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The Great Depression as a Savings Glut

Victor Degorce & Éric Monnet

Highlights

- Banking crises of the Great Depression coincided with a sharp international increase in deposits at savings institutions and life insurance.
- This flight-to-safety fuelled a credit crunch since other institutions did not replace bank lending.
- Savings held in savings institutions and life insurance companies increased as a share of GDP and in real terms.
- These findings provide new explanations of the fall in credit and aggregate demand in the 1930s.
- They illustrate the need to consider nonbank financial institutions when studying banking crises.

Abstract

New data covering 23 countries reveal that banking crises of the Great Depression coincided with a sharp international increase in deposits at savings institutions and life insurance. Deposits fled from commercial banks to alternative forms of savings. This fuelled a credit crunch since other institutions did not replace bank lending. While asset prices fell, savings held in savings institutions and life insurance companies increased as a share of GDP and in real terms. These findings provide new explanations of the fall in credit and aggregate demand in the 1930s. They illustrate the need to consider nonbank financial institutions when studying banking crises.

Keywords

B22, E21, E51, G01, G21, N2.

JEL

Great Depression, Banking Crises, Precautionary Savings, Paradox of Thrift, Savings Banks.

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The Great Depression as a Savings Glut

Victor Degorce and Eric Monnet *

> *"There are today many well-wishers of their country who believe that the most useful thing which they and their neighbours can do to mend the situation is to save more than usual. [...] It is utterly harmful and misguided – the very opposite of the truth."*
>
> *J.M. Keynes (1931, II.6 p.151).*

An important question remains unanswered in studies on the Great Depression: what happened to savings? Conventional wisdom assumes that people lost their savings in bank failures or withdrew their bank deposits to hoard cash. The bank failures created a negative shock to the stock of money, which triggered or exacerbated the economic crisis (Fisher 1932; Friedman and Schwartz 1963; Grossman 1994; Mitchener and Richardson 2019). We paint a different picture, based on a new dataset covering 23 countries. These data reveal that, during the banking crises of the Great Depression, savings accumulated in savings institutions, at the expense of commercial banks. This phenomenon was an international feature of the Great Depression, and on a considerable scale.

Savings deposits increased not only as a share of income, but their nominal value increased, despite the economic crisis and deflation. In the 23 countries of our dataset, deposits in savings institutions increased on average by 111 percent between 1928 and 1933, while bank deposits

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collapsed by 15 percent.[1] This increase was stronger during the banking crisis years. In some countries, the increase in savings also occurred through life insurance. We do not find that cash was the primary vehicle for savings.

Savers shifted their funds from commercial banks to other financial institutions because the latter were safer than the former. Savings institutions (including postal savings systems) had first appeared in the mid-to-late 19th century. They took various institutional forms within and between countries. Despite their diversity, they were everywhere recognized to belong to a different category than the one of commercial banks. They were primarily set up to promote savings, in contrast to commercial and cooperative banks whose aim was to develop credit. They offered less payment and credit facilities but were perceived as safer because they were more regulated by governments, with most of their assets invested in safe long-term securities rather than lending to businesses.

The increase in deposits in savings institutions is the mirror image of the widely studied banking crises of the 1930s. This part of the story, which has long remained in the shadows, broadens our knowledge of the period for two reasons. First, it sheds new light on the relationship between banking crises and the fall in private credit. The reason is simple: the transfer of deposits from commercial banks to savings institutions mechanically triggered a credit crunch since the latter did not replace the former as lenders to businesses. Studying the US economy, Friedman and Schwartz (1963) argued that the decline in the money supply associated with bank failures caused the Great Depression. Bernanke (1983) demonstrated the need to look beyond this monetary effect because the loan-to-deposit ratio of commercial banks fell. In his view, a rise in the cost of credit intermediation also drove the decline in credit. Our analysis brings a more institutional and systemic perspective to this debate. The aggregate loan-to-deposit ratio (credit multiplier) fell sharply because savings institutions that received deposits generally did not lend to businesses. Had savings institutions replaced banks as lenders, total lending might have remained stable in the economy (or the decline in lending would have been due solely to the asymmetric information problem described by Bernanke).

[1] Romania is a clear outlier with a 723% increase in savings deposits between 1928 and 1933, if we exclude Romania from the sample, the average growth rate of savings deposits between 1928 and 1933 is 82%.

Second, our investigation raises new questions about precautionary saving during the Great Depression (Keynes 1931; Temin 1976; Romer 1990). Was the increase of deposits at savings institutions merely a reallocation of funds or was it also driven by an accumulation of new savings at the expense of consumption (precautionary savings)? Since historical data are too limited to compute total saving flows or personal saving rates, we can only provide partial answers to this question. Moreover, there are in fact important difficulties with identifying precautionary savings even when a personal saving rate is computed by National Accounts. The first reason was already highlighted by Keynes (1936, p. 84): "Every such attempt to save more by reducing consumption will so affect incomes that the attempt necessarily defeats itself."[2] Savings and GDP are jointly determined. The second is due to changes in asset prices that may affect the valuation of wealth (Guidolin and La Jeunesse 2007). The last is that aggregate or average personal saving rates hide the fact that some economic agents can save more at the same time as others increase their liabilities (Mian et al. 2020).

Although it is impossible to estimate precautionary savings precisely by income groups, we can nevertheless provide evidence that savings increased for at least part of the population. The first piece of evidence is simply to add up all the forms of saving that we have been able to measure, including the commercial bank deposits that declined during the Great Depression. If the flight-to-safety had been merely a reallocation of funds from commercial banks to other forms of savings, we should not see an increase in the amount of these savings during the Great Depression.[3] Yet, we do. This is true for the average ratio across countries as well as if we add up all the savings of the countries in our sample, expressed in constant dollars. However, this leaves aside the possibility that households or firms sold bonds, real estate or shares and transferred the money to their savings accounts. We cannot distinguish between price and volume effects for asset and housing prices (although their decline in nominal terms was probably mainly due to a fall in prices). To address this issue, we estimate the relationship between the growth rate of savings on the left-hand side (including deposits in savings institutions, cash and life insurance) and banking crises on the right-hand side, while controlling for the growth rates of equity prices, house prices and commercial bank deposits. If the increase

[2] It was later called the paradox of thrift; see Chamley (2012); Eggertsson and Krugman (2012).

[3] Note that this method deliberately underestimates new gross saving flows because it makes the strong (and wrong) assumption that all the fall in bank deposits was due to withdrawals.

in savings on the left-hand side was only due to a transfer of savings captured by the variables on the right-hand side, we should see a negative coefficient on these variables and no significant relationship with banking crises. Instead, we find that banking crises are positively associated with an increase in our measure of savings, everything else equal. We do not ignore the fact that the fall in asset prices resulted in a loss of wealth for households. We nevertheless argue that this negative wealth effect was not incompatible with an increase in new savings at the expense of consumption.

Academic literature on savings during the Great Depression

The extensive literature on banking crises during the Great Depression has focused primarily on the monetary and non-monetary effects of bank failures. While first formulated in the context of the US economy, these perspectives have been applied to international comparisons as well (Bernanke and James, 1991; Eichengreen, 1992; Grossman, 1994; Grossman and Meissner, 2010). More recently, the literature has shed light on the amplifying effect of network transmission through a flight-to-safety within the banking sector (Mitchener and Richardson 2019; Blickle et al. 2019; Calomiris et al. 2020). It remains focused on the commercial banking system. One reason why the role of nonbank savings institutions was neglected in the literature may be that – as our comparative dataset reveals – they were of more limited importance in the United States (see Table A1 in the Appendix), the country that has been and still is the basis for most macroeconomic theory of the Great Depression. The United States, however, was not spared the transfer of deposits from commercial banks.[4] The growth in deposits in mutual and postal savings banks in the US between 1930 and 1933 was already visible in the data published by Friedman and Schwartz (1963). Their analysis was nevertheless confined to a footnote: "The growth of postal savings deposits from 1929 to 1933 is one measure of the spread of distrust of banks." (p.308).[5] Likewise, in their international study of banking crisis in the Great Depression,

[4] Life insurance were quantitatively more important in the US. See Table A2 in the appendix and Goldsmith (1969, p.450).

[5] O'Hara and Easley (1979) further studied the increase in postal savings during the Great Depression in the United States, but not the larger mutual savings institutions. Studying the role of financial intermediaries in the US since 1900 (defined as banks, trusts,

Bernanke and James (1991) devoted only a footnote to the phenomenon we fully characterize in the current paper: “Savings banks, in contrast, held mostly government securities and thus often gained deposits during panic periods” (p.65).

Thus, although the rise in savings deposits was not unseen by previous scholars, it never was the subject of a specific study. Its macroeconomic effects have not been appreciated. It is only recently that the role of savings institutions during the Great Depression gained new attention, in a case study focusing on France (Baubeau et al. 2018, 2021). It stimulated ongoing research on other European countries (see Jorge-Sotelo (2019, chp.5) on Spain, Molteni (2021) on Italy and de Vicq and Peeters (2022) on the Netherlands). In a similar vein, and following the earlier work of O’Hara and Easley (1979), Schuster et al. (2020) noted that the US postal savings banks served as a ”safe haven” during the banking crises of the 1930s and Fleitas et al. (2023) observed a negative correlation between US postal savings and Building and Loan associations’ deposits.[6] Our study elevates these recent observations to a full account by providing the first comprehensive international study of savings during the Great Depression. Moreover, we attempt to systematically assess the macroeconomic implications of the rise in some forms of savings. We track savings deposits across as many countries and institutions as possible, we study the effect of the flight-to-safety on aggregate credit, and we discuss the potential macroeconomic importance of precautionary savings.

As explained previously, our interpretation of the fall in private credit is complementary but distinct from those of Friedman and Schwartz (1963) and Bernanke (1983). We quantitatively assess the difference between the mechanism highlighted by Bernanke and ours by comparing the loan-to-deposit ratios of commercial banks and the overall financial system. The second difference between our perspective and Bernanke’s is that we consider that the flight-to-safety from commercial banks to savings institutions was associated with periods of banking distress but was not necessarily a mechanical consequence of bank failures. Commercial banks might

insurance companies, savings and loan associations, credit unions, investment companies and government lending institutions), Goldsmith concluded: “The most rapid increases [of the assets of financial intermediaries] occurred during the Great Depression and World War II.” (Goldsmith 1958, p.12). Rockoff (1993) built on Friedman and Schwartz’s observation and concluded that it was not the stock of money that declined during the Great Depression but its “quality” because postal savings offered less payment facilities (checks in particular).

[6] These papers on the US postal savings system neither quantify the flight-to-safety from commercial banks and its effect on credit, nor discuss mutual savings banks and life insurance.

face withdrawals but not necessarily fail. As the cases of Greece and the Netherlands illustrate, it is even possible to observe a sizeable flight-to-safety without major bank failures.[7]

Another strand of the literature on the Great Depression – also centered on the United States – has studied the debt-deflation (or "consumer balance sheet") channel (Fisher 1933; Mishkin 1978; Olney 1999; Hausman et al. 2019), that is how the increase in the real value of debt put a strong constraint on consumption. This perspective is different but complementary to ours as the indebtedness of some consumers is compatible with the accumulation of savings by the wealthiest firms and households. Constrained consumers reduce their spending to pay off existing debt while unconstrained consumers accumulate precautionary savings to stay away from the borrowing limit, as in Keynes (1931, 1936). In both cases, aggregate demand is pushed down and output falls (Challe et al. 2017; Guerrieri and Lorenzoni 2017; Mian et al. 2020). We present further evidence that the number of accounts and the average volume of deposits in savings account increased. The number of savings accounts per capita indicates that not all the population had access to savings deposits.

Despite the influence of Keynesian theory on the interpretation of the Great Depression, we are aware of very few attempts to quantify the increase in savings at the expense of consumption. Temin (1976) and Romer (1990) provided indirect evidence of precautionary savings by examining the pattern of consumption of several goods after the 1929 stock market crash in the United States (US), but they did not study the data on savings.[8] We focus here on the link between banking distress and the accumulation of savings, a story more consistent with the fate of other countries where banking crises, rather than stock market crashes, first triggered economic crises (Grossman and Meissner 2010, p. 320). Our argument on precautionary savings is nevertheless conceptually similar to the one of Romer (1990): financial uncertainty led people to forego consumption.

[7] See de Vicq and Peeters (2022) for a recent detailed study of this episode. In the French case, Baubeau et al. (2021) also show that some banks that did not fail experienced a significant drop of their deposits.

[8] Goldsmith (1958) noted that the assets of US financial intermediaries increased during the Great Depression. Goldsmith (1969, vol.1, W18) found that total nominal intangible assets of the US economy decreased between 1930 and 1933 but this is driven by deposits in commercial banks, private securities and receivables. He showed but did not discuss the increase in deposits in other institutions and life insurance, nor he discussed their relationship with the banking crises and the Great Depression.

The international comparison covering more than 20 countries is both the strength and the weakness of this paper. Its strength is that it allows us to present the shift from commercial banks to savings institutions as a major macroeconomic and international feature of the Great Depression (although the extent varies from country to country). Only by considering the heterogeneity of financial institutions could we explain how an increase in savings could coincide with a large decrease in credit. Yet, macroeconomic comparisons across countries do not allow for a precise analysis of the motives for savings and the identification of the causal chain of events that led from savings accumulation to economic depression. In particular, the evidence on precautionary saving is much more suggestive than that on the link between flight to safety and the credit crunch. A more precise identification of precautionary saving and of its economic effects remains necessary. We hope that our presentation of the broad macroeconomic picture and of the potential mechanisms at play will encourage further research at the regional or individual level when data are available. Once visible, the role of saving and savings institutions in the Great Depression can no longer be ignored.

SAVINGS INSTITUTIONS AND BANKING CRISES DURING THE INTERWAR

History of savings institutions

Savings institutions first appeared in the mid-to-late 19th century.[9] They were typically set-up by local or central governments to encourage thrift among lower social classes. Yet, they soon started attracting funds from higher social classes and even from small businesses (Vogler 1991; Brück 1995; Mura 1996; Schuster et al. 2020; Monnet et al. 2021). They were primarily set up to promote savings, in contrast to commercial and cooperative banks whose first aim was to develop credit. This implied specific regulations and the holding of safer assets.[10] Savings institutions' deposits thus had three main advantages: they were safe (usually due to state guarantee), they were widely accessible (unlike commercial banks in most countries, savings

[9] Kindleberger (1984, p.12) dates the birth of savings banks to 1810 in England and 1818 in France. Nevertheless, he gives little or no space to these institutions in his landmark book on the financial history of Western Europe.

[10] Cooperative banks whose first aim was to grant credit to local businesses (such as Raiffeisen credit cooperatives in several European countries, see Guinnane (2001)) are not considered as savings banks. Edwards and Ogilvie (1996) note that German savings banks "were initially set up by municipalities to encourage savings - even tiny sums-by poorer people. Later in this period they also had middle-class depositors. They were required to invest in absolutely safe securities, such as mortgage credits and gilt-edged securities" (p.431-432)..

institutions established branches in rural and sparsely populated areas), and they paid interest (unlike cash and other hoarded funds). The special status of savings institutions progressively disappeared in the second half of the 20th century, as deposit insurance was extended to commercial banks. Starting in the late 1970s and early 1980s, most savings institutions were privatized or merged with commercial banks (Carletti et al. 2005; Bülbül et al. 2013). In the 1920s and 1930s however, commercial banks were essentially unregulated (US banking regulation being an exception), and savings institutions' deposits were a unique haven for precautionary savings.

