The Gnomes of Zürich and the New York Bankers' Panic of 1907

September 23, 2024

Abstract

Using a unique dataset of daily returns on all Swiss stocks traded on the Zurich exchange, this paper shows that the New York Bankers' Panic of 1907 affected foreign stock markets earlier than previous studies of the international spillovers of this crisis suggest. Moreover, the spillovers were confined to banks' stocks and did not significantly influence returns on Swiss firms' stocks from other sectors. Key events, such as the news about the bankruptcy of the Knickerbocker Trust or announcements of the Bank of England, coincided with significant abnormal daily returns on Swiss banks' stocks.

JEL: G15, G21, N20
Keywords: banks, crisis, international spillover, Panic of 1907, stocks

1 Introduction

In March 2023, the collapse of Silicon Valley Bank (SVB) was a recent example of a domestic banking crisis sending ripples through international financial markets. The SVB bankruptcy spread anxiety about the health of the global banking sector and led to falling stock prices of banks worldwide. This widespread loss in investor confidence even affected banks with no direct links to SVB (Jordan, 2023).

Since such events are comparatively rare, studies of past banking crises are useful for uncovering patterns in their effects on international financial markets. Banking crises during the first age of globalization (1880–1914) are particularly interesting in this respect because the degree of global financial integration in this period was comparable to today's (Flandreau and Zumer, 2004).

Against this background, this paper studies the impact of the New York Bankers' Panic of 1907 on stocks traded on the Zurich exchange, one of the three largest stock exchanges in Switzerland in that period of time. I evaluate empirically whether there were market-wide effects and assess daily abnormal returns on stocks of Swiss firms from different economic sectors. This paper uses event study methods and a unique dataset of the population of shares traded on the Zurich exchange for this empirical assessment.

To my knowledge, this paper is the first to study daily movements in a foreign (non-US) stock market at the firm level around the time of the New York Bankers' Panic, thus, providing a unique view of how this crisis affected financial markets internationally.[1]

Essentially, the New York Bankers' Panic resulted from the unsuccessful fight of a trust (United Copper) against short sellers and rumors about the involvement of other New York trusts and banks in this failed endeavor. The rumors spread within days, leading to turmoil on the New York Stock Exchange. This crisis culminated in the bankruptcy of the Knickerbocker Trust on 22 October 1907. This event triggered runs on banks and other trusts either personally or financially connected

[1]Bordo, Redish, and Rockoff (2015) analyze how the Canadian banking system coped with banking crises that originated in the US. The Panic of 1907 is part of their sample of crises. Purchart (2015) argues that the Panic of 1907 laid the foundations of a severe downturn of the Swiss economy in 1909 while Bordo and James (2007) highlight that Switzerland fared relatively well during the Panic of 1907.

to the Knickerbocker Trust. Eventually, the private initiative of John Pierpont Morgan to provide liquidity, financial support by the US Treasury, and actions of foreign central banks calmed financial markets (Rodgers and Payne, 2014; Sprague, 1908; Tallman and Moen, 2018).

How this crisis unfolded from New York to the rest of the US, the shocks that potentially paved the way to this crisis and how the Panic of 1907 affected the US financial system, the real economy as well as the regulation of the US financial system has already been extensively studied (Fohlin and Lu, 2021; Fohlin, Gehrig, and Haas, 2016; Frydman, Hilt, and Zhou, 2015; Jaremski and Wheelock, 2023; Mishkin and White, 2014; Moen and Tallman, 1992; Odell and Weidenmier, 2004; Sprague, 1908).

This paper contributes to the literature on the effects of the Panic of 1907 on international financial markets. Noyes (1909) and Tallman and Moen (2018) argue that this crisis started spreading across borders when the decision to suspend the convertibility of deposits to gold a couple of days after the bankruptcy of the Knickerbocker Trust created a currency premium. This premium on cash was so high that it triggered gold flows from Europe to New York. Arbitrage opportunities on the bond market contributed to gold flows, too (Rodgers and Wilson, 2011). European central banks tried to mitigate these outflows by increasing discount rates and introducing other measures.

The main results of this paper leave the impression that the international financial market effects of the Panic of 1907 started earlier than previously suggested (Noyes, 1909; Tallman and Moen, 2018). The news of a domestic banking crisis in the US quickly spilled over internationally and adversely affected the stock prices of foreign banks in particular. This observation does not only describe the international financial spillovers of the Panic of 1907. This pattern also applies to more recent examples of such crises, e.g., the recent bankruptcy of SVB in 2023.

