debate has a number of elements: 1) whether the financial stability mandate should be elevated to the same level as price stability and stability of the real economy; 2)

[4] Mallaby (2016) is highly critical of Greenspan on this episode. He is well contradicted by Poole (2016)

whether central banks should follow leaning against the wind policies or macro prudential policies or both to head off incipient systemic risks (aka credit driven asset price bubbles); 3) who should have responsibility for financial stability policy: the central bank or another Financial Stability Authority.

1) The Financial Stability Mandate

The BIS (Borio (2012)) and others (e.g. Ingves (2017)) have argued that the financial stability mandate should be elevated to the same level of importance as price level (and macro) stability. This has been opposed by many Federal Reserve officials, inter alia Williams 2014, Bernanke 2017 and Yellen 2014.

2) LAW Policy

The case for LAW policy has been made forcefully by Stein (2013) who argued that raising policy rates could "get into the cracks "of systemic risk that crude macro prudential instruments could not do (see also Adrian and Liang (2016) and Smets (2014)). Norges Bank has also taken this approach (Olsen (2015), Gerdrup et al (2017)). A strong opponent to LAW is Lars Svensson who in a series of papers (2014, 2016 a,b,c, 2017) demonstrates that the costs of using LAW in terms of raising unemployment greatly outweighs the benefits of heading off an asset price boom and a possible financial crisis. His view is supported by Bernanke (2017), Williams (2015) and the IMF (2015). The example of the actions of the Riksbank in 2010 which followed LAW policy to head off a housing boom only to precipitate a recession and disinflation makes their point.

In a recent paper Filardo and Rungcharoenkitkul (2016) make the case for using LAW policy to smooth the credit cycle well in advance of a potential crisis. Their analysis is based on the existence of a well-defined credit cycle (for which the historical evidence is not overwhelming), in contrast to the view in Svensson's work that serious financial crises associated with credit driven asset price boom busts (the approach taken here) are rare one off events[5].

3) Responsibility for Financial Stability Policy

Svensson (2016c), Williams (2015) and others argue that monetary policy should be separate from financial stability policy on the grounds of the Tinbergen Principle—that each instrument should be paired with a separate objective and that macro prudential policy involves credit policy. Such policy tools as was the case several decades ago are a threat to central bank independence and the credible commitment to maintain price stability. Svensson (2016c) raises the issue of institutional design—whether monetary policy and financial stability policy should be housed in the same institution, as in the UK or in separate authorities as in Canada, Sweden, Australia and New Zealand.

None of these issues have been completely resolved. To do so requires both using the tools of modern economic analysis and examining the historical record as is done here.

[5] For a critique see Svensson (2017).

3. The Historical Evolution of Monetary Policy and Financial Stability policy

Central banks have evolved for close to four centuries. Their evolution was initially tied up with meeting the fiscal needs of nascent states to finance government expenditures in wars and to market government debt as was the case of the Riksbank in 1668 and the Bank of England in 1694. Later in the nineteenth century central banks played a key role in managing the gold standard "the rules of the game". Their key responsibility was to maintain convertibility of their currencies into specie. During this period central banks evolved as lenders of last resort in the face of banking panics and thus they became guarantors of financial stability. Because of their special status of having government charters and because of their size, central banks evolved into bankers banks and later lenders of last resort. The Bank of England is generally viewed as the first central bank to successfully develop as a lender of last resort. However other early central banks such as the Riksbank and the Banque de France engaged in financial rescue operations in the nineteenth century. In addition, along with the lender of last resort function central banks evolved as both providers and protectors of the payments system.

The definition of financial stability has changed significantly over time. In the eighteenth and nineteenth centuries it meant avoiding or managing banking panics, i.e. serving as lender of last resort. Bank supervision and regulation (which is part of financial stability policy) also was developed in the nineteenth century but it was not usually done by central banks (Toniolo and White 2016). The definition of financial stability changed in the twentieth century with the adoption of the real bills doctrine followed by the Federal Reserve in its early years. The real bills doctrine urged a central bank to head off an asset price boom because it would lead to

inflation, then depression and deflation (Meltzer 2003 chapter 1). More recently financial stability encompasses both being a lender of last resort and preventing imbalances that could lead to asset price booms and busts and financial crises. Also the lender of last resort has expanded to include the entire financial system, not just the banking system.

In the twentieth century central banks took on the role of maintaining price stability, stabilizing the business cycle and maintaining full employment. Since the GFC many central banks have been given a financial stability remit. Responsibility for a monetary policy geared towards stable economic outcomes and a financial stability remit have created challenges and this has become evident in recent years with central banks greatly expanding their interventions in the financial system while struggling to meet their inflation and real economic objectives.

In Bordo and Siklos (2017) we present an overview of the evolution of central banks' monetary and financial stabilization roles across different monetary policy regimes from the classical gold standard era before World War I to the present. Under the classical gold standard central banks followed the gold convertibility rule and monetary policy was harnessed to that objective. It did not mean price stability because real shocks to the gold market led to some short run price level instability although in the long run the price level was mean reverting. In that era financial stability meant lender of last resort complemented by sound banking structure, supervision and regulation. Indeed countries with well-developed LLR facilities learned to avoid banking panics (e.g. UK, France , Germany) while countries that did not have sound rules based central banks and also poor banking structure (e.g. the U.S. and peripheral countries) had frequent banking panics.

Three key principles for both sound monetary policy and financial stability regimes from that era were: adhering to the convertibility rule; having an effective LLR; and having sound banking structure, supervision and regulation.

In the interwar gold exchange regime central banks had difficulty maintaining convertibility because of the new political demands for stabilizing the business cycle. Adhering to an incredible gold standard made it difficult for countries to maintain financial stability (i.e. act as LLRs) (Eichengreen 1992). In the case of the U.S., adherence to the flawed real bills doctrine and an incomplete LLR function contributed to its failure to prevent four severe banking panics thereby causing the Great Contraction (Bordo and Wheelock 2010). In this period adherence to the flawed real bills doctrine led the Federal Reserve to use its policy tools to attempt to defuse the 1920s Wall Street boom—an early flawed attempt at financial stability policy—but it mainly succeeded in creating a serious recession with the boom bursting three months after the business cycle peak (Friedman and Schwartz 1963)

The Great Depression was blamed on the banks and the Federal Reserve by President Franklin Delano Roosevelt leading to a long period of heavy financial regulation (repression) including the Glass Steagall separation of commercial from investment banking and other regulations to reduce risk taking by banks and the financial sector. Similar policies were instituted in other countries. In addition the Federal Reserve lost its independence to the Treasury and monetary policy became subordinate to the needs of the Treasury (fiscal dominance). Similar developments occurred in the other advanced countries. The period from the mid 1930s until the early 1970s was one of heavy financial regulation across the world and virtually no banking panics occurred (Bordo , Eichengreen et al 2001). In addition, after World War II the Bretton

Woods System was established based on pegged exchange rates and capital controls. Thus financial repression was both international and domestic.

A key part of the financial repression regime was the use by monetary authorities of many of the tools of macro prudential policy to control the provision and allocation of credit; liquidity ratios, capital ratios, margin requirements, interest rate ceilings and firewalls between financial sectors. Also during this period, the financial sector safety net, especially deposit insurance removed the banking panic problem but opened up the Pandora's box of moral hazard.

After the breakdown of the Bretton Woods System in 1971-73 and the advent of managed floating, many central banks (with the key exceptions of the Bundesbank and the Swiss National Bank) followed inflationary monetary policies in an attempt to maintain full employment (Bordo and Orphanides 2013). The Great Inflation of the 1970s greatly challenged the financial repression regime as interest ceilings became binding in the face of rising inflation expectations. This encouraged financial innovation to get around the controls (e.g. the Eurodollar market and Money Market Mutual Funds). This led to deregulation of the financial system in the US and later in other advanced countries and set the backdrop to the reemergence of financial instability. The banking crisis problem reemerged in 1974 with the failures of Herstatt bank in Germany and Franklin National in the US. In the latter case the monetary authorities bailed out the insolvent Franklin National on the grounds that it was 'too big to fail'. A similar process occurred ten years later with the bailout of Continental Illinois bank. Similar developments were occurring in the UK and other countries. Now banking crises were converted from short lived liquidity driven banking panics resolved by LLR actions to

bailouts of insolvent banks which involved expensive and drawn out actions by the fiscal authorities. This created a link between banking and fiscal crises (Bordo and Meissner 2016). Thus, by the time of the Great Moderation in the mid 1980s when macro stability and especially credibility for low inflation was restored with the widespread adoption of central bank independence and later inflation targeting, problems with financial stability began to emerge. These included both the emergence of asset price booms in equities and housing, and the development of shadow banking in the face of the deregulation of the financial system. As has been well documented this set the stage for the increase in systemic risk and the Great Financial Crisis.