Savings institutions enjoyed a privileged relationship with the State. Still, the degree of state involvement varied widely between (and sometimes within) countries. Two broad groups of institutions can be distinguished. In the first group, savings institutions were set-up as state-backed institutions, under the direct responsibility of the Ministry of Finance. Their deposits were explicitly guaranteed by the State. Postal Savings systems are included in this category. They were created by European states at the end of the 19th century, based on the expansion of the postal network, and transplanted to the United States in 1911 (National Monetary Commission 1910; Kemmerer 1911). As a rule, funds deposited at these institutions were invested in government securities or deposited at the Treasury department.[11] Some private institutions' deposits were also centralized by the state. UK's Trustee Savings Banks (TSBs) were private institutions, but their deposits were collected by the Bank of England and invested in government bonds (Horne 1947). Likewise, the French *Caisses ordinaires d'épargne* were privately owned but, from 1837 onwards, their assets were nevertheless managed by the *Caisses des dépôts et consignations*, a government-sponsored financial institution, and fully invested in government securities or deposits at the Treasury (Monnet et al. 2021).

The second group includes private savings institutions which enjoyed more autonomy to manage their portfolio. They were however strictly regulated by the State, contrary to

[11] See Molteni (2021) for Italy, and Calder (1990) on Japan's postal savings bank. The US Postal savings system was an exception, with part of the assets invested as commercial bank deposits. During the Great Depression, however, these assets were almost entirely invested in Treasury bills. Commercial banks refused to remunerate the deposits of postal savings banks at the required rate of 2.5%. In 1939, only 5% of the assets of US postal savings were deposited in commercial banks (Schuster et al. 2020). The Belgium's *Caisse Générale d'Epargne et de Retraite* (CGER), a public institution which collected deposits through post offices, used some of its funds to grant loans to farmers and mortgage loans to low-income groups (Van Molle 1986).

commercial banks at that time (with the exception of US banking regulation). In Austria, savings banks had to report annually on their activities, and an imperial commissioner sat on their board (Lepelletier 1911). In Denmark and Norway, a supervision authority was created in 1880 and 1887 to monitor private savings banks and liquidate them if they lost more than 5% over a year.[12] In return, private savings institutions' deposits enjoyed an explicit or implicit state guarantee. The founding act of the Spanish *cajas de ahorros* of June 1880 for example stated that the *cajas* were "under the protection" of the government (Mura 1996; Casals 1991). Funds deposited at private savings institutions were primarily invested in government securities or in long-term mortgage loans. Discounting of commercial bills or other short-term loans similar to commercial bank loans were not their main business activity (see discussion below and Table A2 in Appendix). Starting in the 1920s, some private savings institutions became involved in commercial discounting, especially in Germany (Proettel 2016), but short-term loans to businesses remained the prerogative of commercial banks.

The ability to set the interest rate on deposits also varied across countries and institutions. In public savings institutions (and sometimes in private ones), the interest rate on deposits was set directly by the Ministry of Finance, usually below market interest rates. A higher interest rate would have put considerable pressure on commercial banks. During the Great Depression, however, many governments failed to keep the rate on savings deposits in line with falling market rates (and deposit rate at commercial banks). More importantly, the risk-adjusted interest rate was clearly in favour of the savings banks once the commercial banks started to face deposit withdrawals. This generated intense criticisms on the part of commercial banks and considerable debate among the political class in many countries. Savings institutions were accused of unfair competition (see for example Skulic (1936) on Yugoslavia, Monnet et al. (2021) on France, de Vicq and Peeters (2022) on the Netherlands, Sissman (1938), O'Hara and Easley (1979) and Shaw (2018) on the US, and Horne (1947) on the UK).[13]

[12] See the chapter on Norway and Denmark in Mura (1996).

[13] Thomes (2013) shows that the German's Sparkassen gained deposits from wealthy households during economic recessions because their deposit rate remained stable, including during the early years of the Great Depression.

New data on deposits in savings institutions

We build a new international database of deposits at savings institutions in 23 countries, covering the 1920-1936 period. Our sample includes the richest part of the world and the hardest hit by banking crises during the Great Depression: North America, Japan, and most European countries. Overall, the 23 countries included in our sample account for 65% of world real GDP in 1930 (Bolt et al. 2018).[14] Data are annual. We collected the data from national statistical yearbooks and, in a few instances, from the League of Nations statistical yearbooks. Whenever possible, we corrected and improved these series with more recent estimates built by other scholars, or by going back to the original annual reports published by savings institutions (see online Appendix). Both the League of Nations and national yearbooks clearly distinguished commercial banks from savings institutions. We relied on these categories built by contemporaries, rather than on our assessment, to construct our database (see online Appendix for a country-by-country list of savings institutions). Data on commercial banks are from similar sources or recent scholarship when available. Other data sources for financial institutions and macroeconomic variables are listed in the online Appendix.

For the majority of countries, higher frequency data were not available. Data on the flow of deposits are also absent, so we had to rely on end-of-year balance sheets. In the absence of banking regulation in most countries (Grossman 2010), it is also impossible to find continuous and representative series of deposit interest rates of commercial banks.

The evolution of savings during the Great Depression

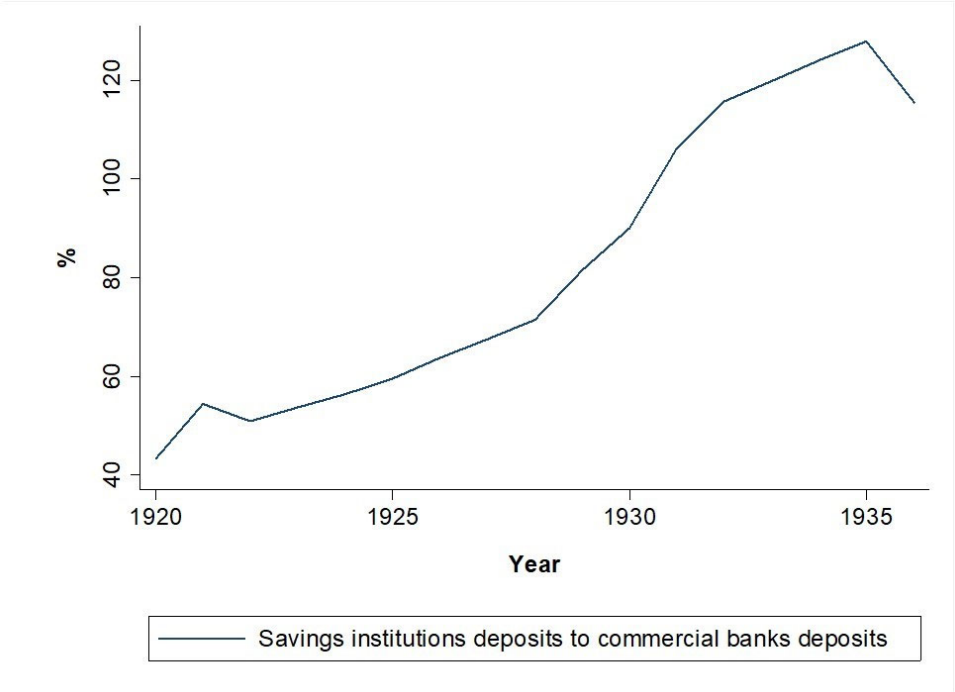
Savings institutions thrived during the Great Depression. Table A1 in the Appendix shows the growth rate of deposits between 1930 and 1932 - the years of the great banking panics (country-by-country plots are presented in the online Appendix). Commercial bank deposits declined everywhere whereas most countries experienced a strong increase in savings institutions' deposits. As we will see later, the exceptions (6 out of 23 countries) were either countries with a major sovereign debt crisis or countries without a banking crisis. The increase in nominal

[14] Austria, Belgium, Bulgaria, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom, United States and Yugoslavia.

deposits is even more striking given that, as is well known, the years 1930-1932 were characterized by global deflation and falling output.

Figure 1 plots the average ratio between savings institutions' deposits and commercial bank deposits, over the 1920-1936 period for 23 countries. The average ratio increased from 71.4% in 1928 to 115.8% in 1932. This means that, on average, in our sample of countries, the early years of the Great Depression saw savings institutions' deposits become the dominant form of deposit. Figure 1 also suggests that the increase in the ratio started before the Great Depression, as soon as 1926. This increase is driven by a few countries (notably Japan and Scandinavian countries) which experienced banking instability in the mid-to-late 1920s. Excluding these countries, we find that the ratio was stable at around 35% from 1925 to 1928, and then increased to 45% in 1929 and reached 84% in 1932 and 95% in 1935.

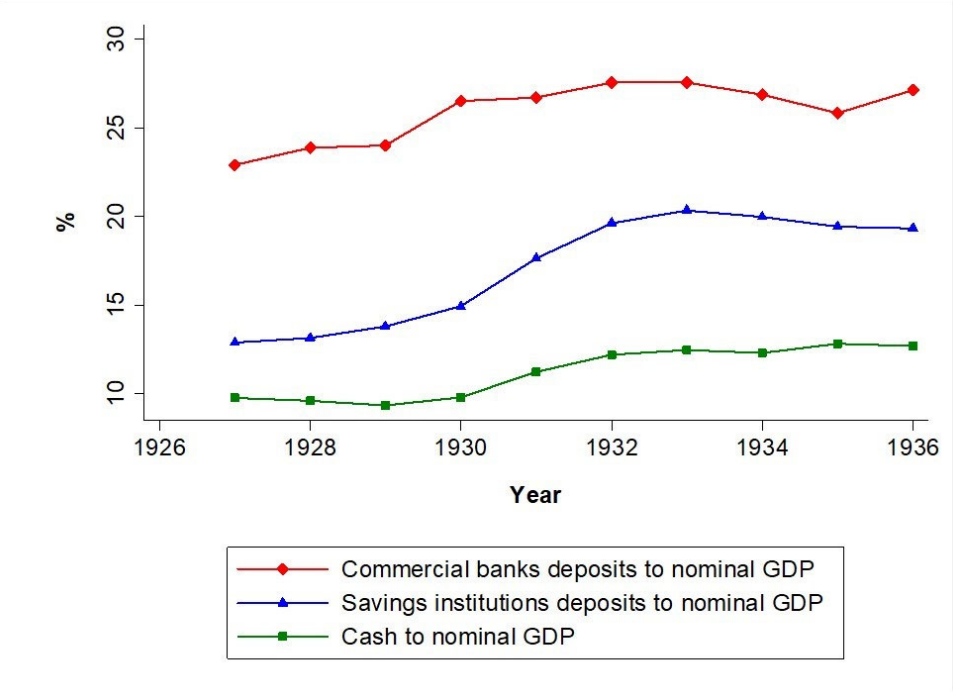
Figure 1: Ratio of deposits in savings institutions to deposits in commercial banks, 1920-1936



Note: Unweighted average of the data for the 23 countries in our sample.
Source: See online Appendix.

The 1928-1933 increase in the ratio is not only due to a fall in commercial bank deposits but also to a sharp increase in savings deposits. On average, bank deposits decreased by 14.5% between 1928 and 1933, while savings institutions' deposits increased by 111%.

Figure 2: Ratio of bank deposits, savings institutions deposits, and cash in circulation to nominal GDP, 1926-1936



Note: Unweighted average of the data for the 19 countries for which we have nominal GDP data.
Source: See online Appendix.

In terms of GDP, the figures are equally striking (Figure 2). Note however that our sample is reduced to 19 countries in this case because of the lack of GDP data for several countries. Deposits in savings institutions increased from 13% to 20% of nominal GDP, while the share of

commercial bank deposits remained constant. The cash to GDP ratio increased more modestly and the increase is mostly driven by the drop of GDP. The nominal quantity of cash increased in only 6 countries out of 23.[15] Cash hoarding explains little of the rise in savings (contrary to the widely held belief that precautionary savings were put "under the mattress" Fisher (1932)).[16] As can be seen from Table A1 and from the online appendix (which provides country-by-country graphs), the increase in savings institutions' deposits is especially visible in countries that experienced a banking crisis, although its extent varied from country to country.

Savings institutions and banking crises

The link between the occurrence of banking crises and the rise of deposits at savings institutions is confirmed by descriptive statistics. On average, in each country of our sample, the growth rate of savings deposits was 6.5 percentage points higher during banking crisis years. If we look at the growth rate of the savings deposits to GDP ratio, the difference is 10.7 percentage points.

To code banking crises, we started from the definition of banking panics provided by Bernanke and James (1991) (also used by Grossman (1994)). It covers the largest share of countries in our sample, and it is the most documented and consistent with scholarship on specific countries. In few instances, we supplement their data using more recent studies. For France, we coded the year 1932 as "non-crisis year" (contrary to 1930 and 1931) based on recent research by Baubeau et al. (2021). For Spain, we coded the year 1931 as "crisis year" based on the work of Jorge-Sotelo (2020). Portugal and Bulgaria are not covered by Bernanke and James, so we instead rely on Reinhart and Rogoff (2009) for Portugal, and on Kossev (2008) for Bulgaria.

The difference between crisis and non-crisis years holds if we also include episodes of banking crises that were not associated with banking panics or bank failures (see Table 1, bottom line). These episodes were defined – and named "quiet crises" – by Baron et al. (2021). These are years when the equity prices of banks under-performed markedly compared to the rest of the

[15] As it is well-known, central banks did not respond to the Great Depression by increasing base money (at least not before they exited the gold standard).

[16] A similar conclusion was reached by Baubeau et al. (2021) for France. About the US, net saving data between 1930 and 1933 gathered by Goldsmith (1969) also show that savings in currency represented only 20% of the savings through life insurance and savings banks (see Table S.21).

stock market. Considering "quiet crises" in our sample is important since waves of bank failures were not always necessary to trigger a reallocation of savings from commercial banks to savings institutions. The Netherlands is a clear case of an increase in savings deposits without major banking panic (see Table A1 in the appendix and de Vicq and Peeters (2022)), but with a "quiet banking crisis" identified by Baron et al. (2021). So is Greece. By contrast, we see no flight-to-safety in Canada, a country that is known as a notable exception during the Great Depression because banks remained strong despite the economy being also affected by the international slump in trade and production (Bordo et al. 2015).

Table 1 shows that, in each country of the database, the growth rate of savings deposits was 6.3 percentage points higher during years of banking crises (including quiet crises), while the growth rate of the savings deposits to GDP ratio was higher by 11 percentage points.[17] Focusing only on the Great Depression crises (1929-1933), we find similar results.

Table 1: The increase in savings during banking crises (relative to non-crisis years).

	Growth rate of savings deposits	Growth rate of savings deposits to GDP
Banking panics	6.5	10.7
Banking crises	6.3	11

Note: The number in each cell is the mean of within-country differences between crisis and non-crisis years. All figures are in percentage points. The table reads as follows: on average, in each country, the growth rate of savings deposits was 6.3 pp higher during banking crisis years than in non-crisis years. Banking crises years include both years of banking panics (our update of the series of Bernanke and James (1991)) and years of quiet crises (Baron et al. 2021). We first take the difference within each country, and then we average it out across our sample. For the growth rate of savings deposits (column 1), the sample covers 23 countries. For the growth rate of savings deposits to GDP (column 2), the sample covers only the 19 countries for which we have nominal GDP data.

Although not recorded in international accounts of the Great Depression (Kindleberger 1973; Bernanke and James 1991; Eichengreen 1992), the increase in savings institutions' deposits

[17] We exclude the 1922 "quiet" banking crisis in Japan, which was a crisis of the small savings banks. The crisis led the Bank of Japan to regulate the private savings banks (see Shizume (2012)).

during banking crises is not surprising given the lack of financial insurance in the interwar period. The absence of public unemployment insurance and (more importantly) financial insurance meant that consumers had to self-insure against risk. When credit dried up, financially unconstrained consumers had a strong incentive to accumulate savings as a buffer against future shocks.[18]

To be sure, part of the increase in savings deposits during a banking crisis was driven by portfolio reallocation (by a flight-to-safety from commercial bank deposits to safe savings institutions), rather than by an increase in precautionary savings. The last section of the article will discuss this issue extensively. This potential reallocation is almost impossible to track precisely, however. Aggregate capital stock data such as those compiled in Piketty and Zucman (2014) are not well suited to address these issues because most of the changes in financial wealth may be driven by a price effect rather than by savings flows. If stock market prices decrease and individuals do not sell their stocks, their nominal savings decrease. This decrease should not be interpreted as a reallocation towards other forms of savings. At this stage, it is sufficient to say that, for this reason, we cannot include in our study data on the stock of housings, bonds, and stocks.