On a market-wide level, I find that the Panic of 1907 did not significantly affect the performance of aggregate Swiss stock prices but worsened market liquidity. Zooming in on different sectors of Swiss stocks, the patterns in Swiss banks' stock returns suggest that the news of the collapse of United Copper on 16 October 1907 had already had an adverse and statistically significant impact on Swiss

stock prices. Abnormal returns on Swiss banks' stocks turned negative after this event. The bankruptcy of the Knickerbocker Trust on 22 October 1907 led to the strongest, significant daily decline in Swiss banks' abnormal stock returns during the acute crisis period. Banks' abnormal stock returns indeed fell further on the days of the suspension of the convertibility of deposits in the US. However, estimates of this effect are only borderline statistically significant and also smaller than the reactions of banks' abnormal stock returns to the two earlier events. Furthermore, in line with the argument of Rodgers and Payne (2014), Swiss banks' stock returns increased when the Bank of England reacted to gold outflows.

Moreover, this paper's empirical analyses suggest that the Panic of 1907 spillover to Swiss stocks was largely confined to banks. I only find significant and negative abnormal returns on banks' stocks around key events of the Panic of 1907. Returns on stocks of Swiss industrial companies were also abnormally low during this crisis period. However, there is no evidence of a statistically significant association with the key events of the Panic of 1907. One possible interpretation of this finding is that market participants expected the immediate repercussions of this crisis to be confined to financial firms with potential links to troubled US banks and trusts. This interpretation of the main empirical results of this paper is in line with evidence of US market participants discriminating between members and nonmembers of the New York Clearing House and, thus, between US financial intermediaries with access to liquidity support and those without support (Fohlin and Lu, 2021; Frydman et al., 2015; Moen and Tallman, 1992). By contrast, market commentary suggests that idiosyncratic issues of one of the dominant industrial companies and strong increases in commodity prices during this period likely account for persistently negative abnormal returns on the stocks of industrial firms.

These findings highlight the value of historical high-frequency financial market data. Of course, the liquidity of the Swiss and many other countries' stock markets at the beginning of the 20th century was low, especially when compared to modern standards. As a consequence of this illiquidity, the main results of this paper rely on a relatively small cross-section of firms. However, the data nonetheless reveal statistically significant patterns in returns on Swiss banks' stocks associated with

key events of the Panic of 1907.

The remainder of the paper is organized as follows. Section 2 describes the data used in the empirical assessments and their sources. Section 3 presents descriptive statistics for Swiss stocks traded on the Zurich exchange between 1905 and 1909. Section 4 introduces the empirical frameworks and discusses the main results. Section 5 concludes. The appendix provides further details on the historical sources.

2 Data

The empirical analyses of this paper use daily information about the population of shares traded on the Zurich exchange between 3 January 1905 and 31 December 1909. The sources of these data are hard copies of the *Kursblatt der Zürcher Börse*, which are available at the Swiss National Bank. Appendix A.1 depicts an example page of these hard copies. GBL Gubler[2] digitized the information from the hard copies. Manual quality checks ensure that one can be 99% certain that the raw data—numbers or firm names—resulting from the digitization process are accurate.

Trading on the Zurich exchange occurred from Monday to Saturday in the sample period. The *Kursblatt* reports bid and ask prices in Swiss franc (CHF) from the trading session between 10:45am[3] and noon.

This study uses the midpoint of the bid and ask prices as a proxy for the stock price of a firm, i.e., $P_{i,t} = \frac{P_t^{bid} + P_t^{ask}}{2}$. There is no information about closing prices in the Kursblatt, but the published bid and ask prices were binding (Bleuler, 1911). Moreover, the *Kursblatt* gives the firm names, the sectors (bank, industrial, insurance and railway) in which the firms operate, the book value in Swiss francs of each common share, the dividend in percent of the firm's book value, as well as information about newly issued shares or mergers and acquisitions or de-listings. In cases when old and new shares of a firm are traded at the same time after the capital increase of a firm, I take them both into account in the analysis,

[2]Special thanks goes to Patrick Halbeisen and Simone Epper from the SNB archives and Simon Heierli from GBL Gubler for shepherding the digitization process.

[3]11am in 1905 and 1906

for example, in calculating market values of a firm to construct a value-weighted market index. Furthermore, the *Kursblatt* also contains market commentary that helps to identify relevant news that drove stock prices on a particular trading day. Appendix A.2 provides an example.

The analysis focuses on capital appreciation returns, i.e.,

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \tag{1}$$

for firm i at day t. There is no clear information about the timing of dividend payments, which prevents the calculation of total returns, i.e., returns taking dividend payments into account.

I only included shares in the analysis for which both the bid and ask prices were available. Moreover, I exclude observations for which $R_{i,t} = 0$, because they reflect stale quotes.

To calculate the return on a value-weighted market portfolio and thus make the analysis as comparable as possible with event studies of modern data, I collect the number of shares for each listed firm from various editions of the *Finanzjahrbuch Schweiz*[4] to construct the market capitalization of firm i for each day, i.e.,

$$mcap_{i,t} = P_{i,t} N_{i,t} \tag{2}$$

with N_t the number of shares.

The value-weighted market return obeys

$$R_{m,t} = \sum_{i=1}^{M} w_{i,t-1} R_{i,t} \tag{3}$$

with $w_{i,t-1} = \frac{mcap_{i,t-1}}{mcap_{total,t-1}}$ and M the total number of firms listed on the Zurich exchange.