By this time the four principles of sound monetary and financial stability policy mentioned above had been violated. Price level stability (low inflation) and real macro stability prevailed but the lender of last resort became an agent for 'Too Big to Fail' leading to moral hazard and the likelihood of further bailouts, and the supervision and regulatory authorities failed to notice and avert the GFC. Macro Prudential policy was seen as a solution to the problem of systemic risk and the development of the shadow banking system but it is not at all clear that credit driven asset price booms are always the problem or that credit cycles are key determinants of financial crises As we argue in the next section, financial crises have many causes and the evidence that they are largely caused by credit booms is not overwhelming.

4. Financial Crises

The incidence of financial crises in the past 40 years has increased to what it was in the first era of globalization in the 50 years before World War I. Bordo and Meissner (2016) present

detailed empirics on the incidence and output losses of banking crises, currency crises, debt crises, twin and triple crises for over 20 countries from 1880 to 2015. The incidence of banking crises has an element of 'back to the future' about it but the output losses in the past decade are much larger than in past experience, even including the interwar period. This is explained by the high fiscal resolution costs of recent banking crises reflecting the growing interconnection between banking and fiscal crises in the present environment of government guarantees. This evidence suggests that the stakes associated with financial crises has become very high.

The evidence on the determinants of banking crises does not point to one single factor as paramount. A meta study of the recent literature on the determinants of financial crises in Bordo and Meissner (2016) points to the conclusion that not all banking crises are driven by credit booms as is emphasized today. Also not all housing and equity booms end in busts (Bordo and Landon Lane (2013a,b)). Many of the studies using various techniques to predict banking crises find that financial sector liberalization in environments with weak regulatory capacity and weak institutions is important (Demigurc-Kunt and Detragiache 1998). Others have emphasized current account deficits and capital inflows. Jordà, Schularick and Taylor (2011) find that prior to 1945 current account deficits are associated with systemic crises, but after 1945 this is no longer the case. They cite the growth of the ratio of credit to GDP as a key determinant and a good predictor of systemic crises. By contrast, Caballero (2014) finds that both capital inflow surges and credit booms are both statistically significant predictors of banking crises. However capital inflow bonanzas do not operate solely through bank intermediated loans. A number of studies are skeptical that would have been sufficient to

avoid the recent global financial crisis. Caballero (2014) as well as Babecky et al (2013) and IMF (2009) suggest a more eclectic approach that simultaneously incorporates multiple variables. Ideally any surveillance of the financial cycle, any conclusions regarding causes of crises, and any potential macro prudential policy should play close attention where exactly risk was concentrated. Surveillance and policy must also carefully weigh the costs and benefits of imposing policy in light of the potential for Type I and Type II errors.

To provide some empirical perspective on the issue of the relationship between credit booms, asset price booms and financial crises associated with deep recessions I examined, using a business cycle methodology, the evidence for a sample of 15 advanced countries from 1880 to the present. Answers to several questions are of interest: 1) what is the incidence of credit booms associated with banking crises? More specifically do they peak slightly before or are coincident with banking crises? 2) what is the incidence of equity boom busts and housing price boom busts associated with banking crises, more specifically do they occur shortly before or coincident with serious banking crises? 3) what is the relationship between these types of events and banking crises associated with severe recessions? These questions relate to a key motivation for why central banks today are so keen on using financial stability policy to prevent these events before they happen.

The methodology used to identify credit cycles and asset price boom busts comes from the business cycle dating literature and has been used before in several of my earlier articles with John Landon-Lane.[6]

[6] The approach taken here to measuring the impact of credit differs from the local projections technique used by Jordà et al in several papers (2011, 2013, 2016 a,b). Their work leads to the conclusion that credit is the key determinant of financial crises over the long run. The approach

To identify a credit boom, we use the approach taken by Gorton and Ordoñez (2016).[7] They define a good credit boom as one that is related to the growth of total productivity such as occurred with the adoption of railroads in the nineteenth century, electricity in the early twentieth century and the internet in the late twentieth century tech boom. A bad credit boom is one that ends in a banking crisis and in which the underlying technical innovation did not pan out.[8]

Two annual data bases for the ratio of credit to nominal GDP are used: a) total loans divided by GDP for the period 1880 to 2010 for 15 advanced countries which comes from the Jordà, Schularick and Taylor web data base (2017); b) the annual data used by Gorton and Ordonez, domestic credit to the private sector divided by GDP, which comes from the World Bank Macro data set for the same group of countries. This variable is defined as the financial resources provided to the private sector, such as loans, purchases of non-equity securities, trade credit

---

I use is simple and does not make any assumptions about homogeneity of cycles over time and across countries. I take the raw data and find the turning points using an established data algorithm (Bry and Boschan 1971) as used by Harding and Pagan (2002). The data is not manipulated in any way by passing it through a smoother (e.g. Hodrick Prescott) or by imposing any econometric model. Approaches such as Jordà et al make some assumptions. The panel assumption they use assumes some homogeneity across countries. Their model is non- linear in that the impulse response function is a non-linear function of the data. My conjecture is that a few big outliers are driving their results. I find evidence similar to their conclusions for a small number of countries and periods but not for the majority of periods and countries. Any panel econometric analysis assumes that the model applies to all observations and all countries. Our results suggest that the panel assumption may not be valid. It also casts doubt as to whether all cycles are the same.

[7] For a critique see Richter et al (2017).

[8] The Gorton-Ordoñez identification rule is that a credit boom starts with three periods of growth that averages more than 5% per year and that ends with two periods of negative growth. I first identify expansions, then check to see if at any time during that expansion there is a three-year span where growth is higher than 5% on average. Then I check if the subsequent period has two periods of negative growth. Under this approach, expansions that are shorter than three periods do not count and contractions that do not have credit declining for the first two periods are ruled out.

and other accounts receivables that establish a claim for repayment. The credit cycles calculated are in the Web Appendix.

Figure 1 compares the dates of banking crises (first year) from the Bordo and Meissner (2016) chronology with the peak year of credit booms using the loans to GDP definition. Table 1 shows the frequency of banking crises and credit booms. We distinguish between the number of credit booms within one year of a banking crisis and the number of credit booms which peak one year before or coincident with a crisis to get a rough idea about causality, since the former group includes episodes where booms peaked after a crisis.

As can be seen the percentage of credit boom peaks within one year of a crisis is 22.6%, while the percentage one year before or in the same year is only 7.5%. Pre-World War I credit booms are associated with a crisis in Australia in 1893; in the interwar Norway in 1921 and in 1930 the US and four other countries; in the post Bretton Woods period Japan, Sweden and Finland; and in the GFC the UK, Italy and Denmark.

Figure 2 combines the loans to GDP data set with the credit to GDP data and does the same comparison. The coincidence between credit booms and crises is slightly lower than in figure 1 with 13.2 % of credit booms within one year of a crisis ad 3.7% with credit booms peaking one year before or coincident with a crisis. The credit data picks up a few more countries viz during the GFC, the US, Sweden, Belgium and the Netherlands.

Finally, I compare credit booms to major financial crises defined as crises associated with a 5% drop in real GDP. Figure 3 shows this comparison. From Table 2 we see that the percentage of credit boom peaks associated with crises is much lower than in the previous figures at 3.7%

and the percentage of credit booms that precede or occur in the same year is even lower at 2.6%.[9]

These results are quite dramatic. They suggest that credit boom induced big crises like the Great Contraction or the GFC are very rare—about once in every 50 years. It raises the question whether there should be a major financial stability policy regime change if these events are so rare?

I next compare asset price boom busts (house prices and equities) with all banking crises. My measures of asset price boom busts comes from Bordo and Landon-Lane (2013 a,b). They only cover the period 1900 to 2010. See figure 4 for housing boom busts. From Table 3 it can be seen that 26% of housing boom peaks occur within one year of a banking crisis and 26% of housing boom peaks occur one year before or coincident with a banking crisis. Figure 5 compares stock market booms with crises. Here the connection is much lower. Only 7% of stock market peaks occur within one year of a crisis and 7% of stock market booms peaks one year before a crisis or coincident with it.

Figure 6 compares housing boom busts with major banking crises. From Table 4 it can be seen that the coincidence is much lower than is the case with all banking crises. Only 11% of house price busts occur within one year of a banking crisis. Also 11% of house price boom peaks occur one year before or coincident with a crisis.

Figure 7 compares stock market boom busts with major banking crises. Only 3% of stock market boom peaks occur within one year of a banking crisis. Also 3% of stock market peaks

[9] In addition, a number of credit booms occur after serious banking crises. This may reflect the fact that after a crisis with many bank failures that bank lending and the extension of credit collapses.

occur one year before or coincident with a crisis. These findings are similar to those of many studies (e.g. Reinhart and Rogoff 2009) which show housing busts tend to be more associated with major financial crises than stock market boom busts.