Last, it is worth remembering that interwar banking crises were often independent from stock market crises (see Grossman and Meissner (2010) for a recent survey). After the US stock market crash of 1929, the Great Depression was characterized by a series of banking crises in the early 1930s, not by stock market crashes. Our first graphical and statistical investigations suggest that savings institutions' deposits strongly reacted to the uncertainty surrounding banking crises, rather than being of consequence of the 1929 international stock market crash.

Savings institutions that were privately owned often invested in mortgage loans. Contrary to business and commercial loans, they were considered as very safe. We still lack a comparative history of housing and mortgage markets during the Great Depression but – except in the United States – we are not aware of any major mortgage crisis that would have destabilized savings institutions. Starting from a similar observation, Eichengreen and Mitchener (2004) hypothesized that countries where the mortgage market was primarily financed by savings institutions and where rent controls were prevalent in the 1920s escaped a construction and mortgage boom.

[18] Models of precautionary savings rely on "incomplete insurance" (see Challe et al. 2017 for a review).

The mortgage crisis in the United States affected Building and Loan associations, which were not considered as saving banks because they were financed by equity rather than deposits. Their equity decreased when borrowers defaulted on their loans. The unique Building and Loan share instalment contract encouraged borrowing members to postpone dissolution and made almost impossible for investors to recover their funds (Fleitas et al. 2018). At the same time, US savings institutions (mutual savings and especially postal savings) attracted new funds from savers that, otherwise, could have gone to Building and Loan funds (O'Hara and Easley 1979; Schuster et al. 2020). The 1930 crisis of Building and Loan associations led to the creation of Savings and Loan institutions during the New Deal era and of the Home Owners' Loan Corporation (Rose and Snowden 2013).[19]

Sovereign debt crises, on the contrary, had more important consequences for savings institutions since they turned government securities into risky assets. In few countries (see Table A1 in the Appendix), a banking crisis hit but deposits in savings institutions did not increase (in nominal terms). These were the three countries that suffered very strong public debt crises starting 1931: Austria, Germany, and Hungary. Note however that the growth rate of nominal savings deposits was still much less negative than the one of commercial banks deposits in these countries. The situation was obviously more difficult for savings institutions that had invested in government securities. Austria's postal savings bank lost 13% of its deposits during year 1931. Savings institutions which invested a lower share of their assets in public securities suffered less from debt crisis. Key examples include Germany's public savings banks (*Sparkassen*), which invested a large fraction of their assets in short-term loans to the economy and mortgages (Lehmann-Hasemeyer and Wahl 2021).

Number of depositors

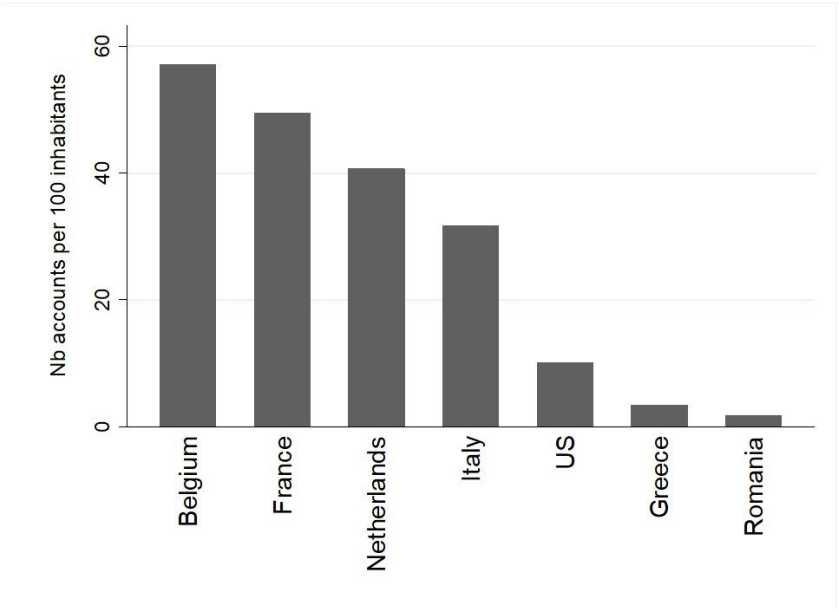
How many depositors increased their savings during the crisis? If the increase in savings was driven by a small share of the population, then the increase in savings deposits need not be associated with an increase in total savings, or in the average saving rate. To discuss if the increase in savings deposits was a widespread phenomenon within the population, we collected data on the number of savings accounts for a sub-sample of 7 countries. First, it is worth looking

[19] In France, on the contrary, mortgage bonds became very attractive and perceived as a safe haven during the crisis despite a marked slowdown in construction (Baubeau et al. 2021).

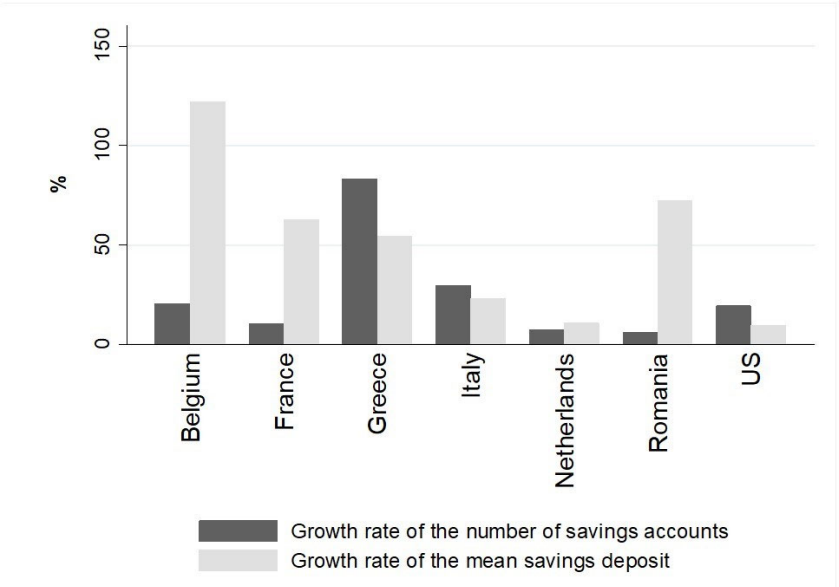
at how many accounts were open. As can be seen from panel (a) in Figure 3, the number of savings accounts per inhabitant in 1933 was well below 10% in Greece and Romania, and barely above 10% in the US. By contrast, the ratio of savings accounts by inhabitant was equal to more than half in Belgium and France. The differences between these countries can be explained quite easily. Greece and Romania are typical examples of countries that were still poor at that time. Saving was unlikely to be widespread in the population despite state policies to import financial institutions from the wealthiest European countries. The low number of accounts in the US – already a rich country – can be explained by the fact that government policies to develop savings institutions had been more modest than in Western Europe. Postal savings were created there in 1911 only and mutual savings banks were usually created through private initiatives. At the other hand of the spectrum, Belgium, France, and the Netherlands were rich countries where the state had pushed the development of savings institutions from the 19th century whereas commercial banks were not regulated. Italy could be included in this group, but the lower number of accounts is probably due to weaker economic and financial development than in the other three countries.

Figure 3: Number of savings accounts and average savings deposit

(a) Number of savings accounts per 100 inhabitants in 1933



(b) Growth rates during banking crises



Note: Panel B focuses on the 1928-1936 banking crises. We calculate - for each country - the growth rate between the year before the first banking crisis and the year after the last banking crisis. For countries that did not have a banking crisis (here, only Greece) we take the growth rate between 1930 and 1933.
Source: See online Appendix.

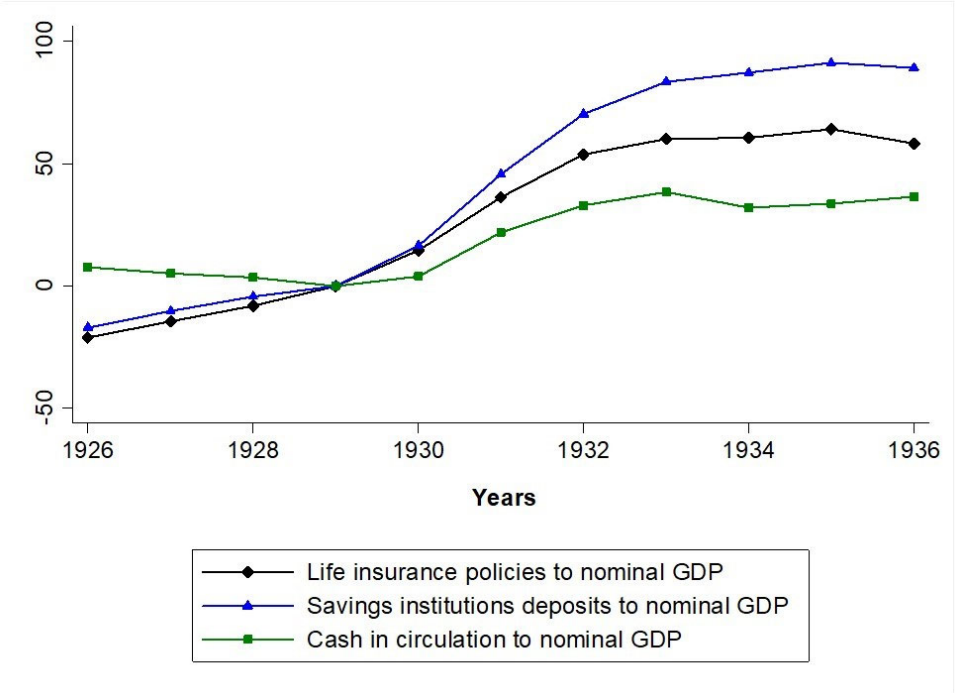
These accounts were not limited to individuals and could also be used by firms. Thus it cannot be interpreted as the number of accounts per inhabitant strictly speaking. Considering the existence of accounts opened by firms (although we cannot estimate their exact share), it is safe to state that less than half of the population had a savings account, even in countries like Belgium and France where savings accounts were widespread. Moreover, except in Greece, the growth of the volume of deposits per account was larger than the growth of new accounts during the crisis (see Panel B in Figure 3). Although there were some new entrants, the increase in savings deposits occurred significantly at the intensive margin: people who already had an account repatriated their funds from other institutions or saved more. This type of behaviour shows that these people were not over-indebted or hand-to-mouth households. The increase in savings during the Great Depression was unequal. Poor households, all the more those who faced debt repayment and/or unemployment, were unlikely to increase their deposit accounts.

Life insurance

Life insurance policies were also an important vehicle for savings in the interwar period. They had emerged later than savings institutions but became prominent in the late 19th century (Radice 1939; Goldsmith 1969; Hautcoeur 2004). We collected data on life insurance companies for 16 countries in our sample (in the remaining 7 countries, life insurance companies were either non-existent or not sufficiently organized to report aggregated data). A list of the sources used is given in the online Appendix.

In these 16 countries, life insurance policies increased on average by 42% in nominal terms, between 1928 and 1933 (while savings deposits increased by 48%). Figure 4 shows that, in these 16 countries, the ratio between life insurance policies and nominal GDP increased in the early 1930s, but less than the ratio between savings deposits and nominal GDP.

Figure 4: Life insurance policies to nominal GDP (1929=100)



Note: Unweighted average of the data for the 16 countries for which we have data on the assets of life insurers. 1929 is the base year.

Source: See online Appendix.

Caution should be applied when using data on life insurance in international comparison. Life insurance policies often took the form of investment accounts. The value of an investment account depends on the value of stocks and bonds in which the capitals are invested. Since both the composition of life insurance companies' assets (for example: government securities, corporate bonds, or stocks) and the fluctuation of the prices of these assets differed widely from one country to another during the Depression (Snowden 1995; Baker and Collins 2003; Hautcoeur 2004), it is quite difficult to present reliable cross-country comparisons that would capture the true increase in savings and exclude valuation effects. We therefore prefer to focus mainly on savings institutions in the rest of our analysis, while checking that our main conclusions do not differ if we also consider life insurance.

Still, it is remarkable that life insurance policies increased on average by 42% between 1928 and 1933, while the price of stocks and junk bonds decreased and the price of safest government and corporate bonds remained stable (for data on the US, see Basile et al. (2017)).

SAVINGS INSTITUTIONS AND THE CREDIT CRUNCH

From a macroeconomic perspective, the inflow of deposits in savings institutions raises two main questions. First, how was the money invested by savings institutions and how did it affect aggregate credit? Second, is there any evidence of an increase in precautionary savings, in addition to the flight-to-safety? This section addresses the first question (credit multiplier) while the following will discuss the second one (precautionary savings).

The assets of savings institutions

Savings institutions lent less to private businesses than commercial banks. A larger share of their assets was invested in safe government bonds or in Treasury deposits.[20] Nevertheless, some savings banks were involved in short-term credit markets (such as the *Sparkassen* in Germany, see Lehmann-Hasemeyer and Wahl (2021)), and could potentially have taken over the role of commercial banks during the crisis. Whether the flight-to-safety led to a decline in the credit multiplier therefore remains an empirical question.

To evaluate this claim, we assembled data on savings institutions assets, using annual balance sheets, which we then compared to commercial banks' assets. We managed to collect this data for the 23 countries in our sample, covering the 1923-1936 period. For most countries, we rely on national statistical yearbooks (see online Appendix). These sources generally report the yearly balance sheets of each type of savings institutions. We focus on two categories of assets: loans and securities. Loans include commercial paper, discounts, advances, overdraft credit, and long-term loans (mortgages, long-term loans to the State, long-term loans to agriculture...). Securities include stocks and bonds (importantly, we consider sight deposits at the central bank or at the Treasury as short-term securities, to reflect their high degree of liquidity). For each

[20] Even in the absence of state regulation, savings institutions generally followed more "conservative" lending policies than commercial banks. See Andersson and Rodriguez (2013) on Sweden's savings banks, Edwards and Ogilvie (1996) on German's sparkassen, and Martin-Aceña (2014) on Spain's cajas de ahorros.

savings institution, we thus compute two annual series: loans and securities. Then, we split each category into two sub-categories: private and public. The purpose of these two categories is to isolate the lending activities of savings institutions that were potentially similar to commercial banks in that they could finance private businesses.

"Private loans" are comparable to the loans granted by commercial banks (short term loans to businesses or individuals), while "public loans" are mostly granted to central or local governments, or as mortgages. We choose to include mortgages in this second category because in most countries the mortgage market was highly organized by the State (with specific regulations and guarantees) while commercial banks were little involved in it.[21] Private securities are stocks and bonds issued by businesses, while public securities are essentially government (central or regional) bonds, and short-term claims on government institutions. So, according to our definition, deposits invested in public loans and securities could not replace bank credit to businesses.

For a few institutions, balance sheets are not available. This is often the case for postal savings and for savings institutions that were required by law to hold mostly or only government securities. We then rely on available institutional information to characterize their assets. For example, funds collected by the French *Caisse Nationale d'Epargne* (CNE) had to be deposited at the Treasury or invested in government bonds. In this case, we compute loans as equal to zero and securities as equal to the deposits of the CNE. Here, all securities are public securities (private securities are equal to zero). A country-by-country description of the choices made to construct asset series for savings institutions is provided in the online Appendix.

For commercial banks, a standardized series of assets was published by the League of Nations.[22] As for deposits, we used series based on more recent historical studies, when possible. Assets are classified into five different categories: cash, commercial bills discounted and bought, investment and securities, participations, and loans and advances. We classify bills

[21] In some countries like France, mortgages were neither made by banks nor savings institutions but through notaries or by a government-backed credit institution that issued bonds (*Crédit Foncier*). See Hoffman et al. (2019). See also Eichengreen and Mitchener (2004) for a review of different forms of mortgage finance in the interwar, and our discussion of the US mortgage crisis above.