Fama and French (1992) show that besides the size ($mcap_{i,t}$) of a firm, the ratio of book-to-market equity helps to explain cross-sectional differences in firms' stock returns. Since the *Kursblatt* explicitly publishes the CHF book value of a

[4]The information about capital events in the *Finanzjahrbuch* also serves as a cross-check for the respective information from the Kursblatt. Appendix A.3 provides one example of an entry in the *Finanzjahrbuch*.

single share and whether the capital was fully paid in daily, I calculate the ratio between the book equity value of a share and its market price (B/M) as a control variable in empirical tests of cross-sectional differences in the returns on stocks of firms from different sectors. B and M are expressed in CHF. In the sample, B only varied when new equity was issued.

As an additional control variable, I use the US market return from Schwert (1990), which is freely available on Bill Schwert's website.

Moreover, I calculate bid–ask spreads from the quoted prices as a measure of the illiquidity of a stock. The bid–ask spread (BA) of stock i is defined as

$$BA_{i,t} = \frac{Ask_{i,t} - Bid_{i,t}}{P_{i,t}} \tag{4}$$

and the market-wide bid–ask spread follows from

$$BA_{m,t} = \sum_{i=1}^{M} w_{i,t-1} BA_{i,t} \tag{5}$$

In robustness checks, I constructed excess returns ($R_{i,t} - R_{f,t}$) using either private or Swiss central bank discount rates as a proxy of the risk-free rate ($R_{f,t}$). The qualitative results of this paper remain unaltered.[5] The detailed results of this robustness check are available upon request.

3 The stock market segment of the Zurich exchange: 1905 to 1909

This section provides general information about the Zurich stock exchange in the sample period from January 1905 to December 1909. It starts with a market-wide view and then zooms in on different sectors. Appendix A.4 gives a short comparison with the modern Swiss stock exchange.

[5]The source of the yearly private discount rate data before the foundation of the Swiss National Bank (the Swiss central bank) in June 1907 and the daily Swiss National Bank's (SNB) discount rate from June 1907 onward are the "Historical time series" (tables 1.1_L and 1.1a_A) publicly available on the SNB website.

Figure (1) shows the evolution of the yearly, aggregate market capitalization of stocks traded on the Zurich exchange over time. For each year, I calculate the average market capitalization (in CHF millions) as the yearly average of daily observations of the total market capitalization of the Zurich exchange.

The Zurich exchange's market capitalization rose almost steadily from 1905 to 1909. In 1907, the year of the New York Panic, the growth of the market capitalization slowed down a bit, but market capitalization still increased. It rose from approximately 330 million Swiss francs in 1905 to CHF 607 million in 1909. According to the information from *Kursblatt der Zürcher Börse.* and the *Finanzjahrbuch Schweiz*, the increase from 1905 to 1906 reflects relatively strong capital issuing activity on the Zurich exchange in this period. In this respect, Zurich was no exception to the international rule. 1906 was a year in which share issuances of industrial and railroad companies frequently took place, especially in the US (Noyes, 1909). Interestingly, the market capitalization of listed stocks increased even in 1909 when Switzerland experienced a deep recession (Purchart, 2015).

[Figure (1) about here]

Similar to other stock markets of small open economies in the early 20th century (Rydquist and Guo, 2021), stock trading on the Zurich exchange was relatively thin. Both bid and ask prices were only available for about 20% to 40% of all of the listed stocks on an average trading day in the sample period from 1905 to 1909.

Illiquidity, measured as the bid–ask spread, of the traded stocks on the Zurich exchange occasionally spiked but did not exhibit pronounced long-term swings in the sample period as shown in figure (2).

[Figure (2) about here]

The sectoral decomposition of the aggregate market capitalization in figure (3) shows that banks made up the largest share of the total stock market capitalization followed by industrial firms, insurance and railway companies in the sample period. The share of banks in the total market capitalization of the Zurich exchange varied

between 50% and 55% between 1905 and 1909. Industrials comprised between 22% and 33% of the aggregate market capitalization between 1905 and 1909.

[Figure (3) about here]

The relatively large share of the banking sector in the aggregate Zurich stock market is not due to the sheer number of banks listed on the Zurich exchange. Figure (4) highlights that the average number of banks tends to be lower than the corresponding number of listed industrial companies in all of the years of the sample period.

[Figure (4) about here]

Table (1) reveals that the average size (market capitalization) of banks was larger than the average size of firms from the other sectors. Measures of the ranges of market capitalizations in each stock market sector also show that the cross-sectional differences are sometimes large. The minimum market capitalization of Swiss banks amounted to 1.66 million Swiss francs between 1905 and 1909, whereas the maximum size was CHF 127.14 million. These cross-sectional differences are even larger for industrial companies. Typically, stocks with minimal market capitalization are also relatively illiquid. This illiquidity leads to pronounced swings in their prices. To limit the impact of those stocks on an index of the aggregate Zurich stock market, I chose to compute a value-weighted market return for later use in the empirical analyses.