Finally, I compare asset price boom busts with credit booms. Figure 8 compares house price boom busts with credit boom peaks. I do it for both the loan data and total credit. For loans 6.3% of credit booms occur within one year of a housing price boom bust. For total credit it is 7.2%. I find that no credit boom peaks occur one year before or coincident to a housing bust for loans. For total credit it is 1.4%.

Figure 9 shows the connection between credit booms and stock price busts. Using the loan data I find that 8.5% of credit booms occur within one year of a stock market crash . For total credit it is 10.5%. 6.3% of credit booms occur within one year before or coincident with a stock market crash using the loans measure while 7.2% occur using total credit.

In sum the results comparing credit booms with asset price booms suggest that credit booms only have a very limited connection with asset price busts.

My evidence suggests that the coincidence between credit boom peaks and serious financial crises is quite rare. It also suggests that credit booms are not very closely connected to asset price booms.[10]

Indeed, a look at when most of the coincidence occurs as is discussed in Appendix I was in two episodes (which some refer to as perfect storms with multiple causes): the Great Contraction 1929-33 and the GFC. This leads to the question whether such rare events should lead to a sea change in monetary policy and financial stability policy. After the Great Contraction the world's

[10] These results have some resonance to a recent article by Goetzmann (2015) who shows that equity booms followed by big crashes are quite rare.

monetary authorities believed that it should, and repressed both the domestic and international financial system for 40 years. That strategy led to unintended consequences driven by the dynamics of financial innovation and may in turn have set the seeds for the GFC 80 years later.[11]

The current obsession with financial stability (and the increased use of the tools of macro prudential policy and LAW) raises the risk of repeating the mistakes of the 1930s and creating a new regime of financial repression which will most likely have unintended consequences[12]. It will likely head off a few minor financial crises in the next few decades but much later in the future precipitate an even bigger financial crisis than 2007-2008.

The analogy between policies designed to suppress natural disasters should be kept in mind. Scholes (2009) gives the analogy of when "fire fighters put out every small fire in Yellowstone National Park…The underbrush grew, setting the stage for multiple lightning strikes to cause

[11] Gordon (2014) argues that the Glass Steagall (1933) separation of commercial from investment banking may have been a foundation for the 2007-2008 financial crisis because it led to the rise of market based credit intermediation--firms that engaged in liquidity and maturity transformation without the safeguards of prudential regulation, deposit insurance and LLR facilities. Gordon (2017) following on Calomiris and White 1994) sees deposit insurance, established in the US as a crisis preventer becoming a crisis enhancer. Regulation Q established in 1933 also had unintended consequences in the 1970s and 1980s and was part of the mechanism that led to increasing financial instability after the quiet period of Financial Repression (Bordo and Haubrich 2010).

[12] I do not mean to critique all of the New Deal policies. There is a vast literature on this topic. The Banking Holiday of March 1933 ended the banking panics and leaving the gold standard, devaluing the dollar etc also contributed greatly to the recovery (Romer 1992, Edwards 2018, Jalil and Gisela 2015, Eggertson 2008). There is a contentious debate on the New Deal Policies and what their contribution to the recovery was (Cary Brown 1956, Hausman et al. 2017, Cole and Ohanian 2004). Our point is that the financial repression policies on the financial system had serious negative and long consequences. These included the inefficiencies associated with artificial firewalls, the distortions associated with interest rate ceilings (regulation Q) on the transmission mechanism of monetary policy, rent seeking behavior by the protected industries etc. See White 2000.

fires to destroy much greater areas in the park than if fires initially had been left to burn of their own accord" (page 105). He further argues that "[f]inancial regulators do the same thing when they dampen volatility: they put out small fires but encourage risk-taking and thus increase the likelihood of a major conflagration"[13] Kim et al (2017) apply this analogy to attempts to smooth recessions which they show are not serially correlated events. They argue from physics that eventually power law dynamics will set in leading to a much worse depression.

5. Conclusion

Since the Global Financial Crisis, the call by the world's monetary authorities has been to place much greater emphasis on financial stability. This includes elevating a financial stability mandate to the same level as price and real macro stability, advocating using the tools of macro prudential policies to head off systemic risk and follow LAW policies. This paper has examined this proposed expansion in the role of central banks in the light of the history of central banking and some empirical evidence on the relationship between a key measure of systemic risk—credit booms—and financial crises and asset price boom busts.

Our historical narrative reveals that before the Great Financial Crisis central banks developed four key principles: 1) price stability i.e. credibility for low inflation; 2) real macro stability; 3) serving as lender of last resort to the banking and payments system; 4) having sound supervision, regulation and banking structure (micro prudential policy). Since the crisis financial stability concerns have extended lender of last resort actions to the entire financial

[13] See Ip (2015).

system and created new tools of macro prudential policy to head off systemic risk. A key motivation for elevating the financial stability role is the common belief that the crisis was largely caused by a credit boom and the failure of supervisory and regulatory authorities to control the growth of leverage.

A key question is whether the GFC was a one-off event, a perfect storm possibly like the Great Contraction of 1929-1933 or part of a pattern (reflecting the 'financial cycle'). This paper presents some evidence that credit booms are not the key determinants of financial crises over the past two centuries and that their coincidence with major financial crises and asset price boom busts is quite weak, largely driven by the two perfect storms. The financial crisis experience is also very heterogeneous. This is suggestive of the first 'one off' view. This implies that the case for elevating the financial stability mandate to the levels discussed recently including LAW and the increased use of macro prudential policies needs to be viewed with a degree of caution. If major financial crises are rare multi caused events then policies leading to financial repression with echoes of the 1930s should be avoided.

Indeed, it is not clear why we cannot go back to the four basic principles that evolved with central banking. This would involve central banks returning to a rules-based lender of last resort function (Bordo 2014), and designing and implementing a supervisory and regulatory system to protect the banking system, i.e. micro prudential policy. The Financial Stability mandate could be done by another agency outside the central bank or possibly be a totally separate facility within the central bank as is the case with the Bank of England. This would prevent central banks from engaging in credit policy, maintain their independence from the

fiscal authorities and allow them to preserve their main goals which are to provide credibility for low inflation and macro stability.

Tables and Figures

Table 1: Frequency of Credit Booms and Banking Crises

Variable	Number of Banking Crises	Number of Credit Booms	Number of Credit Boom Peaks within 1 year of Banking Crisis	Number of Credit Boom Peaks 1 year before or on a Banking Crisis
Loans	69	53	12	4
Loans + Domestic credit	69	75	12	5
Loans (major banking crises)	29	53	7	2
Loans + Domestic credit (major banking crises)	29	75	7	2

Table 2: Frequency of Major Banking Crises and Asset Price Booms/Busts

Variable	Number of Major Banking Crises	Number of Asset Price Booms	Number of Asset Boom Peaks within 1 year of Banking Crisis	Number of Credit Boom Peaks 1 year before or on a Banking Crisis
House prices	25	27	3	3
Stock prices	25	101	3	3

Table 3: Frequency of Credit Booms and Asset Price Booms/Busts

Variable	Number of Asset Price Booms	Number of Credit Booms	Number of Credit Boom Peaks within 1 year of Asset Price Bust	Number of Credit Boom Peaks 1 year before or on an Asset Price Bust
House prices (loans)	27	47	3	0
House prices (Domestic Credit –Gorton data)	27	69	5	1
Stock prices (loans)	101	47	4	3
Stock prices (Domestic Credit – Gorton data)	101	69	7	5

Figure 1: Banking Crises and Credit Booms (Loans)

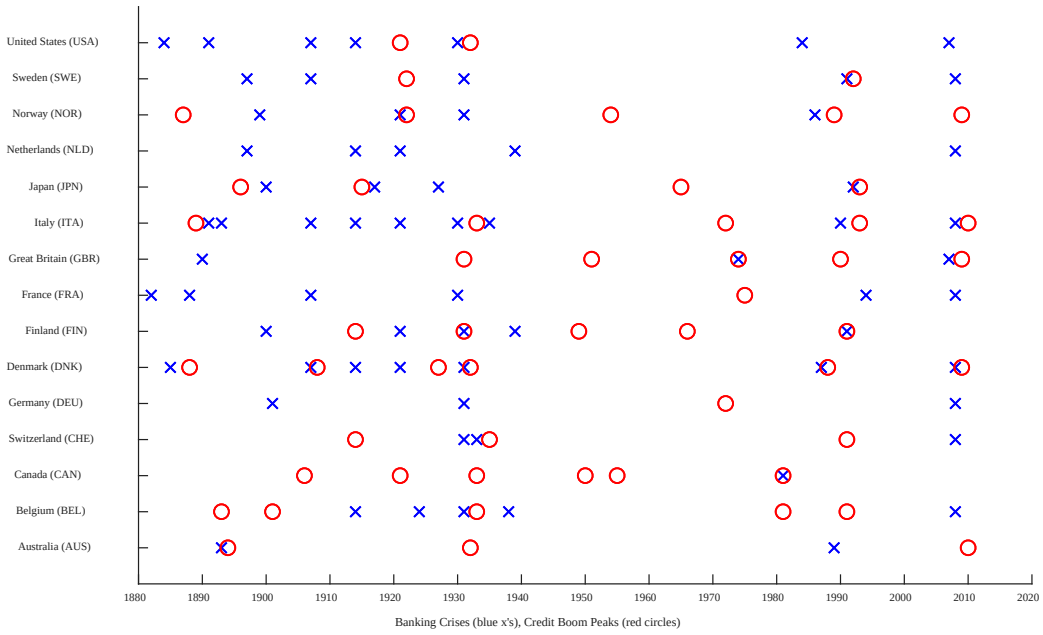


Figure 2: Banking Crises and Credit Booms (Loans and Credit)