[22] Unfortunately, the League of Nations did not publish data on the assets of savings institutions. However, this difference is not accidental. It reflects the fact that for the League of Nations statisticians, savings institutions were not primarily lending institutions similar to banks.

discounted and bought, and loans and advances under "loans", and investment and securities and participations under "securities". All banking loans are classified as "private" loans; and all securities are assumed to be private securities. This assumption cannot be verified in our sources and is very likely to be false in some countries.[23] Yet, it will only underestimate the private credit crunch if banks purchased government securities during the crisis.

The credit crunch

We expect that the total loan-to-deposit ratio (covering both commercial banks and savings institutions) decreased during the early 1930s when depositors shifted their money from banks to savings institutions. Panels (a) and (b) in Figure 5 compare the credit multiplier (loan-to-deposit ratio) of commercial banks to the aggregate credit multiplier (which also includes savings institutions). The latter is calculated as the sum of "private" loans by commercial banks and by savings institutions divided by the sum of deposits in both types of institutions.

Bernanke (1983) looked at the loan-to-deposit ratio of US commercial banks to conclude that the fall in bank loans was not simply a balance sheet reflection of the decline in deposits but was also driven by the rise in information asymmetries after bank failures.[24] In the same spirit, panel (a) in Figure 5 displays the mean of this ratio in our sample of countries. By contrast, a fall in the aggregate credit multiplier (panel (b)) also reflects a decrease in loans to private businesses driven by the flight-to-safety from commercial banks to savings institutions.

Two comments are in order. First, the pre-crisis aggregate multiplier is significantly below the commercial banks' multiplier (80% vs 110%). Second, the drop in the aggregate credit multiplier during the Great Depression outweighs the drop in the commercial banks' multiplier. The aggregate multiplier indeed drops from 80% in 1930 to 65% in 1935 (an absolute decrease of 15%), while the commercial banks multiplier decreases from 110% to 100% (an absolute decrease of 10%). In relative terms, the 1935 aggregate multiplier is 19% below its 1930 value,

[23] Baubeau et al. (2021) and Mitchener and Richardson (2019) - on France and the United State respectively - show that the safest banks that did not experience bank runs did increase their holding of government securities during the 1930-1931 banking crises.

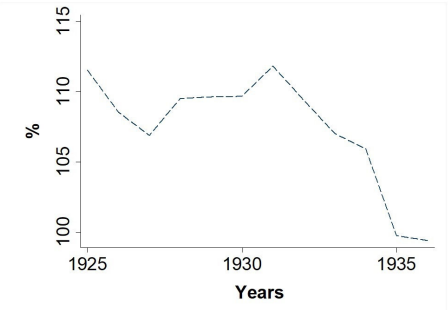
[24] He found that the ratio of loans to deposits among US commercial banks dropped from 85% in 1929 to around 60% at the end of 1934. For this country, we find that the total loans to deposits ratio decreased from 68% to 44%. In absolute terms, the decrease of the commercial bank multiplier and aggregate multiplier are comparable. In growth rates, however, the fall in the aggregate multiplier (-35%) outweighs the fall in the commercial bank multiplier.

while the commercial bank multiplier is only reduced by 9%. As shown in panels (c) and (d) in Figure 5, this result is even stronger if we take into account private securities. This time, the aggregate multiplier drops from 92% in 1930 to 77% in 1935 (-15% in absolute terms), while the commercial bank multiplier only decreases from 129% to 124% (-5% in absolute terms).[25] Thus, a key message of Figure 5 is that the drop in the loans-to-deposits ratio is larger if we include savings institutions.

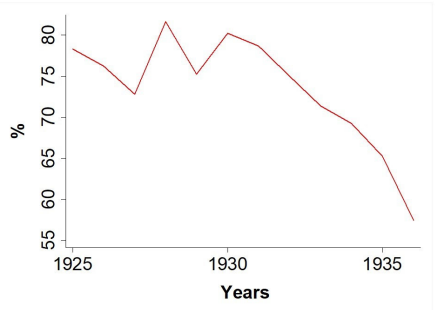
By switching their funds from commercial banks to savings institutions, depositors therefore impaired the ability of the financial system to create credit. This is because, indeed, savings institutions provided less credit to businesses than commercial banks. Figure 6 reminds us of this fundamental difference, consistent with the pattern of the ratios in Figure 5. The average share of "private loans" in total assets of savings institutions was around 20% and had even slightly decreased during the 1920s, reaching 19% in 1929 (Figure 6, panel (a)). This was in strike contrast with commercial banks whose loan-to-deposit ratio was above 100% (loans exceeded deposits). Not only the loan-to-deposit ratio of savings institutions was low but it continued to decrease slightly during the crisis. The pattern is similar when we include private securities in panel (b). The savings institutions did not attempt to replace the commercial banks by increasing the share of "private loans" in their balance sheet. This explains why the aggregate credit multiplier fell so much.

Figure 5: Flight-to-safety and the credit multiplier

(a) Commercial banks loans to commercial deposits

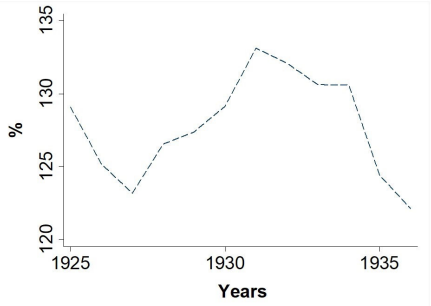


(b) Total loans to total bank deposits

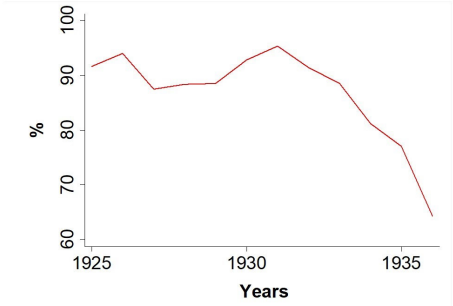


[25] A 25-30% capital ratio was usual for commercial banks in the interwar.

(c) Commercial banks loans and titles to commercial banks deposits



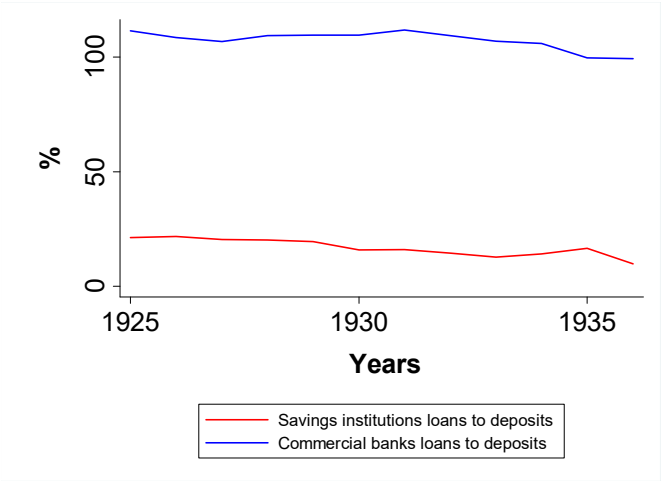
(d) Total loans and titles to total deposits



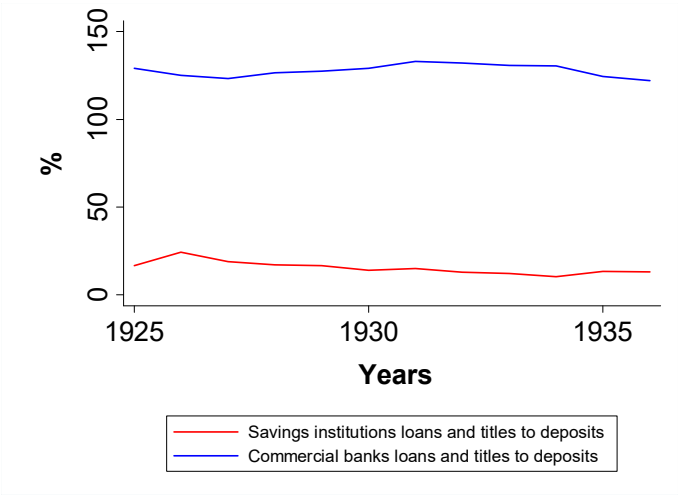
Note: Unweighted average of the data. Panel A and B include the 23 countries in our sample. Panel C and D include the 16 countries for which we are able to distinguish between private and public securities held by savings institutions. See the text for the definition of private loans and securities.

Figure 6: Comparison of loan-to-deposit ratios: commercial banks vs. savings institutions

(a) Ratio of loans to deposits



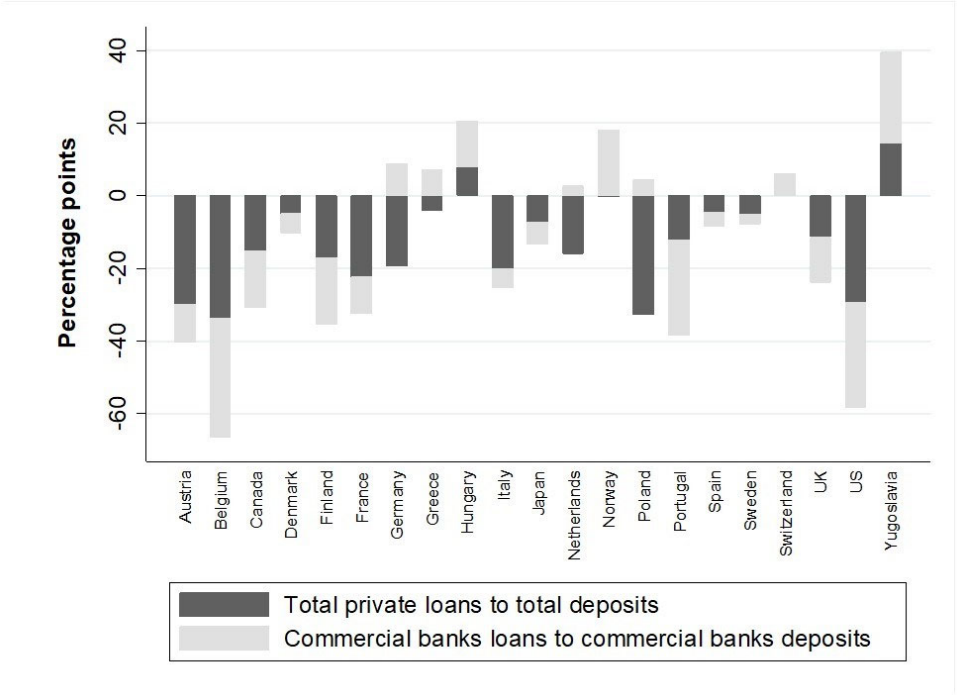
(a) Ratio of loans and titles to deposits



Note: Unweighted average of the data. Panel A include the 23 countries in our sample. Panel B include the 16 countries for which we are able to distinguish between private and public securities held by savings institutions.

Figure 7 highlights the heterogeneity across countries in response to banking crises. It displays the first difference between both the aggregate multiplier (black) and the commercial banks' multiplier (grey) before and after banking crises (in percentage points). The first difference is thus calculated over a specific period for each country, depending on when it was hit by a banking crisis (in case of several banking crises, the last one is considered). For countries that did not have a banking crisis, we take the growth rate between 1930 and 1933 (the years when most banking crises were concentrated in other countries).

Figure 7: Change in the loan-to-deposit ratio during banking crises



Note: Difference between the year before the first banking crisis and the year after the last banking crisis (in pp). We focus on the 1928-1936 banking crises. We calculate the difference of both ratios between the year before the first banking crisis and the year after the last banking crisis. For countries that did not have a banking crisis, we take the growth rate between 1930 and 1933. Data for Bulgaria is not available before 1932, hence Bulgaria does not appear in the graph (Bulgaria experiences one banking crisis in 1931). For Italy, asset data for the casse di risparmio ordinarie are not available for year 1936, so we calculate the growth rate between years 1930 and 1935 instead (Italy experiences two crises, one in 1931 and one in 1935). Finally, Romania appears as a clear outlier with an increase in both multipliers of more than 30% (driven by a 50% fall in commercial banks deposits). In the Appendix, we present the same graph including Romania.

Source: See online Appendix.

It is important to note that, since the loan-to-deposit ratio was always higher for commercial banks, a decline in both ratios of the same magnitude (in pp) means that the decline in the aggregate ratio was caused by more than the decline in the commercial bank ratio.[26] In the US case where the fall in both ratios is of similar magnitude, a flight-to-safety to savings institutions was also at work (and the loan-to-deposit ratio of these institutions plunged), in addition to the fall in the commercial bank credit multiplier observed by Bernanke. Figure 7 shows that the change in the commercial bank multiplier was sometimes very small (or even positive), which did not prevent a large fall in the aggregate credit multiplier (Netherlands, Italy, Poland, France). This fall was driven by the flight-to-safety. In fact, the commercial bank credit multiplier can remain stable (or even slightly increase) even if there is a commercial banking crisis. Friedman and Schwartz' argument, for example, did not require a decrease in this ratio, but simply that loans and deposits plunged together. For several countries (Hungary, Yugoslavia, Norway), the commercial bank multiplier even increased while commercial bank deposits fell. The aggregate multiplier also increased in such cases. Consistent with the observation and motivation of Bernanke (1983), the US – together with Belgium – experienced the largest fall in the commercial bank credit multiplier. In all other countries, the aggregate multiplier decreased more (or increased less) than the commercial bank multiplier.

Comprehensive data on life insurance assets for all countries in our sample are altogether missing for the interwar years. However, the investment strategy of life insurance companies in a limited number of countries was studied by Baker and Collins (2003), Hautcoeur (2004) and Stalson (1942). Much like savings institutions, life insurance companies invested primarily in safe assets. In France, on the eve of the Great Depression, life insurance companies for example held nearly 70% of their assets in state-guaranteed bonds and in real estate. In the UK, public sector investments concentrated 43% of total assets (the rest being mainly held in mortgages and shares). This share remained broadly constant during the Great Depression. Data for the US show that about a third of the assets of life insurers were invested in bonds in 1930 (no detail is available on the types of bonds held) and only 3% in stocks (see Goldsmith (1969, vol.1, Table I5, p.450)). The largest share was mortgage loans (40%). These shares remained stable in the early 1930s. It is therefore unlikely that the absence of data on life

[26] For example, if the loan-to-deposit ratio of commercial banks is $60/100$ and the aggregate one is $20/100$. A fall in the former by 10pp will lead to a fall in the latter by around 3.5pp only.

insurance companies' assets biases our conclusion on the drop of the aggregate credit multiplier.

Why did savings institutions not increase lending to the private sector?

Most public savings institutions were required by law to invest exclusively in safe public assets (long term government debt or deposits at the Treasury) and could therefore not replace banks as lenders to firms and households. Thus, only a change in their legal statutes or in government policy could have allowed them to lend to the economy. However, political support for such reforms was lacking. Governments believed that using savings deposits to invest in the economy would damage the credibility of the State and those of savings institutions themselves (see for example Tournié (2011) and Monnet et al. (2021) on the French debates, de Vicq and Peeters (2022) on the Dutch ones, and Shaw (2018) on those about the assets of postal savings in the United States). Parliamentarians and governments feared that giving more lending power to savings institutions would trigger runs on these institutions, similar to those experienced by commercial banks. They were also sometimes reluctant to increase the competition with the commercial banks. In the United States, after debates on whether the money deposited in postal savings should be used to finance the New Deal, the government eventually decided to create Federal lending programs mostly financed by bond issuance, rather than by savings accounts, and reinforce the banking sector by organizing deposit insurance (Shaw 2018).[27] It was only in the late 1930s, and most of the times during and after World War II, that governments in Europe (Bülbül et al. 2013; Monnet 2018) or Japan (Park 2011) started to use savings institutions to direct credit to some specific sectors or firms. This post-war development coincided with a greater role for government in industrial policy and economic planning as well as with strict banking regulations that reduced the lending role of commercial banks (Monnet 2023).