Please note that table (1) takes all of the firms listed between 1905 and 1909 into account, i.e., firms that delisted during this period and new ones. That is why the total number of observations exceeds the average number of firms per year shown in figure (4).

[Table (1) about here]

Table (2) provides the corresponding information about the ratio of book equity to market equity as a measure of stock market valuations for each sector. In modern data, size and book-to-market equity (B/M) are each important to explain cross-sectional differences in firm-level stock returns on top of cross-sectional differences in the sensitivities to the market return (Fama and French, 1992).

We observe pronounced differences between sectors. On average, banks tend to have lower B/M than industrial or Swiss railway companies. In addition, the cross-sectional dispersion of the B/M among banks is lower than for industrials and railways. Insurance firms are a particular case, because equity capital was not fully paid in. Hence, their actual book equity was only between one-fifth and one-half of the theoretically possible value of book equity. This explains the comparatively low B/M of these firms.

[Table (2) about here]

4 Empirical frameworks and results

This section summarizes the main results. The empirical analyses rest on the estimation of a GARCH model for the market return and the market-wide bid-ask spread (Engle, 2001) and event study methods (MacKinlay, 1997; Campbell, Lo, and MacKinlay, 1997) to analyze daily movements in Swiss stock returns in the period of the New York Bankers' Panic of 1907. In the context of this study, we deal with several common event dates and cannot distinguish between affected and unaffected firms a priori.

Event study analyses are possible because the completion of the transatlantic telegraph cable in 1866 facilitated the quick dissemination of news across the Atlantic (Hoag, 2006). For example, the *Kursblatt* published the prices of selected shares traded on the New York Stock Exchange with a lag of one day. The market reports in the *Kursblatt* also suggest that the traders knew the previous day's price movements on the New York Stock Exchange (see A.2 for an example one day after the collapse of United Copper).

4.1 Market-wide effects of the Panic of 1907?

This section assess whether the Panic of 1907 had effects on the overall Zurich stock market, i.e. on the return on the market portfolio, R_{mt}, that comprises all stocks traded on the Zurich exchange and on the market-wide bid-ask spread of stock prices, BA_{mt}, a measure of market liquidity.

This assessment boils to down to the estimation of a GARCH (1,1) model[6] for the market return and the bid-ask spread including a dummy variable that takes values of one in a time window around the bankruptcy of the Knickerbocker Trust. This event window ranges from 20 trading days before and 20 trading days after the bankruptcy of the Knickerbocker Trust on 22 October 1907.

The coefficient estimates of the dummy variable tell us whether the mean return or the bid-ask spread were different from average values in a time window around the key event of the Panic of 1907 taking into account that the variability of these variables might have been affected by the crisis in the US.

More formally, I estimate the following equation for the mean value of the dependent variables. The exposition follows Engle (2001).

$$X_t = \mu + \gamma D_t + \epsilon_t \tag{6}$$

with $X = R_m, BA_m$, μ the estimate of the mean return or mean bid-ask spread and γ the coefficient for a dummy variable that takes values of one during the event window and zero otherwise. The estimate of γ hence indicates whether the dependent variable was different from its average value in a time window around the key event of the Panic of 1907.

The simultaneously estimated variance equation of the GARCH model is

$$h_t^2 = \omega + \alpha\epsilon_{t-1}^2 + \beta h_{t-1}^2 \tag{7}$$

with h the variance of the regression residuals ϵ. In the estimation, I assume that the error terms follow a student distribution. Statistical tests suggest that the assumption of normally distributed error terms in the GARCH estimation do not fit the data well (results not reported but available upon request).

Table 3 presents the results of the GARCH estimation. Judged by the estimate of the dummy variable for the event window, the market return was not different from its average during this period. For the market return, the estimate of γ is indistinguishable from zero. By contrast, market liquidity as measured by the bid-ask spread appears to have deteriorated during the event window. The positive

[6] I use the *rugarch* package in R.

and statistically significant estimate of γ reveals that the bid-ask spread was higher than on average during the event window. This means that market liquidity was significantly lower.

Taken together, the GARCH estimates leave the impression that the market-wide return on the Zurich stock market was unaffected by the New York Panic of 1907 even though market liquidity deteriorated. Next, I assess whether returns on stocks of firms from different sectors exhibited unusual patterns.

4.2 Analyses of different stock market sectors

4.2.1 Cumulative abnormal returns over time

This section computes and evaluates cumulative abnormal returns (CARs) on stocks of banks and stocks of firms from other sectors in a time window of 20 days before and after the collapse of the Knickerbocker Trust in New York.