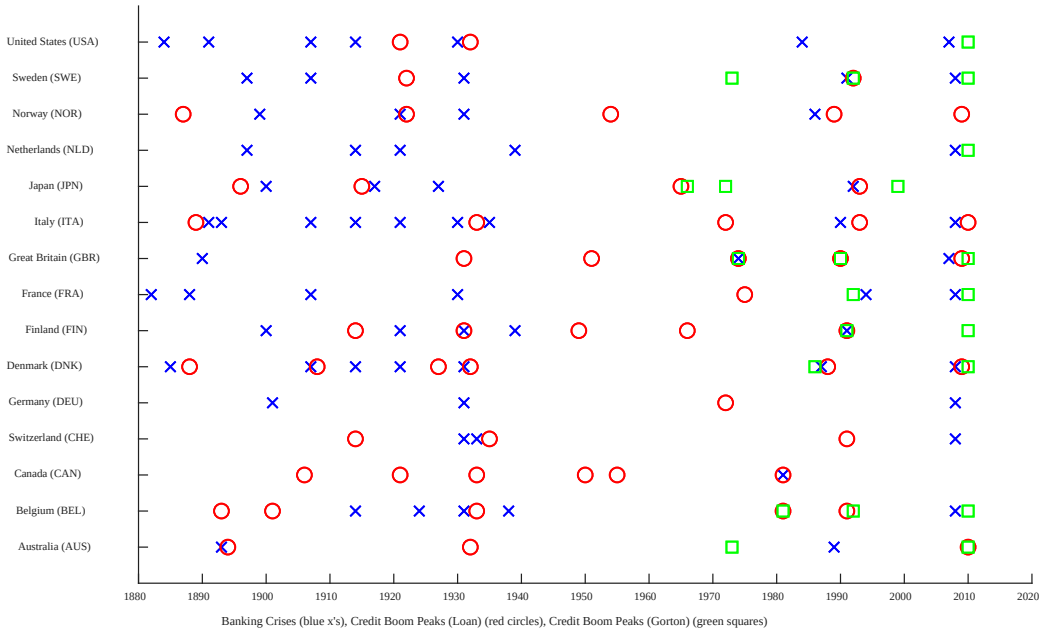
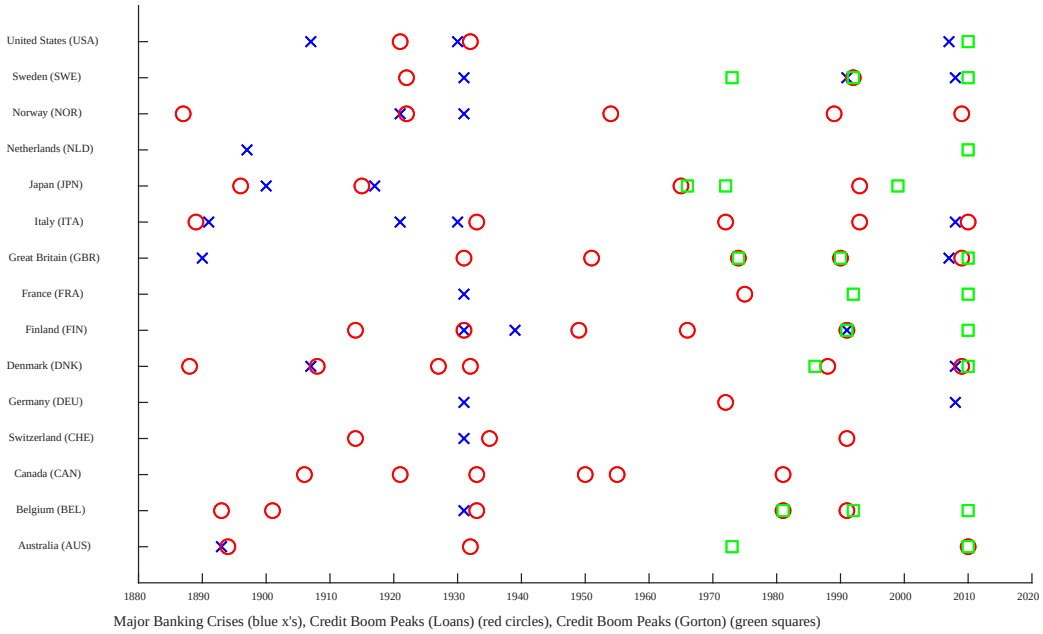
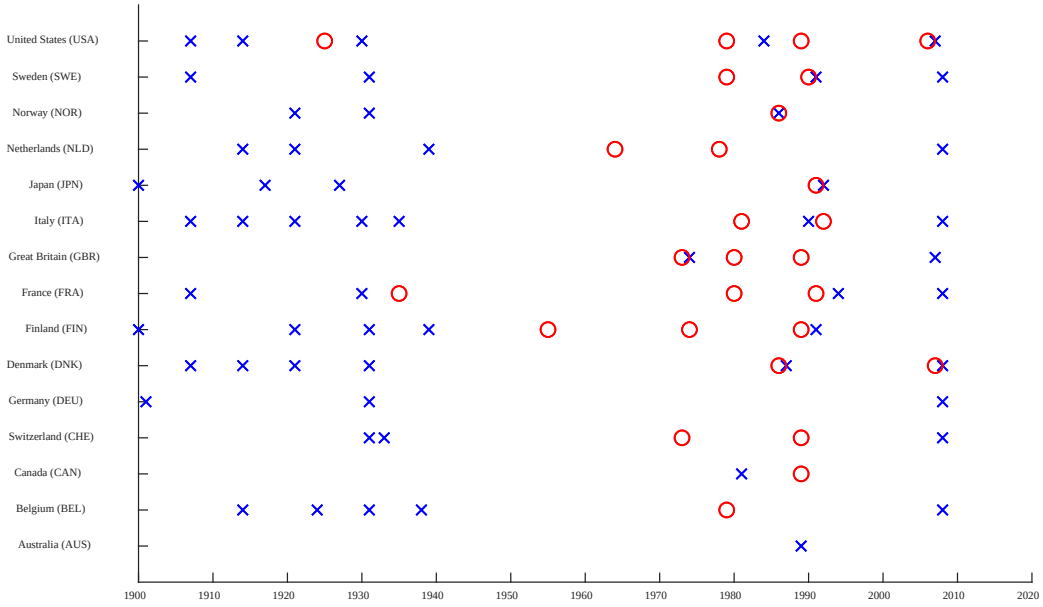


Figure 3: Major Banking Crises and Credit Booms (Loans and Credit)



Major Banking Crises (blue x's), Credit Boom Peaks (Loans) (red circles), Credit Boom Peaks (Gorton) (green squares)

Figure 4: Banking Crises and House Price Booms



Banking Crises (blue x's), Housing Price Boom Peaks (red circles)