Portugal is the only country where the government openly asked the public savings institution to take over the role of banks and lend to businesses during the Great Depression. As a result, the decline in the aggregate multiplier was small compared to the commercial bank multiplier. Starting in 1929 Portugal's national savings bank, the *Caixa Geral de Depositos*, was involved in a government policy designed to modernize agriculture and industry (Lains, 2008). This is the

[27] Jaremski and Plastaras (2016) estimate that inflows in postal savings deposits alone helped fund 4.2% of total New Deal spending.

only case in our sample where the loan-to-deposit ratio of savings institutions increased around a banking crisis. Between 1930 and 1932, the Caixa increased its credit to the economy by 58%, even more than the 46% increase in deposits. Still, counter-cyclical lending by public savings institutions remained the exception rather than the rule.

Private savings institutions enjoyed more autonomy from the state to manage their portfolio. Yet, their business model crucially depended on being perceived as safe haven by depositors. Unlike public savings institutions, they could not always count on an explicit state guarantee to elicit depositors' confidence. For this reason, they followed prudent lending policies (Andersson and Rodriguez 2013; Aceña 2013), by keeping a relatively large share of their assets in cash or public bonds. In France, some members of the private savings institutions asked in 1931 (but did not succeed) to be given more freedom regarding asset management, but they were still intended to finance long-term safe investment and especially mortgage bonds, rather than to start lending short-term to businesses (Tournié 2011). From the point of view of private savings institutions, *not* increasing lending to businesses was therefore justified. From a macroeconomic perspective, however, it had disastrous consequences.

PRECAUTIONARY SAVINGS

Our previous argument about the flight-to-safety and the credit multiplier is valid even if there is a constant saving rate. A different matter is whether the transfer of deposits during banking crises was associated with a rise in precautionary savings. If banking crises made consumers and businesses worry about their future ability to borrow, they could have reacted by saving more than before, at the expense of consumption. Whereas neoclassical theory postulates that a rise in the saving rate pushes investment and economic growth up, Keynesian theory predicts that – in the short-term – an increase in savings depresses aggregate demand. More recent theories consider that these two views are not incompatible as long as we consider heterogeneous economic agents. The negative effect of an increase in precautionary savings on economic growth can occur at the same time as a decrease in the average savings rate or in total net savings, if the richest save while the debt of the poorest increases (Challe et al. 2017; Guerrieri and Lorenzoni 2017; Mian et al. 2020).

In this section, we present and discuss pieces of evidence showing that the savings flows discussed previously were unlikely to be explained only by a transfer of funds. Instead, some

households and firms may have saved more than before, especially when banking crises hit. Before presenting the quantitative evidence, it is necessary to explain the theoretical and empirical difficulties to measuring precautionary savings.

We face several important problems when decomposing the rise in savings deposits between reallocation of existing funds and new precautionary savings. The first one is that banks create money when they lend (or eliminate it if they do not renew the loan). Thus, commercial bank deposits can decrease both because they are withdrawn by depositors or because loans are not renewed at maturity. In times of economic crisis and banking panics, the two are probably happening at the same time, especially if a commercial bank tried to restore its reserve ratio by reducing lending.[28] It follows that the drop of commercial bank deposits is larger than the rise in deposits at savings institution, even if the increase in the latter is entirely explained by a transfer from the former.

The second issue is that we cannot know if individuals or firms sold other assets (possibly at a depreciated price) to increase their savings deposits. In the handful of countries in which we have estimations of the nominal financial wealth (Piketty and Zucman, 2014), it is impossible to distinguish between price and volume effects. This prevents us from measuring the aggregate wealth of different groups and from determining if the rise in savings deposits was driven by the sale of securities. Considering capital losses (or gains) due to changes in the price of securities or housing would run counter to standard practices for calculating savings flows and savings rates (Guidolin and La Jeunesse 2007; Mody et al. 2012; Mian et al. 2020).

The third problem is that an aggregate or average saving rate in fact tells us little about precautionary saving and the Keynesian mechanism. As emphasized by Guerrieri and Lorenzoni (2017) and Mian et al. (2020), the Keynesian effect of precautionary savings is compatible with a significant part of the households (or firms) being debt-constrained while

[28] This would lead us to under-estimate total savings (since part of the decrease in commercial banks deposits is driven not by a decrease in savings but by a contraction of credit, through the credit multiplier). However, a second mechanism is also at work. Deposits flowing from commercial banks to savings institutions could flow back to commercial banks, through the asset side of savings institutions. Therefore, there is a risk of over-estimating total savings (by double-counting savings institutions' deposits). However, this argument would be valid only if the cash to deposit ratio of savings institutions decreased during the crisis. The data suggests that the opposite happened, as the cash to deposit ratio of savings institutions was multiplied by 2 between 1929 and 1934. Overall, our estimate of total savings is therefore negatively biased. We thank an anonymous referee for pushing us to develop this argument.

another part of the population saves more. This can be illustrated by the case of the United States, where household debt during the Great Depression has received a substantial amount of attention and for which we have better data on assets and liabilities than in other countries. Olney (1999) shows that households were shouldering an unprecedented burden of instalment debt in the early 1930s. This led them to cut consumption in order to repay the debt. Total liabilities of households increased in 1930, 1931, 1932 by 10% a year on average (Mishkin 1978).[29] If we exclude equity securities (preferred and common stocks) whose nominal value was mostly driven by a fall in prices, financial wealth actually increased (Goldsmith 1969, vol.1, Table W18), together with indebtedness. It follows that the net saving of households did not decrease when we exclude debt and stocks (Goldsmith 1969, vol.1, Tables S20-21), that is when we exclude potential asset valuation effects and indebted households.[30] This is consistent with Goldsmith (1958, chp.4) who found that, in real terms, total assets of all financial intermediaries increased during the Great Depression in the United States. Put differently, those who accumulated debt were not the same as those who accumulated savings. And if the wealthiest have a greater propensity to save, a coincident increase in savings and debt may even be consistent with a higher savings rate (Mian et al. 2020). Thus, the US case in fact shows that a decrease in total net savings and an increase in debt are compatible with the accumulation of savings by a part of the population in savings deposits and life insurance.

In what follows, we rely on two different (still imperfect) methods to show that the increase in deposits at savings institutions and life insurance companies was not simply a reallocation of funds (i.e. flight-to-safety). Given the data limitations outlined above, we cannot provide a precise measure of precautionary savings but instead seek to assess whether the pattern of savings is consistent with an increase in new gross savings for at least part of the population or,

[29] The growth rate is the same each year because Mishkin interpolated the data between 1929 and 1933 published by Goldsmith (1969).

[30] The personal saving rate published by the Bureau of Economic Analysis (BEA) starts to decrease in 1932 only (retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/A072RC1A156NBEA, October 6, 2022.). To our knowledge, only the United States has published a personal saving rate series covering the interwar period. It is also the only country for which data on household debt are available. This is probably due to the peculiarity of the US banking regulation at that time. The methodology used by the BEA relies on national accounts and thus starts from consumption and income series whereas Mishkin (1978) uses data on wealth. The discrepancy between the two methodologies (which should not exist in theory, if data were perfect) is well-known, including for recent periods Guidolin and La Jeunesse (2007)..

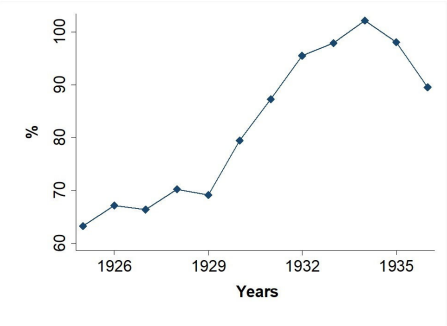
on the contrary, whether the savings destroyed in bank failures clearly outweigh the increase in funds in other savings institutions.

Attempting an evaluation of precautionary savings

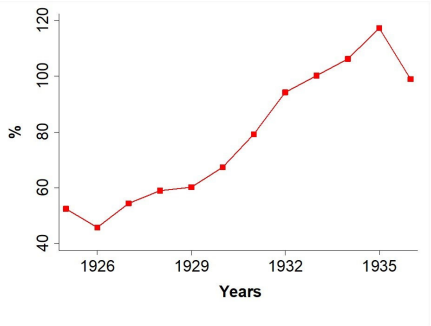
Figure 8 presents the evolution of total savings, calculated as the sum of commercial bank deposits, savings institutions deposits, cash in circulation, and life insurance policies. This is intended to measure approximately the financial wealth of households and firms (excluding securities). The key feature is to include commercial bank deposits that decreased during the period. Thus, if all the increase in savings deposits, cash and life insurance was driven by the fall in commercial bank deposits, this measure of total savings should not grow. If it grew at a faster rate than total income, we interpret this as evidence of precautionary savings.[31] This method deliberately understates precautionary savings because it assumes that the entirety of the decrease in bank deposits was driven by withdrawals. Moreover, looking at the growth of real savings also understates precautionary savings because of the "paradox of thrift" emphasized by Keynes (Chamley 2012; Eggertsson and Krugman 2012): the initial increase in savings causes a fall in GDP so that both real savings and real GDP eventually grow less than their potential.

Figure 8: Savings during the Great Depression (deposits, cash, and life insurance)

(a) Total savings to GDP, cross-country average



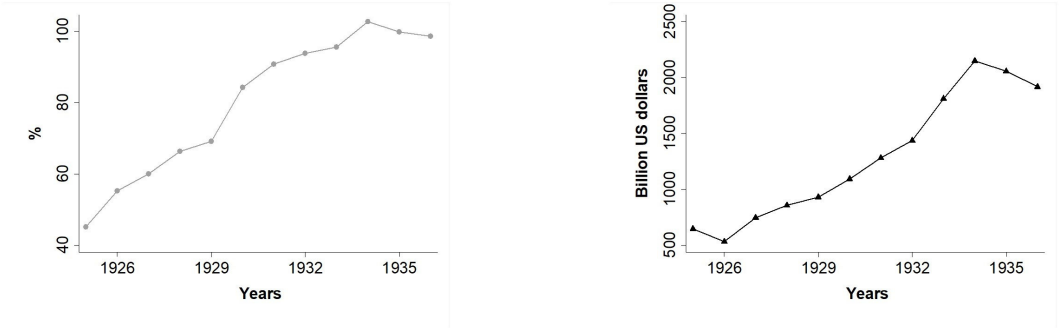
(b) Global savings to GDP



(c) Total savings to 1929 GDP, cross-country average. Constant 1929 dollars.

(d) Real global savings. Constant 1929 dollars.

[31] Of course, the ideal measure would be to scale the measure of savings by the income of the same group. This is impossible without individual data.



Note: Total savings is calculated as the sum of savings institutions deposits, commercial banks deposits, cash in circulation, and life insurance policies.

Panel A shows the unweighted average of the ratio total savings to nominal GDP across the 16 countries for which we have life insurance data. Panel B presents the evolution of the ratio of global savings to global nominal GDP. To obtain this ratio, we first convert each country's total savings in dollars, using yearly exchange rate data (see Appendix). We do the same for national GDPs. Then we add up savings to create a yearly measure of world savings, which we divide by the sum of national GDPs. The sample is the same as in panel A. Panel C plots the cross-country average of the ratio real total savings to GDP. Unlike in panel A, the GDP is held constant (at its 1929 value). Panel D looks at real global savings. We use the same measure of world dollar savings as in panel B, but instead of scaling it by nominal GDP we deflate it with the US price index (constant 1929 prices). The sample is the same as in panels A, B, and C.

We first look at the ratio of savings to GDP in order to check if economic agents decreased their savings to compensate fully the decrease in income. It is clear that they did not. In Figure 8, panel (a) presents the cross-country average of the ratio of total savings to nominal GDP. The sample is limited to the 16 countries for which we have data on life insurance. Starting in 1929, the ratio increases very sharply. The ratio indeed jumps from 69% in 1929 to 79% in 1930, to finally reach a maximum of 102% in 1934. To rule out the possibility that outliers are driving this result, we also calculate the ratio of savings to GDP at the global level, that is for all countries in our sample. To do so, we convert national series into dollars using yearly exchange rate data. We then compute a series of total savings, which we divide by total nominal GDP. This method gives larger economies a larger weight. This property is particularly interesting to capture how precautionary saving may have affected aggregate demand at the international level during the Great Depression. Panel (b) plots the ratio of global savings to global GDP. Once again, the ratio jumps from 60% in 1929 to 94% in 1932 and 117% in 1935.

We now look at the real growth rates of our measure of savings. Panels (c) and (d) confirm that the evolution presented in panels (a) and (b) is not only driven by the fall in GDP during the

Great Depression. While GDP and prices collapsed, total savings accumulated in financial institutions continued to grow. Panel (c) looks at the cross-country average of the real savings to GDP ratio with GDP kept constant (at its 1929 value). We still scale savings by GDP in order to obtain comparable values across countries. Yet, as savings are divided by the value of GDP in 1929 for each year, the increase in the series after 1929 cannot be due to the fall in GDP. Like in panel (a), the ratio increases markedly in 1930 (from 69% to 84%), to finally reach 103% in 1934. It is not surprising to see that real savings (expressed as a share of 1929 GDP in constant 1929 prices) increased in the 1920s in line with real GDP growth. It is striking to see that it continued to rise in the 1930s while the world entered economic depression and real GDP fell.

Panel (d) provides a similar picture looking at the evolution of the world real savings (in dollars). To obtain this series, we calculate total nominal savings by year in dollars (like in panel (a)), which we then deflate using US prices. The series is thus expressed at constant 1929 prices. As panel (d) shows, world real savings more than double between 1929 and 1935 (930 to 2150 billion constant US dollars). Consistent with studies that have underlined the deflationary international context (Eichengreen 1992), we thus show that the increase in precautionary savings was a global phenomenon, which means that it could affect aggregate demand across countries. All series in

Figure 8 decrease markedly in 1936 when the last European countries (Gold bloc) leave the gold standard.

Banking crises and precautionary savings

We now test directly whether a rise in savings was associated with a banking crisis. Following the literature, the usual method is simply to regress a measure of precautionary savings on a measure of banking crisis (Mody et al. 2012). In accordance with the previous discussion, it is important in our case to control for reallocation between different type of savings. Otherwise, we could wrongly interpret the positive coefficient on the banking crisis dummy as evidence of a positive correlation between precautionary savings and crisis, whereas it in fact captures the reallocation between different forms of savings during banking crises. Thus, we use the growth rate of the sum of savings deposits, cash, and life insurance policies in the left-hand side, and

we include the growth rate of commercial bank deposits, equity return, and the growth rate of housing prices on the right-hand side. If a banking crisis triggers only a reallocation of funds from the variables in the right-hand side to those in the left-hand side, then the correlation between these variables should be negative and the coefficient on the banking crisis dummy should equal zero. By contrast, if the coefficient on the banking crisis is positive despite the aforementioned control variables, we conclude that a crisis was associated with a rise in precautionary savings, at least for a part of the population. Finally, since our dependent variable is the nominal growth rate of savings, we control for the nominal growth rate of GDP on the right-hand side. This prevents the correlation between banking crises and savings from being driven by the direct effect of banking crises on output and prices.

$$Savings_{i,t} = \beta_0 + \beta_1 BankPanics_{i,t} + \beta_2 Bank_{it} + \beta_3 GDP_{it} + \beta_4 Equity_{it} + \beta_5 Housing_{it} + y_t + d_i + \varepsilon_{i,t} \quad (1)$$

Savings is the growth rate of total savings (savings deposits + cash + life insurance). An alternative specification will exclude life insurance from this measure. *BankPanics* is a banking crisis dummy. *Bank* is the growth rate of commercial bank deposits, *GDP* is the growth rate of nominal GDP, *Equity* is the return on equity (calculated as the growth rate of the stock market index by Baron et al. (2021)), and *Housing* is the growth rate of housing prices.[32] *Bank* controls for the reallocation away from commercial bank deposits, while *Equity* controls for the reallocation from stocks, and *Housing* for the reallocation away from real estate. All specifications include country-fixed and year-fixed effects. Standard errors are clustered at the country level. Year-fixed effects capture common global shocks, including the international contagion of the US stock market crash of 1929.