Abnormal returns reflect whether the return on a firm's stock behaved differently than usual during a specific period in time. Even though this was not the case for the market-wide return (see section 4.1), it could well be the case that particular firms were affected by the Panic of 1907. For example, market participants may have expected the immediate repercussions of this crisis to be confined to financial firms (banks) with potential links to troubled US banks and trusts.

I assume that the market model (CAPM) applies to the return on security i

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \tag{8}$$

with R_{it} the return on stock of firm i and R_{mt} the return on the market portfolio. In theory, the market portfolio comprises all risky assets (Sharpe, 1964; Lintner, 1965; Mossin, 1966). In empirical work, the return on a broad stock market index approximates the market portfolio. In the context of this paper, the return on the market portfolio is the value-weighted return on a portfolio that comprises all Swiss stocks traded on the Zurich exchange.

To obtain an estimate of the abnormal return (AR) on the stock of firm i, I estimate α_i and β_i in a pre-event window that runs from January 1905 until 21

trading days before the collapse of the Knickerbocker Trust on 22 October 1907.[7]

This approach assumes that the estimates from the pre-event regression provide the sensitivities of firms' stock returns to the market return in normal times. Hence, the regression coefficients characterize the normal behavior of stock returns. I use these estimates to assess whether the dynamics of Swiss firms' stock returns deviated from their usual pattern around the time of the Panic of 1907 by calculating so-called abnormal returns.

The abnormal return on the stock of firm i in the event window τ, which covers 20 days before and after the bankruptcy of the Knickerbocker Trust, is

$$AR_{i,\tau} = R_{i,\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m,\tau} \tag{9}$$

$AR_{i,\tau}$ around zero reflects that firm i's stock returns basically followed their usual pattern. In the present context, one would expect negative $AR_{i,\tau}$ if the Panic of 1907 adversely affected the stock price of firm i.

In the subsequence, I distinguish between the four sectors of the Zurich exchange stock market segment (bank, industrial, insurance and railway) and average the $AR_{i,\tau}$ across firms of a given sector on each day. Then I calculate the cumulative sum of the abnormal log returns (CARs) on stocks of banks, industrial, insurance and railway companies during the event window (Campbell et al., 1997).

US evidence suggests that market participants discriminated between members and nonmembers of the New York Clearing House and thus between US financial intermediaries with access to liquidity support and those without support (Fohlin and Lu, 2021; Frydman et al., 2015; Moen and Tallman, 1992). Therefore, I focus first on the abnormal returns on Swiss banks' stocks because the Panic of 1907 originated in the New York trust and banking sector. Against this background and given the lack of detailed and timely information about the cross-border exposures of banks in general, I hypothesize that news about the Panic of 1907 arriving in Switzerland primarily affected Swiss banks.

The banking sector has a relatively large share in the overall Zurich stock

[7] I varied the starting point of the pre-event estimation as a robustness check. The results remain qualitatively unaffected by this variation as long as the pre-event window covers at least approximately one year. Results are available upon request.

market capitalization, which does not favor finding abnormal returns on the stocks of Swiss banks. Hence, I view the following results as conservative estimates of the effects of events during the Panic of 1907 on abnormal returns on banks' stocks.

Figure (5) depicts the CARs for Swiss banks. Vertical lines indicate potentially important events. The shaded area highlights the period when European central banks took actions to stem gold outflows to the US.

At the beginning of the event window (early October 1907), the CARs of Swiss banks hovered around zero. This observation suggests that the dynamics of returns on Swiss banks' stocks on those days aligned with their typical pattern. There was a small drop in abnormal returns a couple of days before the collapse of United Copper on 16 October 1907, but we do not observe a pronounced downward movement. This changed shortly after the United Copper collapse. Then, the abnormal returns on Swiss banks' stocks fell markedly. They stabilized in the following two days before they shifted deeper into negative territory on the day after the bankruptcy of the Knickerbocker Trust. The abnormal returns on banks' stocks continued their decline after the New York Clearing House suspended the convertibility of deposits into gold. This movement aligns with Noyes (1909) and Tallman and Moen (2018), who argue that the international spillover of the Panic of 1907 started with this event. However, one also sees clearly in figure (5) that the abnormal returns on Swiss bank stocks stabilized in the period highlighted by the shaded area. This area indicates the period when European central banks started to raise discount rates and partly introduced other measures to stem gold outflows to the US. This observation supports Rodgers and Payne (2014) who argue that European central banks' actions helped calm US stock markets. The visual inspection of the CARs of Swiss banks suggests that those actions also supported Swiss stock prices. This is most clearly visible for the event indicated by the second vertical line in the shaded area, which marks the decision of the Bank of England to increase its discount rate. The CARs of Swiss banks increase markedly after this decision.

[Figure (5) about here]

Figure (6) compares the CARs of the banking sector with the industrial sector of the Zurich stock market. Stocks from the railway and insurance sectors were so

infrequently traded that the CARs on stocks of firms from these sectors are largely uninformative. Therefore, I do not report those graphs, but they are available upon request.