Figure 5: Banking Crises and Stock Price Booms

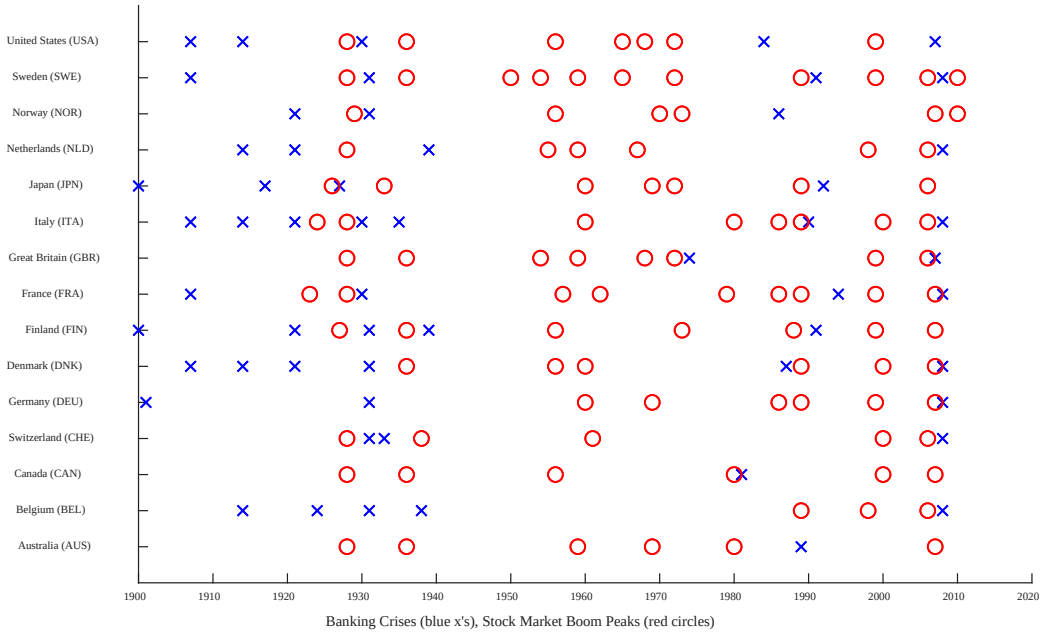


Figure 6: Major Banking Crises and House Price Booms

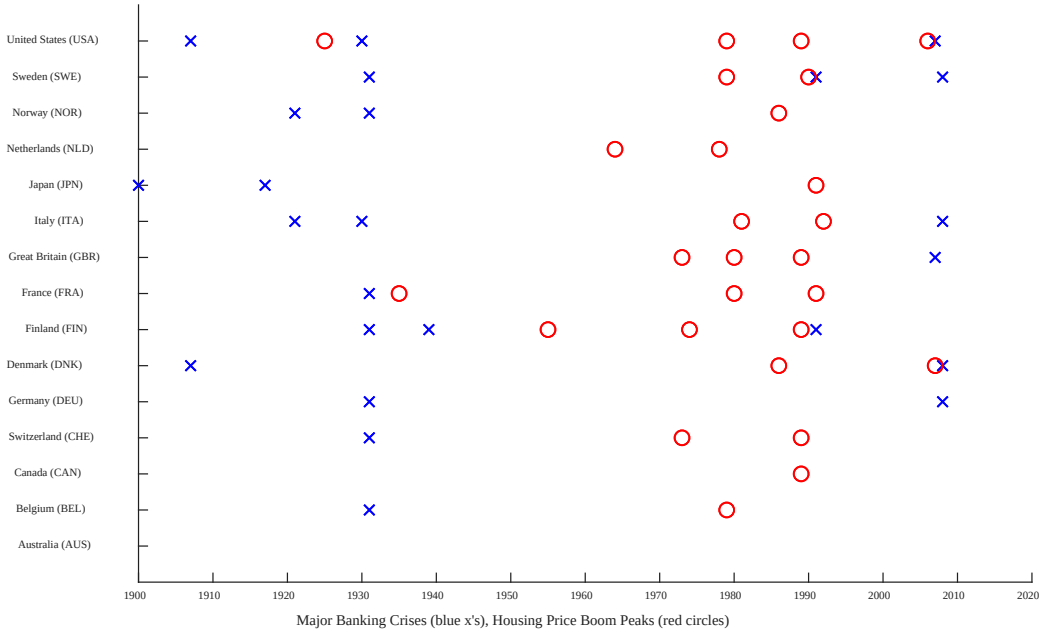


Figure 7: Major Banking Crises and Stock Price Booms

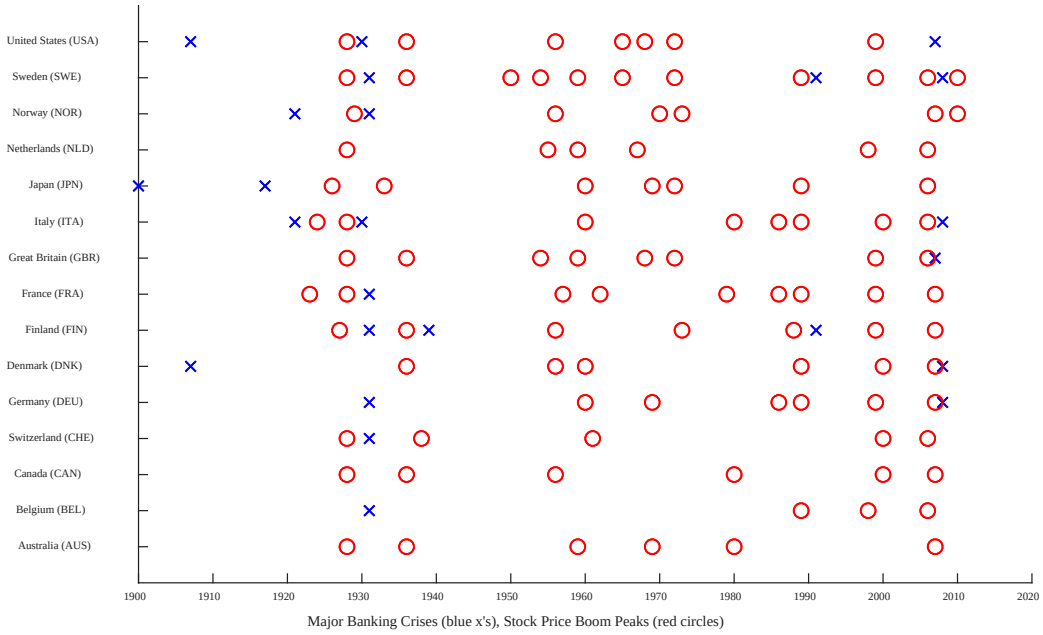


Figure 8: House Price Booms and Credit Booms (Loans and Credit)

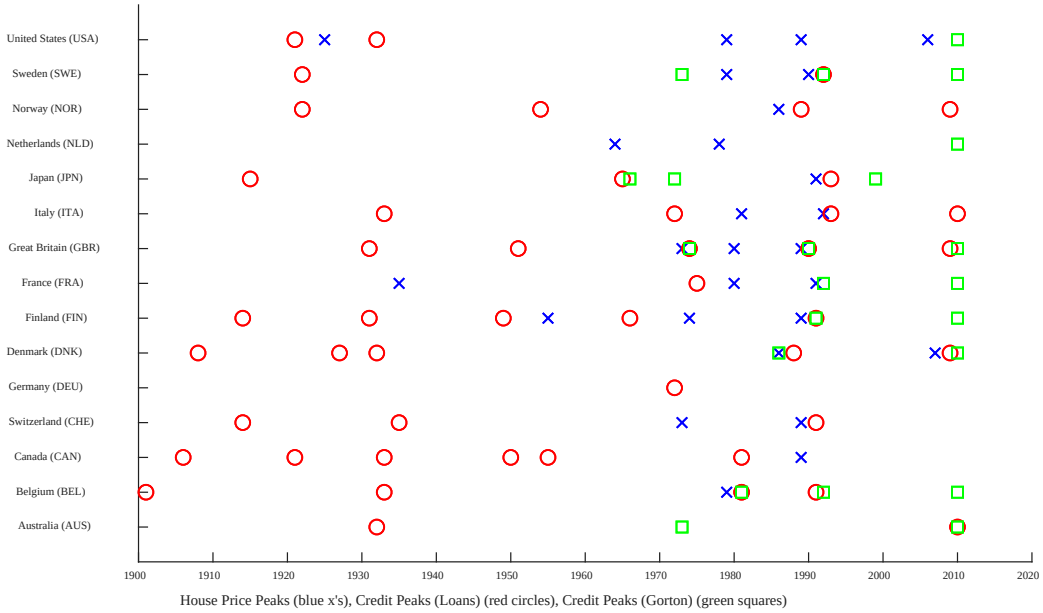
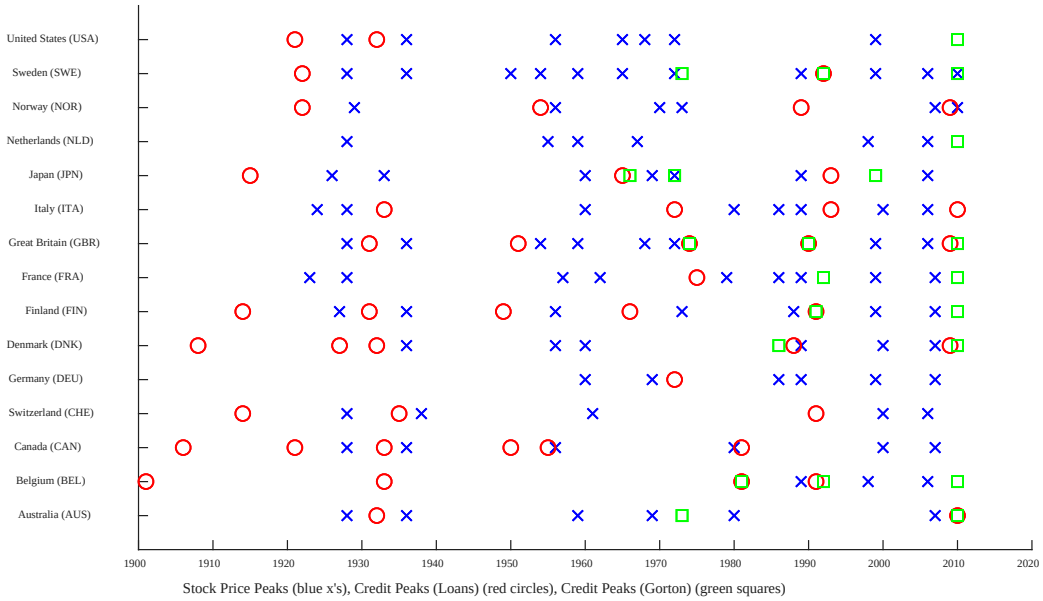