Column (1) estimates our model without the control variables *Equity* and *Housing*. The sample is limited to 16 countries because of the availability of GDP and life insurance data. In column (2), we add *Equity* as control variable. In column (3), we estimate the full equation by adding *Housing* as control variable. Adding housing prices to the equation decreases the sample to 12 countries. Columns (4) replicates the specification from column (3), but it excludes life insurance

[32] Housing prices are drawn from the dataset of Jordà et al. (2019), and nominal GDP comes from Bordo et al. (2001).

policies from our measure of total savings. The first four specifications are estimated using an updated version of Bernanke and James' definition of banking panics (see above). In column (5), we look at the effect of banking crises, which include both panics and "quiet" crises.

According to the benchmark specification, banking panics lead to a significant increase of 2.5 percentage points in the growth rate of our measure of total savings (column (1)). The coefficient is larger (3.1 pp) when adding control variables (columns 2 and 3) and increases again (4.5pp) when excluding life insurance policies from total savings (column 4).[33]

In the fifth column, we combine Bernanke and James' coding of banking panics with the recent coding of Baron et al. (2021) which includes banking crises without panics. Compared to column (3), the coefficient is slightly larger (3.5pp vs 3.1pp). In line with previous discussions, considering such episodes confirms that bank runs, and bank failures were not a necessary condition for banking crises to produce an increase in precautionary savings.

Did precautionary savings predict banking crises?

A different interpretation of the results displayed in Table 2 would be that banking crises were themselves due to a drop of aggregate demand in the preceding years, driven by precautionary savings. This could have weakened the economy and hence the health of the banking system, as argued by Temin (1976).[34]

[33] We reach similar conclusions if we use a sample of 19 countries, excluding life insurance, and without controlling for equity and house prices.

[34] Romer (1990) does not argue that US financial turmoil were preceded by a rise in precautionary savings, but she documents a fall in consumption after the 1929 market crash, before the banking crises of 1930-1931. Temin (1994) disputes the role of the 1929 crash in causing the banking crises. Outside the US, the origin of banking crises is not attributed to the stock market crash (Bernanke and James 1991; Grossman 1994; Grossman and Meissner 2010).

Table 2: Banking panics, precautionary savings, and total savings

	(1)	(2)	(3)	(4)	(5)
Banking panics	0.025**	0.031**	0.031**	0.045**	
	(0.010)	(0.011)	(0.011)	(0.017)	
Banking crises					0.035***
					(0.009)
Nominal GDP	0.131***	0.128**	0.102*	0.138**	0.091*
	(0.040)	(0.044)	(0.049)	(0.045)	(0.043)
Bank deposits	0.169	0.179	0.182	0.163	0.191
	(0.099)	(0.117)	(0.120)	(0.120)	(0.121)
Equity return		-0.004	-0.030	-0.029	-0.028
		(0.026)	(0.020)	(0.017)	(0.020)
House prices			0.138***	0.130***	0.138***
			(0.018)	(0.016)	(0.017)
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	204	180	151	161	151
R-squared	0.328	0.348	0.463	0.311	0.472
No. of countries	16	14	12	12	12

* p<0.1 ** p<0.05 *** p<0.01

Note: The dependent variable is the growth rate of total savings. Except in column (4), total savings is calculated as the sum of savings deposits, cash in circulation, and life insurance policies. In column (4) we exclude life insurance policies from total savings. Column (2) controls for the return on equity, column (3) controls for the growth rate of housing prices. In the first four specifications we use an updated version of Bernanke and James (1991) definition of banking crises (see footnote 18 and online appendix). In column (5), we combine Bernanke and James' coding with the coding of Baron et al. (2021). We exclude the 1922 "quiet" crisis in Japan, which was mostly a crisis of the small savings banks (Shizume 2012). All estimations include country-fixed and year-fixed effects, and standard errors are clustered at the country level.

To account for this potential problem, we run a regression with a banking crisis dummy as independent variable and the lagged value of the growth of savings deposits as explanatory variable. If Temin's argument were valid, a banking crisis at date T could be accurately predicted by the increase in savings at date T-1. The results presented in Table 3 invalidate this hypothesis. The coefficient on lagged savings deposits is never significant (and usually negative). In columns (1) and (3), we consider the logarithm of savings deposits and, in column (2) and (4) their growth rates. In columns (3) and (4), we add control variables (commercial bank deposits, cash and GDP). In the online appendix, we consider alternative specifications where we also include life insurance with a smaller sample size or use the extended definition of banking crises. We still find no evidence that the previous values of the level or growth rate of savings predicted banking crises. This invalidates the Keynesian interpretation that the banking crises of the Great Depression were the consequence of a decline in aggregate demand in the preceding years.

Table 3: The increase in savings does not predict banking crises

	(1)	(2)	(3)	(4)
Log savings deposits (t-1)	0.042		-0.079	
	(0.032)		(0.057)	
Growth rate of savings deposits (t-1)		-0.040		-0.159
		(0.059)		(0.146)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	No	Yes	Yes
Observations	316	291	263	240
R-squared	0.201	0.182	0.191	0.173
No. of countries	23	23	19	19

* p<0.1 ** p<0.05 *** p<0.01

Note: The dependent variable is our banking panics dummy. All variables are lagged by one year. Columns (1) and (2) do not include any controls. In column (3), we control by the lagged value of log bank deposits, log banknote circulation, and log nominal GDP. In column (4), we use the growth rate of the same variables as control. All estimations include country-fixed and year-fixed effects, and standard errors are clustered at the country level.

CONCLUSION

The banking crises of the Great Depression shifted the world economy from a regime of easy credit to a regime of tight credit (Eichengreen 1992; Eichengreen and Mitchener 2004; Schularick and Taylor 2012). This change has been widely studied – at the national or global level – as the consequence of the decline in money and of the increase in the cost of financial intermediation caused by bank failures (Friedman and Schwartz 1963; Bernanke 1983; Bernanke and James 1991). Our investigation points at an additional mechanism: credit collapsed because banking crises were associated with a transfer of funds from commercial banks to other institutions that collected savings but did not lend (or lent much less) to businesses. This paper has provided evidence of such transfers and of their significant effect on the total credit multiplier, considering both banks and non-banks. The overall picture is one of a decrease in credit, despite the rise of real gross savings (in non-bank deposit accounts and life insurance).

We hope to have demonstrated that the aggregate effect of banking crises during the Great Depression can no longer be studied without considering jointly the savings institutions to which depositors turned during bank failures. Data for more than 20 countries illustrate the international character of this phenomena. More research is now needed to understand the precise country-specific mechanisms behind these transfers and new savings flows, and how governments and banks responded differently across nations. A key question that emerges from our research is why governments did not actively act to redirect accumulated savings towards business investment.

Studying the transfer of savings from commercial banks to savings institutions and life insurance, we also found evidence that the increase in savings was not only a reallocation of funds. Here we relate to the Keynesian interpretation of the Great Depression, which emphasizes the decline in aggregate demand (Temin 1976; Eichengreen 1992; Romer 1990; Bernanke and James 1991). Our contribution to this line of thought is to present some first evidence of an increase in savings where the literature previously focused on consumption or macroeconomic fiscal and monetary (i.e. gold standard) constraints. While an increase in savings caused by banking crises may have aggravated the Great Depression, there is no evidence that an increase in savings predicted the banking crises. The rise in savings does not contradict the debt-deflation channel that may also have been at work in several countries. The

two are compatible as long as we take into account household and firm heterogeneity (Guerrieri and Lorenzoni 2017). Given the data problems and limitations inherent in cross-country analyses, however, we recognize that there is still much to be written on the distribution of savings and on financial inequalities during the Great Depression and on how it may have contributed to the deepening of the global economic crisis.

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APPENDIX

Table A1: Banking crisis and savings - Additional descriptive statistics

Country	Growth rate of bank deposits 1930-1932	Growth rate of savings deposits 1930-1932	Growth rate of life insurance 1930-1932	Bank deposits to GDP in 1930	Savings deposits to GDP in 1930	Life insurance to GDP in 1930	Number of banking crises (quiet crises in parenthesis): 1930-1932
Austria	-47%	-10%	--	--	--	--	1
Belgium	-10%	+27%	+33%	25%	9%	2%	1
Bulgaria	-4%	+78%	-8%	26%	1%	9%	2
Canada	-11%	-3%	+10%	36%	2%	28%	0
Denmark	-13%	-1%	+10%	11%	38%	32%	0
Finland	-7%	+2%	-5%	32%	18%	40%	0 (1)
France	-14%	+48%	+25%	24%	12%	11%	2
Germany	-40%	-5%	+6%	18%	15%	2%	2
Greece	-9%	+87%	--	42%	2%	--	0 (1)
Hungary	-19%	-19%	--	--	--	--	1
Italy	-15%	+18%	+1%	27%	24%	9%	1
Japan	-6%	+13%	+15%	7%	24%	53%	0
Netherlands	-36%	+19%	+5%	34%	12%	44%	0 (1)
Norway	-17%	-4%	+3%	23%	49%	41%	0 (1)
Poland	-30%	+23%	--	--	--	--	1
Portugal	-7%	+46%	--	5%	7%	--	1
UK	+1%	+9%	+7%	26%	9%	28%	0
US	-26%	+12%	+10%	23%	11%	21%	3
Romania	-51%	+217%	--	--	--	--	1
Spain	-15%	+15%	+19%	10%	6%	1%	1
Sweden	-2%	+9%	+6%	36%	33%	41%	1
Switzerland	-10%	+13%	+6%	70%	9%	33%	1

Yugoslavia	-32%	+17%	--	28%	2%	--	1

Note: We take the growth rate between 1929 and 1932 for bank deposits in Belgium, and for savings deposits in Austria (data for 1930 is not available). Quiet crises are the crises identified by Baron et al. (2021), that do not appear in our banking panics dummy based on Bernanke and James (1991). The "quiet crisis" in Greece started in 1929.

Table A2: Savings institutions' assets in 1930

Country	**Total** Loans in % of deposits (1) = (2)+(3)	Private loans in % of deposits (2)	Public loans in % of deposits (3)	**Total** Securities in % of deposits (4) = (5)+(6)	Private securities in % of deposits (5)	Public securities in % of de-posits (6)
Austria	0	0	0	100	0	100
Belgium	34	16	18	60	10	50
Bulgaria	13	13	0	8	0	0
Canada	34	16	18	77	0	77
Denmark	80	14	66	23	--	--
Finland	87	31	56	6	--	--
France	0	0	0	100	0	100
Germany	83	22	61	0	0	0
Greece	34	0	34	66	0	66
Hungary	0	0	0	100	0	0
Italy	82	35	47	34	--	--
Japan	23	23	0	48	0	48
Netherlands	36	6	30	48	15	33
Norway	77	51	26	34	--	--
Poland	74	47	27	36	--	--
Portugal	69	37	32	16	5	11
UK	0	0	0	100	0	100
US	61	4	57	42	19	23
Romania	100	0	100	0	0	0
Spain	52	21	31	48	0	48

Sweden	72	10	62	31	--	--
Switzerland	106	2	104	18	--	--
Yugoslavia	40	40	0	29	0	29

Note: Loans include commercial paper, discounts, advances, overdraft credit, and long-term loans (mortgages, long-term loans to the State, long-term loans to agriculture...). Securities include stocks and bonds (we classify sight deposits at the central bank or at the Treasury as securities). If there is more than one savings institution in the country, we take the sum of loans, securities, and deposits across all savings institutions. Column (1) is calculated as the sum of column (2) and column (3). Column (4) is calculated as the sum of column (5) and column (6). The sum of column (1) and column (4) does not necessarily equal 100. It can be inferior to 100 (since there were other items on savings institutions' asset side, notably cash), and it can also be superior to 100. For Bulgaria, the data is for year 1932 (since data before 1932 are missing)

ONLINE APPENDIX (Supplementary material)

We relied on the advice and expertise of many researchers to build this new database. Special thanks are owed to Flora Macher, Tamas Vonyo, Kiril Kossev, Peter Kugler, Joost Jonker, Ruben Peeters, Amaury de Vicq, Jan Tore Klov- land, Karsten Gerdrup, Kim Abildgren, Stéphanie Collet, Ryland Thomas, Mark Billings, Masato Shizume, and Pierre-Cyrille Hautcoeur.

A1. Data sources for banks, savings institutions, and life insurance companies

For deposit data, our main sources are national statistical yearbooks (produced by central banks or national statistical agencies). When these sources are not available, we turn to the League of Nations *Statistical Yearbook* (s). By tapping directly into the original publications, we avoid transcription errors which are frequent in secondary sources (Mitchell (2013) uses similar sources, but we noticed several occasions where he had misreported the data). Whenever possible, we improve and correct these series with recent estimations. For life insurance policy data, we also use national statistical yearbooks (except for France, where we rely on a

secondary source).

Data on the assets of savings institutions also are from national statistical year- books (with a few exceptions). For commercial banks assets, we rely on successive editions of the League of Nations ”Memorandum on Commercial Banks”, except for France where we use the data from Baubeau et al. (2021) and for Italy where we use data from Cotula et al. (1996).

The sections below give a country-by-country overview of the sources used for commercial banks and savings institutions deposits, for savings institutions assets, and for life insurance policies.

1

COMMERCIAL BANK DEPOSITS

- Austria: *Statistische Handbuch für die Republik Osterreich* (various years). We add up savings account and current account deposits in the Aktien- banken (commercial banks) and the Landeshypothekenanstalten (public mortgage banks). Data for years 1920, 1921, 1922 and 1931 are not avail- able. Million schillings.
- Belgium: LoN *Statistical Yearbook* (s) (various years). All deposits of less than one-month notice in commercial banks. Starting in 1935, banks oper- ating mainly in the Belgian Congo are included. Data for years 1930 and 1934 are not available. Million francs.
- Bulgaria: LoN *Statistical Yearbook* (s) (various years). All deposits in pop- ular banks, commercial banks and in the agricultural bank and central co- operative bank (state banks). Data before 1923 are not available. Million leva.
- Canada: *Canada Yearbook* (various years). Chartered banks. Sum of sav- ings account and chequing account deposits.
- Denmark: *Statistisk Ärbog* (various years). Sum of current account and folio account deposits in commercial banks. Data for year 1920 is not available. Million kroner.
- Finland: *Suomen Tilastollinen Vuosikirja* (various years). All deposits in commercial banks. Million markkaa.
- France: Baubeau et al. (2021). Million francs.
- Germany: *Statistisches Jahrbuch für das Deutsche Reich* (various years). All deposits in commercial banks. Data before 1924 are not available. Mil- lion marks.
- Greece: Lazaretou (2014). Million drachmas.

- Hungary: Macher (2019). We add up deposit accounts in the issue banks and in the "other banks". Million pengos.
- Italy: Natoli et al. (2016). We add up deposits in the following banks: Societa ordinare di credito (SOC), Istituto di credito di diritto pubblico (ICDP), Istituto di credito di categoria (ICC), altre istituzione finanziarie (OUT), and altre banche (AB). Data for year 1926 is not available. Million liras.
- Japan: *Hundred Years of Statistics of the Japanese Economy* (1966). Cur- rent deposits in private ordinary banks. Million yen.
- Netherlands: LoN *Statistical Yearbook* (s) (various years). All deposits in the six main banks (including agencies and branches overseas). Million guilders.
- Norway: Eitrheim et al. (2004). Million kroner.
- Poland: LoN *Statistical Yearbook* (s) (various years). Deposits in joint-stock banks, Polish branches of foreign joint-stock banks, Bank of the National Economy (excluding deposits of the government), Agricultural State Bank and two communal banks. Data before 1924 are not available. Million zlotys.
- Portugal: LoN *Statistical Yearbook* (s) (various years). All deposits in com- mercial banks and special credit institutions. Data before 1924 are not available. Million escudos.
- Romania: LoN *Statistical Yearbook* (s) (various years). All deposits in com- mercial banks. Million lei.
- Spain: Aceña and Pons (2005). Current account deposits in private banks. Data for year 1936 is not available. Million pesetas.
- Sweden: *Statistisk Arsbok* (various years). Deposits by the public in private banks. Million kroner.