In the left panel of figure (6), I depict the CARs of banks from figure (5) for comparison. A casual inspection of the dynamics of the CARs shows that the patterns differ between banks and industrials. The dynamics of CARs on industrial stocks started deviating from their usual patterns right at the beginning of the event window. Against the background of the market reports of the *Kursblatt*, the volatile and steadily falling abnormal returns on industrials' stocks could be due to extraordinarily strong movements in the price of aluminum and other commodities. In addition, according to the market report, idiosyncratic issues of Nestlé, the largest industrial firm in the sample, in the event window seem to have contributed to the persistently negative abnormal returns as well.

[Figure (6) about here]

To sum up, the visual inspection of the dynamics of CARs on stocks of Swiss banks suggests that stock prices reacted to early signs of trouble on the New York Stock Exchange, earlier than suggested by Noyes (1909) and Tallman and Moen (2018). Banks' abnormal stock returns changed markedly after the collapse of United Copper, the bankruptcy of the Knickerbocker Trust and the suspension of the convertibility of deposits into gold in the US. In addition, the movements in Swiss banks' CARs leave the impression that European central bank actions contributed to calming stock markets. This latter observation is most pronounced for the Bank of England's decision to increase discount rates on 31 October 1907.

4.2.2 Event study regression: Are abnormal returns significant?

In this section, I assess whether abnormal returns on Swiss banks' and nonfinancial industrial firms' stocks were statistically significantly associated with the key events of the Panic of 1907.

Therefore, I run the following regression

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \sum_e \lambda_i^e d_t^e + \epsilon_{it} \tag{10}$$

in which $R_{i,t}$ is the return on the stock of firm i, $R_{m,t}$ the market return defined as in section 4.2.1 and d_t^e representing dummies that take values of one on the day of a key event, e, during the Panic of 1907 and zero otherwise. The regression estimates λ_i^e for each event are interpretable as abnormal returns (Gibbons, 1980; Salinger, 1992).

The key events are the collapse of United Copper on 16 October 1907 (*d.copper*), the bankruptcy of the Knickerbocker Trust on 22 October 1907 (*d.knicker*) and the suspension of deposit convertibility by the New York Clearing House on 26 October 1907 (*d.clha*). Moreover, I specify a dummy for the decision of the Bank of England to increase its discount rate on 31 October 1907 because the CARs of Swiss banks increased markedly after this decision, as shown in figure (5). The question is whether this increase was statistically different from zero. In addition, I specify dummies for each of the first three days after each of the three key events (*.a*1, *.a*2,*.a*3). Since the major events of the Panic of 1907 followed quickly one after another, the dummy indicating three days after the collapse of the Knickerbocker Trust (*d.knicker.a*3) for instance also indicates the day before the suspension of the convertibility of deposits into gold in New York. Therefore, I only include special dummies for one day before the United Copper failure and the day before the collapse of the Knickerbocker Trust (*.b*1) in the regression. Finally, I include a dummy variable that takes values of one during the period between 22 November and 7 December 1907 and zero otherwise (*d.bdf*). In this period, the Banque de France took actions to stem gold ouflows to New York and Rodgers and Payne (2014) argue that these actions helped to calm the US stock market.

I estimate equation (10) separately for the period from 3 January 1905 to 31 December 1907 for samples of Swiss banks and Swiss industrial companies.[8] Due to the illiquidity of insurance and railway stocks on some days close to the key events, I focus on banks and industrials. Table (4) presents the estimation results.

Events in the US were certainly known to Swiss stock traders one day after the event occurred. Hence, one cannot expect significant abnormal returns on the day of the event but one day later.

This lag is reflected in the estimates of the different dummy variables in the re-

[8]Extending the estimation period to the end of 1909 does not affect the qualitative results. Details are available upon request.

gression for Swiss banks, the first column in table (4). We observe three significant dummy estimates. The first one occurred two days after the collapse of United Copper. This estimate is significantly different from zero and negative. Returns on Swiss banks were unusually low on this day, but why do we not observe a reaction on day one after the United Copper event? The market commentary presented in the appendix A.2 suggests that traders on the Zurich exchange were aware of the bad news from New York, but were more excited by good news (increasing prices of bank stocks) from Italy. It seems that this mixed news did not trigger any unusual pattern in Swiss banks' stock returns on this day. The regression estimates then suggest that eventually, the significance of the news from New York settled in and contributed to abnormally low returns on Swiss banks' stocks on the second day after the collapse of United Copper.

The dynamics of Swiss banks' stock returns around the bankruptcy of the Knickerbocker Trust are more clear-cut. The return on the day after the Knickerbocker Trust event was statistically significantly negative. The estimate is larger than the one after the United Copper collapse. This observation indicates that the Knickerbocker event had a greater impact on the stock market performance of Swiss banks than the demise of United Copper. However, this effect appears short-lived. The dummies for the days two and three after the Knickerbocker bankruptcy are statistically insignificant.