Figure 9: Stock Price Booms and Credit Booms (Loans and Credit)



References

- Tobias Adrian and Nellie Liang (2016) "Monetary Policy, Financial conditions, and Financial Stability,' Staff Report No. 690, Federal Reserve Bank of New York. December.
- J.Babecky, T. Havranek J. Mateju, M. Rusnask, K. Smidkova , B. Vasicek (2013) "Leading Indicators of Crisis Incidence: evidence from developed countries" *Journal of International Money and Finance* 35 (1), 1-19 (2013).
- Ben Bernanke (2017) Remarks at the Griswold Policy Conference, Princeton University March 2017.
- Ben Bernanke and Mark Gertler (1999) "Monetary policy and asset price volatility," Proceedings - Economic Policy Symposium - Jackson Hole, Federal Reserve Bank of Kansas City, pages 77-128.
- Michael Bordo (2003) "Discussion of 'The Great Depression as a Credit Boom gone wrong' by Barry Eichengreen and Kris Mitchener." BIS Working Paper 137.
- Michael Bordo (2014) "Rules for A Lender of Last Resort; an Historical Perspective" *Journal of Economic Dynamics and Control*. 49 Issue c.
- Michael Bordo, Barry Eichengreen, Daniella Kingebiel, Maria Soledad Martinez Peria (2001) Is the Crisis Problem Growing More Severe? *Economic Policy* 16 (32) pp 52-82.
- Michael Bordo and Joseph Haubrich (2010) "Credit Crises, Money, and Contractions: an Historical View," *Journal of Monetary Economics*. Vol 57 (January), pp 1-120.
- Michael Bordo and Olivier Jeanne (2002) "Monetary Policy and Asset Prices: Does 'Benign Neglect' Make Sense? "*International Finance*, 5(2) pp 139-164.

- Michael Bordo and John Landon Lane (2013a) “Does Expansionary Monetary Policy Cause Asset Price Booms: Some Historical and Empirical Evidence” NBER Working paper 19585 October.
- Michael Bordo and John Landon Lane (2013b) “What Explains House Price Booms? History and Empirical Evidence” NBER Working Paper 19584 October.
- Michael Bordo and Christopher Meissner (2016) “Fiscal and Financial Crises“ *North Holland Handbook of Macroeconomics* (eds) John Taylor and Harald Uhlig volume 2a, pp 355 -412. New York.
- Michael Bordo and Athanasios Orphanides (2013) *The Great Inflation*. Chicago; University of Chicago Press.
- Michael Bordo and Pierre Siklos (2017) “Central Banks: Evolution and Innovation in Historical Perspective” Riksbank March
- Michael Bordo and David Wheelock (2010) “The Promise and Performance of the Federal Reserve as Lender of Last Resort, 1914-1933’ in Michael Bordo and William Roberds (eds.*) A Return to Jekyll Island; The Origins, History and Future of the Federal Reserve*. New York: Cambridge University Press.
- Claudio Borio (2012) “The Financial Cycle and Macroeconomics; What have We Learnt?” BIS Working Paper.
- Claudio Borio and Philip Lowe (2002) “Asset Prices, Financial and Monetary Stability: Exploring the Nexus” BIS Working Paper no. 114.

- Claudio Borio and William R. White (2003), Whither monetary and financial stability: the implications of evolving policy regimes, *Proceedings - Economic Policy Symposium - Jackson Hole*, issue, pp 131-211.
- Gerhard Bry and Charlotte Boschan (1971) "Cyclical Analysis of Time Series: Selected Procedures and Computer Programs", National Bureau of Economic Research, Inc.
- Jose Caballero (2014) "Do Surges in International Capital Inflows Influence The Likelihood of Banking Crises?" *Economic Journal* 1-36.
- Charles Calomiris and Eugene White (1994) "The Origins of Federal Deposit Insurance" in Claudia Goldin and Gary Libecap (eds.) *The Regulated Economy: A Historical Approach to Political Economy*, Chicago: University of Chicago Press, pp 145-188.
- Cary Brown (1956) "Fiscal Policy in the 1930s: A Reappraisal", *American Economic Review* Vol 46. No. 5 (December), pp 857-879.
- Harold Cole and Lee Ohanian (2004) "New Deal Policies and the Persistence of the Great Depression; A General Equilibrium Analysis," *Journal of Political Economy*. Vol 112. No.4 (August), pp 779-816.
- Sebastian Edwards (2018) *Broken Promises: When America Defaulted.* Princeton: Princeton University Press (in press).
- Gautti Eggertson (2008) "Great Expectations and the End of the Depression," *American Economic Review* Vol 98. No. 4, September, pp 1476-1516.
- Barry Eichengreen (1992) *Golden Fetters*. New York: Oxford University Press.
- Barry Eichengreen and Kris Mitchener (2004) "The Great Depression as a Credit Boom Gone Wrong" *Research in Economic History*. Volume 22 pp 183-237.

- Andrew Filardo and Phurichai Rungcharoenkitkul (2016) “Quantitative Case for Leaning against the Wind” BIS Working Paper.
- Milton Friedman and Anna Schwartz (1963) *A Monetary History of the United States. 1867 to 1960*. Princeton University Press.
- Gabriele Galati and Richhild Moessner (2014) “What do we know about the effects of Macroprudential Policy” DNB Working paper no. 440 September.
- Karsten Gerdrup, Frank Hansen, Tord Krogh and Junior Maih (2017) “Leaning against the Wind When Credit Bites Back”, *International Journal of Central Banking*, Vol. 13 No. 3, September 2017, pp. 287-320.
- Wiliiam N. Goetzmann (2015) “Bubble Investing: Learning from History” NBER Working Paper 21693 October.
- Marvin Goodfriend (2014) “Lessons from a century of FED policy: Why monetary and credit policies need rules and boundaries.” *Journal of Economic Dynamics and Control*, *49*, 112-120.
- Jeffrey Gordon (2014) “The Empty Call for Benefit-Cost Analysis in Financial Regulation” *Journal of Legal Studies*. Vol 43. No.52. pp S356-S378.
- Jeffrey Gordon (2017) “The Future of Global Finance: But First Some History” Presentation at the Conference: The Future of Global Finance: Populism, Technology and Regulations. Columbia University. October.
- Gary Gorton and Guillermo Ordoñez (2016) “Good Booms, Bad Booms” NBER Working Paper 22008 February.

- Don Harding and Adrian Pagan (2002) “Dissecting the cycle: a methodological investigation,” *Journal of Monetary Economics*, 49, issue 2, p. 365-381.
- Joshua Hausman, Paul Rhode and Johannes Wieland (2017) “Recovery From the Great Depression: the Farm Channel in Spring 1935,” NBER Working Papers 23172, National Bureau of Economic Research, Inc.
- Stefan Ingves (2017) “Monetary Policy Challenges—Weighing Today Against Tomorrow” Speech given at Swedish Economic Association, Stockholm School of Economics. May 16
- International Monetary Fund (2009) “Lessons of The Global Financial Crisis for Macroeconomic Policy” (mimeo) IMF Research Department.
- International Monetary Fund (2015) “Monetary Policy and Financial Stability” Staff report.
- Greg Ip (2009) *Foolproof: Why Safety can Be Dangerous and How Danger Makes Us Safe*. New York: Little Brown.
- Andrew Jalil and Rua Gisela, 2015 “Inflation Expectations and Recovery from the Depression in 1935: Evidence from the Narrative Record,” Finance and Economics Discussion Series. Division of Research and Statistics and Monetary Affairs. Federal Reserve Board. Washington, DC.
- Oscar Jordà, Moritz Schularick and Alan Taylor (2011) “Financial Crises, Credit Booms, and External Imbalances: 140 Years of Lessons” *IMF Economic Review* 59: 340-378.
- Oscar Jordà, Moritz Schularick and Alan Taylor (2013) “When Credit Bites Back.” *Journal of Money, Credit and Banking* Vol 45 (December) pp 3-28.
- Oscar Jordà, Moritz Schularick and Alan Taylor (2016a) “Sovereigns versus banks: credit, crises, and consequences.” *Journal of the European Economic Association* 14 (1) pp 45-79.