- Switzerland: *Historische Zeitreihen die Banken in der Schweiz* (2007). De- posits in cantonal banks and big banks (excluding interbank deposits). Million francs.
- United Kingdom: Cappie and Webber (1985). Current accounts deposits in clearing-banks, non-clearing banks, Irish banks, and Scottish banks. Data before 1922 are not available. Million pounds.
- United States: Friedman and Schwartz (1963). Demand deposits in com- mercial banks (seasonally adjusted). Data or year 1936 is not available. Million dollars.
- Yugoslavia: *Statisticki Godisnjak* (various years). All deposits in commer- cial banks. Million dinari.

SAVINGS INSTITUTIONS DEPOSITS AND ASSETS

- Austria: *Statistische Handbuch für die Republik Osterreich* (various years). Deposits in the postal savings bank and in the public savings banks. Data before 1925 are not available. Million schillings. Asset data are not avail- able.
- Belgium: *Annuaire Statistique de la Belgique et du Congo Belge* (various years). Deposits at the Caisse Générale d'Epargne et de Retraite (CGER). Asset data are from the *Compte rendu des opérations et de la situation de la Caisse Générale d'Epargne et de Retraite*. Million francs.
- Bulgaria: *Statističeski godišnik na Narodna republika Bãlgarija* (various years). Deposits at the postal savings bank. Asset data are from the same source. Million leva.
- Canada: *Canada Yearbook* (various years). Sum of deposits in the postal savings bank, in the Dominion government savings banks, and in the private savings banks. We assume deposits at the postal savings bank are invested in public securities. For the government savings banks, we assume that all

deposits are invested in public loans (deposits are used almost exclusively to finance farms loans under the Agricultural Development Act, according to the 1937 edition of the Canadian Yearbook). For private savings banks, we use information on the assets of the savings bank of Montreal (provided in the Yearbook) to compute the share of public loans and public securities.

- Denmark: *Statistisk Ärbog* (various years). Deposits in the private savings banks. Asset data are from the same source. Million kroner.
- Finland: *Suomen Tilastollinen Vuosikirja* (various years). Deposits in the postal savings bank and in the private savings banks. Data for years 1935 and 1936 are not available. Asset data are from the same source. Million markkaa.
- France: *Annuaire Statistique de la France* (various years). Deposits in the Caisse Nationale d'Epargne (CNE) and in the Caisses d'Epargne Ordinaires (CEO). All deposits are invested in public securities. Million francs.
- Germany: *Statistisches Jahrbuch für das Deutsche Reich* (various years). Deposits in the public savings banks. Data before 1924 are not available. Asset data are from the same source. Million marks.
- Greece: *Statistical Yearbook of Greece* (various years). Deposits at the postal savings bank. Asset data are from Mura (1996). We interpolate data between 1931 and 1934 based on data for 1930 and 1935. Million drachmas.
- Hungary: *Magyar Statistikai Evkonvy* (various years). Deposits in the postal savings banks and in the private savings banks. Data are only avail- able for year 1930 and between 1932 and 1934 (included). We assume deposits are invested in public securities. Million pengos.
- Italy: *Annuario Statistico Italiano* (various years). Deposits in the postal savings bank and in the casse di risparmio ordinarie (saving banks). Asset data are from the same source. Million liras.

- Japan: *Hundred Years of Statistics of the Japanese Economy* (1966). De- posits in the postal savings banks and in the savings banks. Asset data are from the *Financial and Economic Annual of Japan*. The data covers the assets of the Deposit Bureau (where postal savings are deposited). Asset data for the savings banks are not available. Million yen.
- Netherlands: *Nederlandse financiële instellingen in de twintigste eeuw: bal- ansreeksen en naamlijst van handelsbanken* (2000). Deposits in the postal savings bank and in the algemene spaarbanken (general savings banks). Asset data are from the same source. Million guilders.
- Norway: Eitrheim et al (2004). Deposits in the public savings banks. Asset data are from the *Statistisk Ärbok*. Million kroner.
- Poland: LoN *Statistical Yearbook* (s) (various years). Deposits in the postal savings bank and in the communal savings banks. Data before 1928 and after 1935 are not available. Asset data are from the *Petit Annuaire Statis- tique de la Pologne*. Million zlotys.
- Portugal: LoN *Statistical Yearbook* (s) (various years). Deposits at the Caixa Geral de Depositos (national savings bank), excluding mandatory deposits. Data before 1926 are not available. Asset data are from Lains (2008). Mil- lion escudos.
- Romania: *Anuarul Statistic al Romanei* (various years). Deposits at the Cassa de Depuneri, Consemnatiuni si Economie (national savings bank). We assume all deposits are long-term loans, based on Brück (1995) and CEC (1964). Million lei.
- Spain: we follow Martinez (2008) by using the data from Aceña (1985). Deposits in the postal savings bank and in the cajas de ahorro (savings banks). Asset data are from Soto and Casaña (2004) for the cajas de ahorro. We assume all deposits at the postal savings bank are invested in public securities. Million pesetas.

- Sweden: *Statistisk Arsbok* (various years). Deposits in the postal savings bank and in the private savings banks. Asset data for the private savings banks are from the same source. For the postal savings bank, we assume all deposits are invested in public securities. Million kroner.
- Switzerland: *Statistisches Jahrbuch der Schweiz* (various years). Deposits in the private savings banks (Raiffeisen banks are not included). Data before 1928 and for year 1929 are not available. Asset data are from the same source. Million francs.
- United Kingdom: Horne (1947). Deposits in the postal savings bank and in the Trustees Savings Banks (TSB). Data before 1923 are not available. All deposits are invested in public securities. Million pounds.
- United States: Friedman and Schwartz (1963). Deposits in the postal sav- ings bank and in the mutual savings banks. Data for year 1936 is not available. For mutual savings banks, asset data are from the *Annual Re- port of the Comptroller of the Currency*. For the postal savings bank, we assume all deposits are invested in public securities, starting in 1929, based on Schuster et al. (2020). Million dollars.
- Yugoslavia: *Statisticki Godisnjak* (various years). Deposits at the postal savings bank. Data before 1924 are not available. Asset data are from Skulic (1936). Million dinari.

LIFE INSURANCE POLICIES

- Belgium: *Annuaire Statistique de la Belgique et du Congo Belge* (various years). Life insurance policies at the CGER. Million francs.
- Canada: *Canada Yearbook*. Life insurance policies in canadian life insurance companies (net of re-insurance reserve).
- Denmark: *Statistisk Ärbog* (various years). Life insurance policies in danish life insurance companies (includes public, joint-stock and mutual life

insurance companies). Data for year 1920 is not available. Million kroner.

– Finland: *Suomen Tilastollinen Vuosikirja* (various years). Life insurance policies in Finland. Million markkaa.

- France: Hautcoeur (2004). Life insurance policies in french life insurance companies (reinsurance included). Million francs.
- Germany: *Statistisches Jahrbuch für das Deutsche Reich* (various years). Life insurance policies in public life insurance companies. Data before 1924 are not available. Million marks.
- Italy: *Annuario Statistico Italiano* (various years). Insurance policies at the National Insurance Institute (Istituto Nazionale delle Azicurazioni). Data for years 1920, 1921 and 1936 are missing. Million liras.
- Japan: *Financial and Economic Annual of Japan* (various years). Life insurance policies at the post office and in private life insurance companies. Data for year 1936 is missing. Million yen.
- Netherlands: *Jaarcijfers voor Nederland* (various years). Life insurance policies in Dutch life insurance companies (reinsurance included). Data be- tween 1922 and 1924 (included) and for year 1936 are not available. Million guilders.
- Norway: *Statistisk Ärbok* (various years). Life insurance policies in Norwegian life insurance companies. Data for year 1920, 1935 and 1936 are missing. Million kroner.
- Spain: *Anuario Estad´ıstico de España* (various years). Life insurance poli- cies in Spanish life insurance companies. Data for year 1934 to 1936 (in- cluded) are missing. Million pesetas.
- Sweden: *Statistisk Arsbok* (various years). Life insurance policies in Swedish life insurance companies (only includes policies subscribed in Sweden). Mil- lion kroner.

- Switzerland: *Statistisches Jahrbuch der Schweiz* (various years). Data for year 1936 is missing. Life insurance policies in Swiss life insurance companies. Million francs.
- United Kingdom: *Statistical Abstract of the Bank of England* (various years). Data on life insurance policies were collected by the Board of Trade and published in yearly reports. Unfortunately, access to these reports is restricted. We therefore proxy life insurance policies by the total assets of life insurance companies. Data for year 1920 to 1923 (included) are missing. Million pounds.
- United States: *Statistical Abstract of the US* (various years). Policies in force in all life insurance companies. Million dollars.

A2. Data sources for other macroeconomic variables

1. Banknote circulation

Mitchell (2013). Mitchell uses the *Statistical Yearbook* (s) of the League of Nations or national statistical yearbooks. We checked and corrected Mitchell's data by going back to the original sources.

2. Banking crisis dummy

Bernanke and James (1991). For France, we coded the year 1932 as "non-crisis year", based on recent research by Baubeau et al. (2021). For Spain, we coded the year 1931 as "crisis year" based on the work of Jorge-Sotelo (2020). Portugal and Bulgaria are not covered by Bernanke and James, so we instead rely on Reinhart and Rogoff (2009) for Portugal, and on Kossev (2008) for Bulgaria. Our "extended" banking crisis dummy is obtained by combining our banking crisis dummy with the dummy of Baron et al. (2021).

3. Equity return

Baron et al. (2021).

4. Exchange rates

Jordà et al. (2017), and Bank of Greece (2014). For Poland and Hungary we rely on the League of Nations Statistical Yearbook (various years).

5. House price index

Jordà et al. (2019).

6. Long-term interest rates

Jordà et al. (2019). For Austria, Greece, Hungary, Poland, Portugal, Romania, and Yugoslavia, data are taken from the League of Nations *Statistical Yearbook*(s).

7. Nominal GDP

Bordo et al. (2001).

8. Real GDP

Inklaar et al. (2018).

9. Wholesale prices

Mitchell (2013).

A3. Primary Sources

- *League of Nations Statistical Yearbook* (various years).
- *League of Nations Memorandum on Commercial Banks* (various editions).
- *Statistische Handbuch für die Republik Osterreich* (various years).
- *Annuaire Statistique de la Belgique et du Congo Belge* (various years).
- *Canada Yearbook (various years)*
- *Compte rendu des opérations et de la situation de la Caisse Générale d'Epargne et de Retraite* (various years).

- *Statističeski godišnik na Narodna republika Bãlgarija* (various years).
- *Petit Annuaire Statistique de la Pologne* (various years).

- *Statistisk Ärbog* (various years).
- *Suomen Tilastollinen Vuosikirja* (various years).
- *Statistisches Jahrbuch für das Deutsche Reich* (various years).
- *Statistical Yearbook of Greece* (various years).
- *Magyar Statistikai Evkonyv* (various years).
- *Annuario Statistico Italiano* (various years).
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- *Nederlandse financiële instellingen in de twintigste eeuw: balansreeksen en naamlijstnaamlijst van handelsbanken* (2000).
- *Jaarcijfers voor Nederland* (various years).
- *Anuarul Statistic al Romanei* (various years).
- *Statistisk Arsbok* (various years).
- *Statistisk Ärbok* (various years).
- *Anuario Estad´ıstico de España* (various years).
- *Historische Zeitreihen die Banken in der Schweiz* (2007).
- *Statistisches Jahrbuch der Schweiz* (various years).
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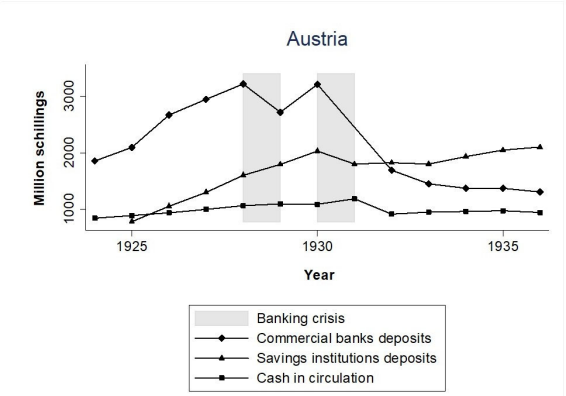
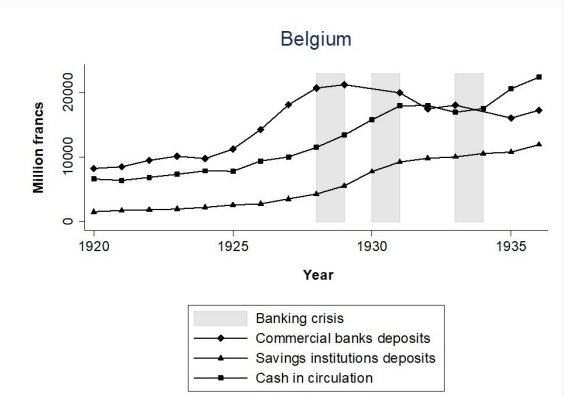
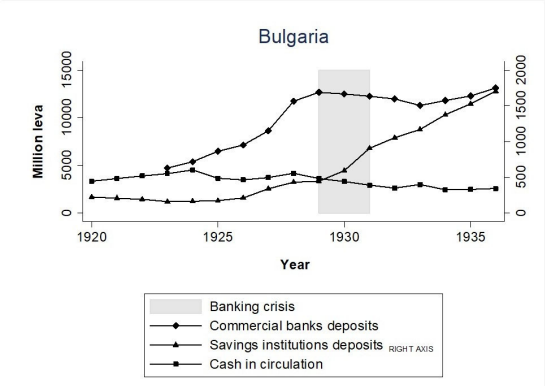
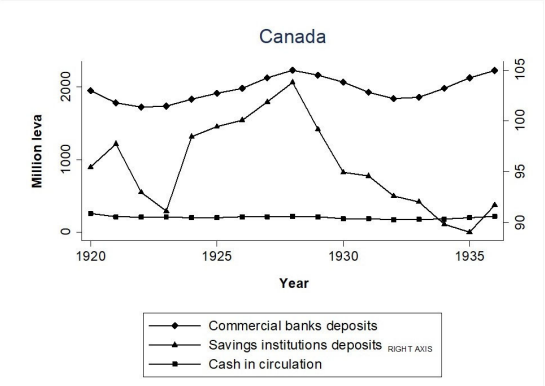
SUPPLEMENTARY GRAPHS

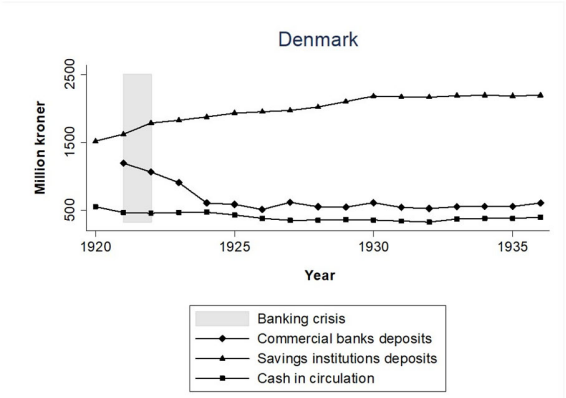
The following graphs plot the evolution of savings institutions deposits, com- mercial banks deposits and cash in circulation, between 1920 and 1936, for each of the 23 countries in our sample. The shaded areas represent banking crisis periods (which include both panics and "quiet" crisis), based on Bernanke and James (1991) and Baron et al. (2021). For a crisis occurring in year Y, the shaded area starts in December of year Y-1 and ends in December of year Y (to show the evolution of the variables during year Y).