Moreover, the estimates for the regression coefficients of the dummies indicating the suspension of deposit convertibility into gold tend to have negative signs. However, they are imprecisely estimated, and only the coefficient of the second day after the deposit convertibility suspension is borderline significantly different from zero. These estimates are broadly in line with Noyes (1909) and Tallman and Moen (2018), who argue that this decision started the international transmission of the crisis. Indeed, these estimates suggest that Swiss stock prices responded to this news. However, as described above, the impact of the Panic of 1907 on Swiss stock prices already started in its early stages.

Furthermore, the regression estimate for the dummy variable indicating the trading day following the announcement of the Bank of England to increase discount rates is positive and statistically significant. This suggests that market

participants interpreted this decision as good news for Swiss banks' stocks. This finding supports the view of Rodgers and Payne (2014) that actions of foreign central banks contributed to calming international stock markets. However, the regression estimate of a dummy variable for the period between 22 November and 7 December 1907, during which the Banque de France took actions to stem gold ouflows to New York, is statistically indistinguishable from zero. Hence, Swiss banks' stock returns were not really affected by the Banque de France decisions in this period.

Judged by these estimates, the bankruptcy of the Knickerbocker Trust had the largest significant impact on the returns on stocks of Swiss banks, followed by the collapse of United Copper and the suspension of the convertibility of deposits to gold in the US. The largest negative movements in the CARs of Swiss banks depicted in figure (5) were also statistically significantly different from zero. At the same time, the significance of the event dummy estimates suggests that the effects of these events were short-lived and lasted for one day. This latter finding is consistent with Fama (1998) who argues that due to market efficiency any stock price reaction to a specific event must be rather short-lived.

Finally, the right column of table (4) gives the results for returns on stocks of Swiss industrial companies. In this sample of firms, no estimates of the regression coefficients of the event dummies are statistically different from zero. On two days, there was no price information explaining the lack of estimates for the dummies that indicate three days after the United Copper event and two days after the suspension of deposit convertibility.

Hence, in contrast to Swiss banks, returns on industrials' stocks did not exhibit any significant unusual dynamics at the height of the Panic of 1907.

[Table (4) about here]

4.2.3 Cross-sectional differences in abnormal returns?

The previous section showed that the returns on Swiss banks' and industrial companies' stocks were abnormally low during the Panic of 1907 even though only the returns on stocks of banks seem to have systematically responded to key events of the Panic of 1907.

The question is whether the abnormal returns on banks' stocks were, on average, significantly different from the abnormal returns on other firms' stocks during periods of several days after the collapse of United Copper.

To answer this question, this paper builds on the empirical setup of Stahl (2023), who evaluates whether the introduction of female suffrage in Switzerland had an impact on specific stock market sectors.

The empirical assessment of Stahl (2023) boils down to a regression of abnormal returns on the stock of firm i, $AR_{i,t}$, on an intercept and a dummy variable ($dummy_i^{sector}$) that takes a value of one if a firm is from a specific sector and zero otherwise. A significant estimate of the dummy variable indicates that abnormal returns on stocks from a particular sector were different from the abnormal returns of all other sectors during the estimation period. Standard errors are clustered at the firm level.

I enhance this regression setup by including control variables (MacKinlay, 1997). The reason for adding controls is that the calculation of the abnormal returns assumes that the sensitivity to the return on the market portfolio is the only explanatory variable of stock returns at the firm level. However, Fama and French (1992) show that cross-sectional differences in firm size (log market capitalization) and in the ratio of book equity to market equity (B/M) explain cross-sectional differences in firm-level stock returns in addition to differences in the sensitivities to the market return. Daily data on size and B/M of each Swiss firm listed on the Zurich exchange are available for the whole sample period. Moreover, differences in the exposure to the US stock market return may be reflected in the abnormal returns on Swiss stocks when calculating those based only on Swiss stock market data. Against this background, I include a measure of the US stock market return (rm_t^{US}) from Schwert (1990) as control as well.

Then I estimate the following regression

$$AR_{i,t} = \alpha_i + \lambda_i d_i^{sector} + \beta_i rm_t^{US} + \gamma_i size_{i,t} + \delta_i B/M_{i,t} + \epsilon_{i,t} \tag{11}$$

I estimate equation (11) with a dummy for banks (d_i^{banks} in equation 11) for different periods that start one day after the United Copper collapse and end 20, 30, 60 and 90 days later. Table (5) summarizes the results.

The regression estimates for the bank dummy reported in table (5) tend to be insignificant for all of the estimation periods, suggesting that the dynamics of banks' stock returns were not statistically significantly different from movements in returns on stocks of other Swiss firms on average. One exception is the 20-day period after the United Copper collapse, when the bank dummy coefficient was positive and borderline statistically significant, suggesting that abnormal banks' stock returns were higher (less negative) than the abnormal returns on stocks of other sectors.