- Oscar Jordà, Moritz Schularick and Alan Taylor (2016b) “The Great Mortgaging: Housing Finance, Crises and Business Cycles. *Economic Policy* Vol 31(85) pp 107-152.
- Oscar Jordà, Moritz Schularick and Alan Taylor (2017) “Macrofinancial History and the New Business Cycle Facts.” in *NBER Macroeconomics Annual 2016*, volume 31, edited by Martin Eichenbaum and Jonathan A. Parker. Chicago: University of Chicago Press.
- Hyo Sang Kim, Wiliam I Newman , Key Yong Park Aaron Tornell (2017) “Economic Recessions and Wildfires” UCLA (mimeo).
- Hyosong Kim, William Newman, Keyyong Park and Aaron Tornell (2017) “Economic Recessions and Wildfires”, UCLA (mimeo).
- Sebastian Mallaby (2016) *The Man who Knew; the Life and Times of Alan Greenspan*. New York: Penguin.
- Allan H Meltzer (2003) *A History of the Federal Reserve Volume 1 1913-1951 Chicago: University of Chicago Press.*
- Hyman Minsky (1977) “A Theory of Systemic Fragility” in Altman E.J. and Sametz, A (eds.) *Financial Crises: Institutions and Markets in a Fragile Environment*. Wiley; New York pp 138-152.
- Øystein Olsen (2015) “Integrating Financial Stability and Monetary Policy” Speech given at the London School of Economics. April.
- William Poole (2016) “The Man Who Knew: The Life and Times of Alan Greenspan by Sebastian Mallaby: A Policy Wonk’s Extended Review” *Business Economics*
- Raghuran Rajan (2011) *Fault Lines; How Hidden Fractures Still Threaten the World Economy*. Princeton University Press.

- Carmen Reinhart and Kenneth Rogoff (2009) *This time is different: Eight centuries of financial folly.* Princeton University Press.
- Christina Romer (1992) "What Ended the Great Depression?" *Journal of Economic History*, Vol 52. No.4 (December), 757-784.
- Bjorn Richter, Moritz Schularick and Paul Wachtel (2017) "When to Lean against the Wind," Croatian National Bank, June.
- Myron Scholes (2009) "Market-Based Mechanisms to Reduce Systemic Risk" in The Road Ahead for the Fed, John D. Ciorciari and John B. Taylor (eds.), Hoover Press, Stanford, California.
- Moritz Schularick and Alan Taylor (2012) "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Cycles, 1870-2008" *American Economic Review* 102 (20) 1029-1061.
- Frank Smets (2014) "Financial Stability and Monetary Policy; How Closely Interlinked?" *International Journal of Central Banking*. Volume 10. No.2 (June).
- Jeremy Stein (2013) "Overheating in Credit Markets: Origins, Measurement and Policy Responses" Board of Governors of the Federal Reserve February.
- Lars E.O. Svensson (2014) "Inflation Targeting and Leaning Against the Wind" International *Journal of Central Banking* 10(2) 103-114.
- Lars E.O. Svensson (2016a) "Discussion of Filardo and Rungcharoenkitkul, Quantitative Case for Leaning against the Wind" Research Forum on Macro-Finance, Center for Central Banking Studies, Bank of England May.

- Lars E.O. Svensson (2016b) “How Robust is the result that the Cost of ’Leaning Against the Wind’ Exceeds the Benefits? Response to Adrian and Liang” Working Paper, Stockholm School of Economics.
- Lars E.O. Svensson (2016c) “Monetary Policy and Macroprudential Policy; Different and Separate“ Stockholm School of Economics (mimeo) February.
- Lars E.O. Svensson (2017) “Cost Benefit Analysis of Leaning against the Wind: Are Costs Larger Also with Less Effective Macroprudential Policy?” Stockholm School of Economics (mimeo) January.
- John B. Taylor (2007) ‘Housing and Monetary Policy” in *Housing, Housing Finance and Monetary Policy*. Federal Reserve Bank of Kansas City.
- Alan Taylor (2012) “The Great Leveraging” BIS Working Papers No. 398 December
- Janet Yellen (2014) “Monetary Policy and Financial Stability” Board of Governors Federal Reserve July.
- Eugene White (2000) “Banking and finance in the twentieth century.” *The Cambridge Economic History of the United States 3* (2000): 743-802.
- John Williams (2015) “Macro Prudential Policy in a Microprudential World” Federal Reserve Bank of San Francisco Economic Letter June.

Appendix

Table A1: Identified Credit Cycles

Country	Expansion	Contraction	Average growth rate of credit during expansion	Percentage drop of credit during contraction	Gorton and Ordonez Credit Boom
Australia	1880-1894	1894-1917	5.0%	-60%	Yes
Australia	1917-1919	1919-1925	11.0%	-19%	No
Australia	1925-1932	1932-1937	8.0%	-23%	Yes
Australia	1937-1939	1939-????	4.0%	----	No
Australia	????-1950	1950-1953	1.0%	-14%	No
Australia	1953-1955	1955-1961	8.0%	-16%	No
Australia	1961-1968	1968-1971	3.0%	-5%	No
Australia	1971-2010	2010-????	5.0%	-----	Yes
Belgium		1880-1889	----	0.1%	No
Belgium	1889-1893	1893-1895	5.0%	-4.0%	Yes
Belgium	1895-1901	1901-????	7.0%	-23%	Yes
Belgium	????-1922	1922-1924	4.0%	-22%	No
Belgium	1924-1933	1933-????	3.0%	----	Yes
Belgium	????-1981	1981-1986	3.0%	-11%	Yes
Belgium	1986-1991	1991-1995	3.0%	-12%	Yes
Belgium	1995-1997	1997-2003	3.0%	-9%	No
Belgium	2003-2008	2008-2010	3.0%	-1.0%	No
Canada	1880-1896	1896-1903	2.0%	-32%	No
Canada	1903-1906	1906-1908	9.0%	-11%	Yes
Canada	1908-1914	1914-1917	3.0%	-36%	No
Canada	1917-1921	1921-1925	8.0%	-27%	Yes
Canada	1925-1933	1933-1937	5.0%	-42%	Yes
Canada	1937-1939	1939-1944	3.0%	-51%	No
Canada	1944-1950	1950-1952	5.0%	-9%	Yes
Canada	1952-1955	1955-1958	6.0%	-7%	Yes
Canada	1958-1981	1981-1983	6.0%	-13%	Yes
Canada	1983-1992	1992-1995	3.0%	-7%	No
Canada	1995-1998	1998-2000	1.0%	-11%	No
Denmark	1880-1888	1888-1891	7.0%	-6%	Yes
Denmark	1891-1908	1908-1920	4.0%	-34%	Yes
Denmark	1920-1927	1927-1929	4.0%	-5%	Yes
Denmark	1929-1932	1932-1944	7.0%	-53%	Yes
Denmark	1944-1948	1948-1957	2.0%	-18%	No
Denmark	1957-1975	1975-1982	3.0%	-11%	No
Denmark	1982-1988	1988-1995	5.0%	-17%	Yes
Denmark	1995-2009	2009-????	5.0%	-----	Yes
Finland	1880-1914	1914-1925	6.0%	-48%	Yes
Finland	1925-1931	1931-1937	9.0%	-33%	Yes