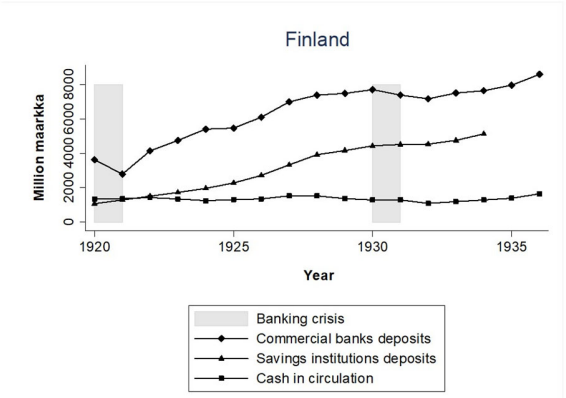


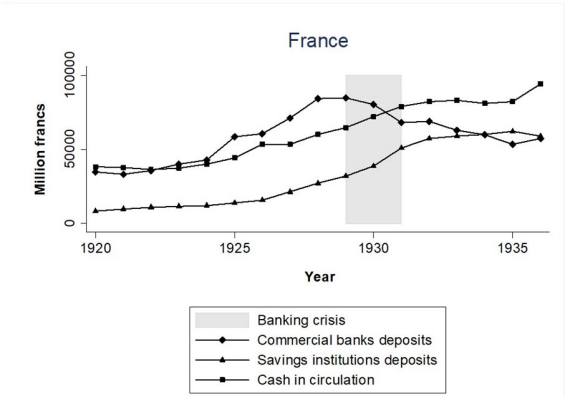


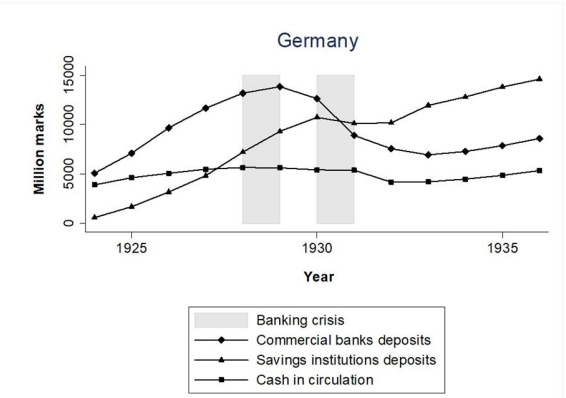


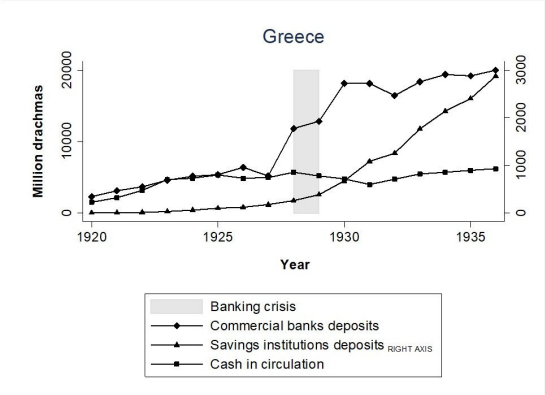


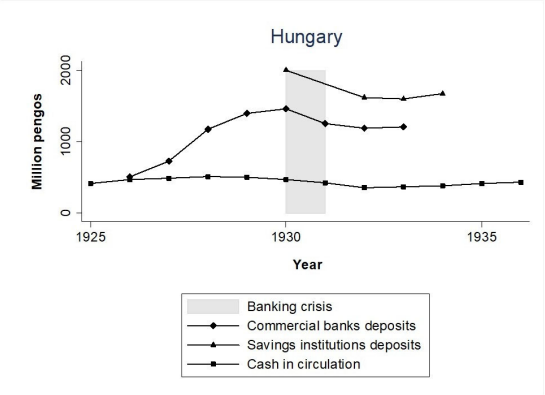

Denmark
Million kroner
500
1500
2500
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

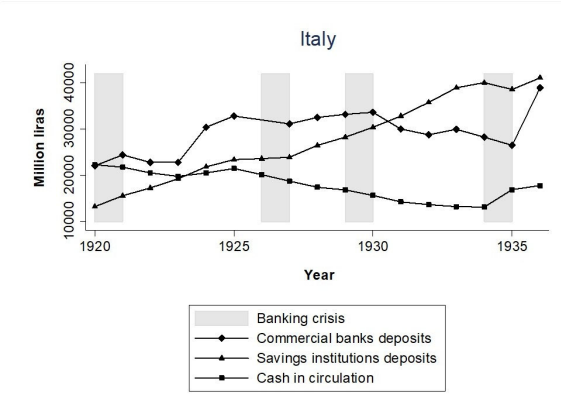

Finland
Million maarkka
0
2000
4000
6000
8000
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

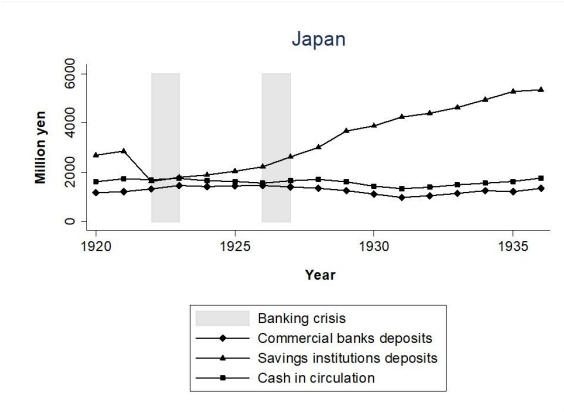

France
Million francs
0
50000
100000
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

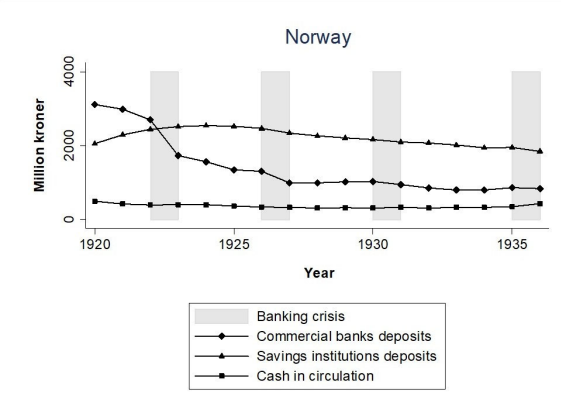

Germany
Million marks
0
5000
10000
15000
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

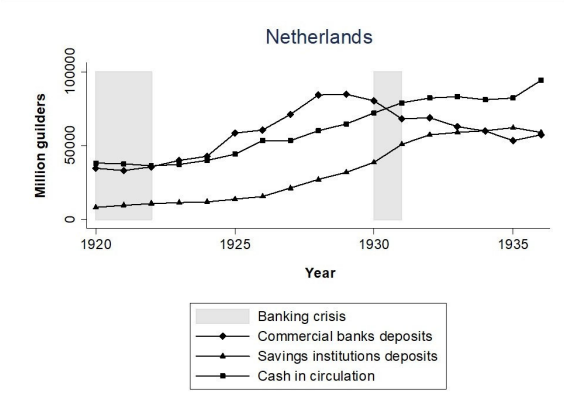

Greece
Million drachmas
0
10000
20000
0
1000
2000
3000
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits RIGHT AXIS
Cash in circulation

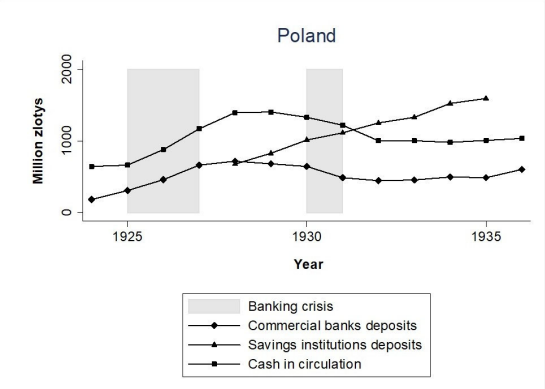

Hungary
Million pengos
0
1000
2000
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

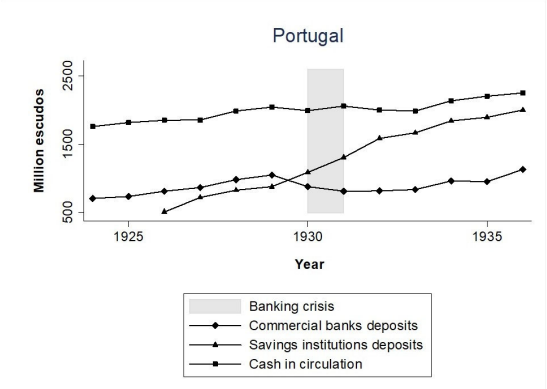

Italy
Million liras
10000 20000 30000 40000
1920 1925 1930 1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

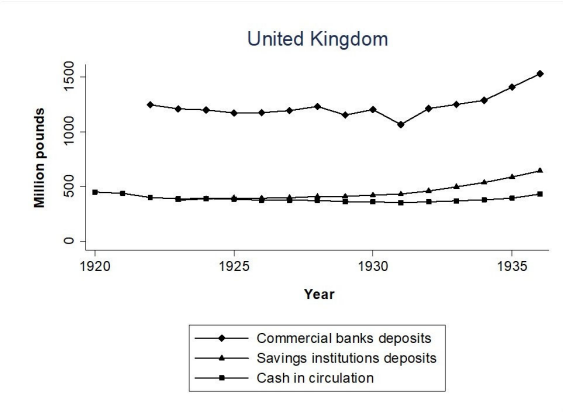

Japan
Million yen
0 2000 4000 6000
1920 1925 1930 1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

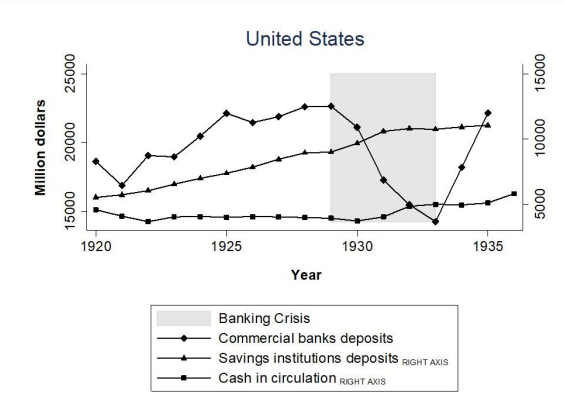

Norway
Million kroner
0 2000 4000
1920 1925 1930 1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

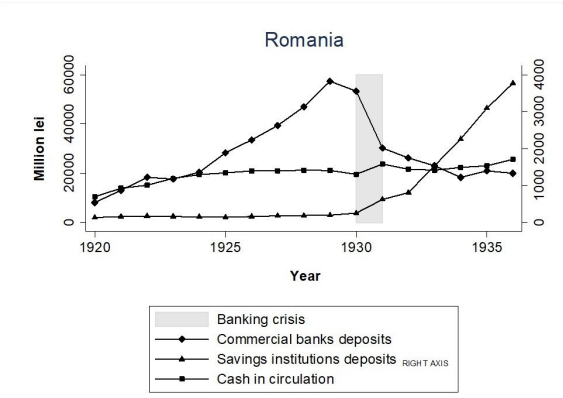

Netherlands
Million guilders
0 50000 100000
1920 1925 1930 1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

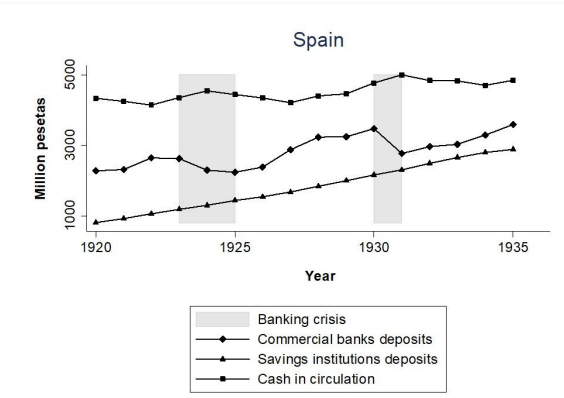

Poland
Million zlotys
0 1000 2000
1925 1930 1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

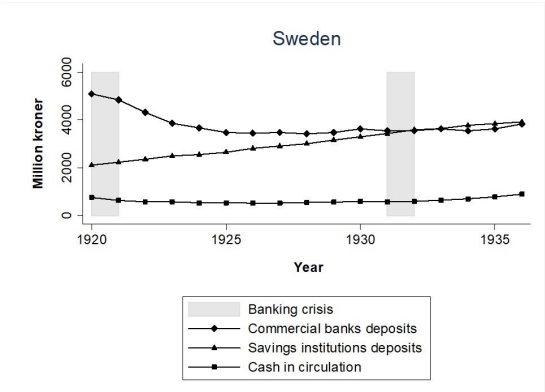

Portugal
Million escudos
500 1500 2500
1925 1930 1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation

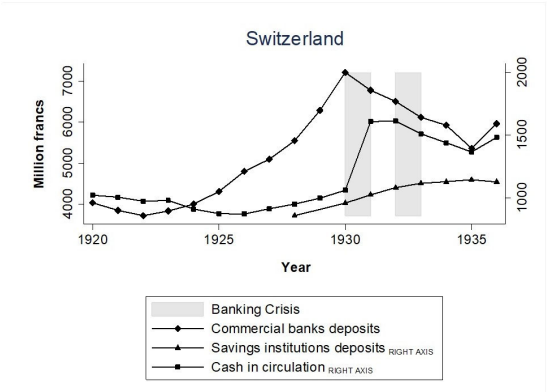

United Kingdom
Million pounds
0
500
1000
1500
1920
1925
1930
1935
Year
Commercial banks deposits
Savings institutions deposits
Cash in circulation

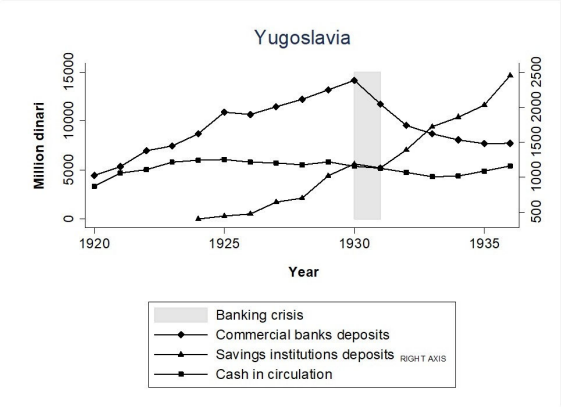

United States
Million dollars
15000
20000
25000
5000
10000
15000
1920
1925
1930
1935
Year
Banking Crisis
Commercial banks deposits
Savings institutions deposits RIGHT AXIS
Cash in circulation RIGHT AXIS


Romania
Million lei
0
20000
40000
60000
0
1000
2000
3000
4000
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits RIGHT AXIS
Cash in circulation


Spain
Million pesetas
1000
3000
5000
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation


Sweden
Million kroner
0
2000
4000
6000
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
Cash in circulation


Switzerland
Million francs
4000
5000
6000
7000
1000
1500
2000
1920
1925
1930
1935
Year
Banking Crisis
Commercial banks deposits
Savings institutions deposits RIGHT AXIS
Cash in circulation RIGHT AXIS


Yugoslavia
Million dinari
0
5000
10000
15000
500
1000
1500
2000
2500
1920
1925
1930
1935
Year
Banking crisis
Commercial banks deposits
Savings institutions deposits
RIGHT AXIS
Cash in circulation