Finland	1937-1939	1939-1945	6.0%	-52%	No
Finland	1945-1949	1949-1951	7.0%	-15%	Yes
Finland	1951-1966	1966-1968	3.0%	-6%	Yes
Finland	1968-1974	1974-1976	2.0%	-3%	No
Finland	1976-1991	1991-1997	4.0%	-45%	Yes
France	????-1950	1950-1952	-----	-0.1%	----
France	1952-1975	1975-1980	4.0%	-17%	Yes
France	1980-1990	1990-1999	2.0%	-16%	No
Germany	????-1946	1946-1948	-----	-0.01%	----
Germany	1948-1972	1972-1974	10.0%	-2%	Yes
Germany	1974-2000	2000-2007	2.0%	-12%	No
Germany	2007-2009	2009-????	3.0%	-----	No
Italy	1880-1889	1889-1898	7.0%	-22%	Yes
Italy	1898-1910	1910-1918	4.0%	-40%	No
Italy	1918-1933	1933-1940	8.0%	-34%	Yes
Italy	1940-1942	1942-1947	3.0%	-63%	No
Italy	1947-1972	1972-1983	6.0%	-35%	Yes
Italy	1983-1993	1993-1996	4.0%	-8%	Yes
Italy	1996-2010	2010-????	4.0%	-----	Yes
Japan	1880-1889	1889-1892	6.0%	-13%	No
Japan	1892-1896	1896-1898	12.0%	-16%	Yes
Japan	1898-1915	1915-1917	6.0%	-10%	Yes
Japan	1917-1926	1926-1929	3.0%	-10%	No
Japan	1929-1931	1931-1938	12.0%	-41%	No
Japan	????-1953	1953-1955	1.0%	-4%	No
Japan	1955-1965	1965-1970	6.0%	-5%	Yes
Japan	1970-1972	1972-1980	11.0%	-17%	No
Japan	1980-1993	1993-1997	4.0%	-5%	Yes
Japan	1997-1999	1999-2007	1.0%	-19%	No
Japan	2007-2009	2009-????	5.0%	-----	No
Netherlands	????-1945	1945-1949	-----	-0.1%	----
Netherlands	1949-1956	1956-1958	5.0%	-2%	No
Netherlands	1958-1980	1980-1985	6.0%	-3%	No
Netherlands	1985-2009	2009-????	4.0%	-----	No
Norway	1880-1887	1887-1889	4.0%	-8%	Yes
Norway	1889-1909	1909-1916	3.0%	-18%	No
Norway	1916-1922	1922-1925	7.0%	-23%	Yes
Norway	1925-1927	1927-????	5.0%	-----	No
Norway	????-1954	1954-1956	6.0%	-5%	Yes
Norway	1956-1960	1960-1970	7.0%	-19%	No
Norway	1970-1979	1979-1981	2.0%	-12%	No
Norway	1981-1989	1989-1996	7.0%	-12%	Yes
Norway	1996-2009	2009-????	3.0%	-----	Yes

Sweden	1880-1887	1887-1895	4.0%	-9%	No
Sweden	1895-1922	1922-1929	1.0%	-24%	Yes
Sweden	1929-1931	1931-1940	8.0%	-31%	No
Sweden	1940-1946	1946-1956	3.0%	-25%	No
Sweden	1956-1979	1979-1984	3.0%	-1%	No
Sweden	1984-1992	1992-1998	6.0%	-29%	Yes
Switzerland	1880-1882	1882-1890	2.0%	-4%	No
Switzerland	1890-1914	1914-1920	3.0%	-42%	Yes
Switzerland	1920-1935	1935-1950	5.0%	-52%	Yes
Switzerland	1950-1957	1957-1960	1.0%	-2%	No
Switzerland	1960-1969	1969-1973	2.0%	-22%	No
Switzerland	1973-1991	1991-1993	3.0%	-1%	Yes
Switzerland	1993-1996	1996-2000	1.0%	-5%	No
Switzerland	2000-2003	2003-2007	.01%	-4%	No
UK	1880-1886	1886-1890	2.0%	-5%	No
UK	1890-1893	1893-1907	5.0%	-9%	No
UK	1907-1910	1910-1918	2.0%	-49%	No
UK	1918-1931	1931-1933	7.0%	-10%	Yes
UK	1933-1937	1937-1944	2.0%	-57%	No
UK	1944-1951	1951-1957	6.0%	-19%	Yes
UK	1957-1974	1974-1978	4.0%	-8%	Yes
UK	1978-1990	1990-1997	7.0%	-10%	Yes
UK	1997-2009	2009-????	4.0%	-----	Yes
USA	1880-1914	1914-1918	3.0%	-31%	No
USA	1918-1921	1921-1923	9.0%	-8%	Yes
USA	1923-1932	1932-1944	4.0%	-80%	Yes
USA	1944-1967	1967-1970	6.0%	-2%	No
USA	1970-1974	1974-1982	4.0%	-9%	No
USA	1982-1988	1988-1993	3.0%	-22%	No
USA	1993-2008	2008-????	2.0%	------	No

Table A2: Identified Credit Booms (using Loans Data)

Country	Expansion	Contraction	Average growth rate of credit during expansion	Percentage drop of credit during contraction
Australia	1880-1894	1894-1917	5.0%	-60%
Australia	1925-1932	1932-1937	8.0%	-23%
Australia	1971-2010	2010-????	5.0%	-----
Belgium	1889-1893	1893-1895	5.0%	-4.0%
Belgium	1895-1901	1901-????	7.0%	-23%
Belgium	1924-1933	1933-????	3.0%	----
Belgium	????-1981	1981-1986	3.0%	-11%
Belgium	1986-1991	1991-1995	3.0%	-12%
Canada	1903-1906	1906-1908	9.0%	-11%
Canada	1917-1921	1921-1925	8.0%	-27%
Canada	1944-1950	1950-1952	5.0%	-9%
Canada	1952-1955	1955-1958	6.0%	-7%
Canada	1958-1981	1981-1983	6.0%	-13%
Denmark	1880-1888	1888-1891	7.0%	-6%
Denmark	1891-1908	1908-1920	4.0%	-34%
Denmark	1920-1927	1927-1929	4.0%	-5%
Denmark	1929-1932	1932-1944	7.0%	-53%
Denmark	1982-1988	1988-1995	5.0%	-17%
Denmark	1995-2009	2009-????	5.0%	-----
Finland	1880-1914	1914-1925	6.0%	-48%
Finland	1925-1931	1931-1937	9.0%	-33%
Finland	1945-1949	1949-1951	7.0%	-15%
Finland	1951-1966	1966-1968	3.0%	-6%
Finland	1976-1991	1991-1997	4.0%	-45%
France	1952-1975	1975-1980	4.0%	-17%
Germany	1948-1972	1972-1974	10.0%	-2%
Italy	1880-1889	1889-1898	7.0%	-22%
Italy	1918-1933	1933-1940	8.0%	-34%
Italy	1947-1972	1972-1983	6.0%	-35%
Italy	1983-1993	1993-1996	4.0%	-8%
Italy	1996-2010	2010-????	4.0%	-----
Japan	1892-1896	1896-1898	12.0%	-16%
Japan	1898-1915	1915-1917	6.0%	-10%
Japan	1955-1965	1965-1970	6.0%	-5%
Japan	1980-1993	1993-1997	4.0%	-5%

Norway	1880-1887	1887-1889	4.0%	-8%
Norway	1916-1922	1922-1925	7.0%	-23%
Norway	????-1954	1954-1956	6.0%	-5%
Norway	1981-1989	1989-1996	7.0%	-12%
Norway	1996-2009	2009-????	3.0%	-----
Sweden	1895-1922	1922-1929	1.0%	-24%
Sweden	1984-1992	1992-1998	6.0%	-29%
Switzerland	1890-1914	1914-1920	3.0%	-42%
Switzerland	1920-1935	1935-1950	5.0%	-52%
Switzerland	1973-1991	1991-1993	3.0%	-1%
UK	1918-1931	1931-1933	7.0%	-10%
UK	1944-1951	1951-1957	6.0%	-19%
UK	1957-1974	1974-1978	4.0%	-8%
UK	1978-1990	1990-1997	7.0%	-10%
UK	1997-2009	2009-????	4.0%	-----
USA	1918-1921	1921-1923	9.0%	-8%
USA	1923-1932	1932-1944	4.0%	-80%

Notes: Credit booms identified using methodology in Gorton and Ordonez (2016). When there is missing data the starting point or ending point of an expansion or contraction is left empty.

Table A3: Major Banking Crises (Those associated with recessions with total loss in GDP of around 5% or more)

Country	Crisis Date	Recession Date	Total Loss (amplitude of recession: % of peak)
Australia	1893	1891-1893	-22%
Belgium	1931	1928-1932	-10.9%
Canada	1923	1917-1921	-35%
Switzerland	1931	1929-1932	-10.34%
Germany	1931	1928-1932	-19.61%
Germany	2008	2008-2009	-4.99%
Denmark	2008	2007-2009	-7.39%
Finland	1931	1929-1932	-6.35%
Finland	1939	1938-1940	-10.85%
Finland	1991	1989-1993	-13.77%
France	1930	1929-1932	-17.37%
Great Britain	1890	1889-1893	-5.44%
Great Britain	2007	2007-2009	-6.24%
Italy	1891	1890-1892	-7.41%
Italy	1921	1918-1921	-29%
Italy	1930	1929-1930	-7.06%
Italy	2008	2007-2009	-8.20%
Japan	1900	1901-1902	-6.61%
Japan	1917	1919-1920	-7.47%
Netherlands	1897	1895-1896	-5.19%
Norway	1921	1920-1921	-11.44%
Norway	1931	1930-1931	-8.74%
Sweden	1931	1930-1932	-4.90%
Sweden	1991	1990-1993	-6.89%
Sweden	2008	2007-2009	-6.09%
USA	1907	1906-1908	-10.77%
USA	1930	1929-1933	-36.75%
USA	2007	2007-2009	-5.71%