If we examine the regression coefficients of the control variables, a robust feature of the data is that high B/Ms are associated with low abnormal returns. At first glance, this finding seems to be at odds with the notion that high B/M stocks earn high average returns (Fama and French, 1992). However, one potential explanation of those high average returns is compensation for distress risk (Chan and Chen, 1991; Fama and French, 1992). Since the Panic of 1907 qualifies as stressful period, the evidence of a significantly negative association between B/M and the abnormal returns could reflect the materialization of distress risk in this period.

In contrast to B/M, the effect of the other control variables on abnormal returns on Swiss firms' stocks in not statistically significant. The regression coefficients are indistinguishable from zero.

[Table (5) about here]

As a robustness check, I define a sector dummy for firms from the industrial sector and run regression (11). Table (6) compares banks and industrials for the 20 days after the collapse of United Copper. The results for banks are already presented in table (5). The regression estimate of the industrial firm dummy is statistically insignificant. This finding leaves the impression that industrials' abnormal returns did not differ from those of the other firms in the estimation period.

[Table (6) about here]

Key events of the Panic of 1907 affected Swiss banks' stocks on single days after those events. However, the results of this section suggest that these effects were

short-lived and did not lead to significant long-lasting cross-sectional differences in the abnormal returns on Swiss stocks traded on the Zurich exchange. This finding is in line with the notion that market efficiency ensures that relevant news provided by events are quickly incorporated in stock prices (Fama, 1998).

5 Conclusions

This paper assessed the movements of returns on Swiss firms' stocks during the New York Bankers' Panic of 1907. This assessment aims at shedding light on the spillovers of this crisis to international financial markets. This paper finds that the global financial market spillover of this crisis started with the collapse of United Copper and, thus, was earlier than previous studies suggest. This paper's empirical results suggest that mainly banks' stocks were significantly affected by news about the key events of the Panic of 1907. Returns on banks' stocks were abnormally low around those dates. By contrast, the returns on stocks of Swiss firms from other sectors were not significantly associated with important events of the Panic of 1907.

References

W. Bleuler. Die Organisation der Zürcher Effektenbörse und der Entwurf zum neuen Börsengesetz. Sonderabdruck aus der Schweizerischen Juristen-Zeitung, 1911. VII. Jahrgang, Heft 14 ff.

M. Bordo and H. James. *Die Nationalbank 1907-1946: Glückliche Kindheit oder schwierige Jugend?*, chapter 1, pages 28–107. NZZ Libro, Zürich, 2007.

M. D. Bordo, A. Redish, and H. Rockoff. Why didn't Canada have a banking crisis in 2008 (or in 1930, or 1907, or ...)? *The Economic History Review*, 68(1): 218–243, 2015.

J. Y. Campbell, A. W. Lo, and A. C. MacKinlay. The Econometrics of Financial Markets: The Econometrics of Financial Markets. Princeton University Press, Princeton, 1997.

K. C. Chan and N.-F. Chen. Structural and Return Characteristics of Small and Large Firms. *The Journal of Finance*, 46(4):1467–1484, 1991.

R. Engle. GARCH 101: The Use of ARCH/GARCH Models in Applied Econometrics. *Journal of Economic Perspectives*, 15(4):157–168, December 2001.

E. F. Fama. Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics*, 49(3):283–306, 1998.

E. F. Fama and K. R. French. The Cross-Section of Expected Stock Returns. *The Journal of Finance*, 47(2):427–465, 1992.

M. Flandreau and F. Zumer. The making of global finance 1880-1913. OECD, 2004.

C. Fohlin and Z. Lu. How Contagious Was the Panic of 1907? New Evidence from Trust Company Stocks. *AEA Papers and Proceedings*, 111:514–519, May 2021.

C. Fohlin, T. Gehrig, and M. Haas. Rumors and Runs in Opaque Markets: Evidence from the Panic of 1907. *CESifo Working Paper Series*, No. 6048(6048), 2016.

C. Frydman, E. Hilt, and L. Y. Zhou. Economic Effects of Runs on Early Shadow Banks: Trust Companies and the Impact of the Panic of 1907. *Journal of Political Economy*, 123(4):902–940, 2015.

M. R. Gibbons. *Econometric Methods for Testing a Class of Financial Models - An Application of the Nonlinear Multivariate Regression Model*. Phd dissertation, University of Chicago, Chicago, IL: University of Chicago, 1980.

N. Hauzenberger, D. Kaufmann, R. Stuart, and C. Tille. What Drives Long-Term Interest Rates? Evidence from the Entire Swiss Franc History 1852-2020. IRENE Working Papers 22-03, IRENE Institute of Economic Research, 2022.

C. Hoag. The Atlantic Telegraph Cable and Capital Market Information Flows. *The Journal of Economic History*, 66(2):342–353, 2006.

M. S. Jaremski and D. C. Wheelock. Interbank Networks and the Interregional Transmission of Financial Crises: Evidence from the Panic of 1907. *National Bureau of Economic Research Working Paper Series*, No. 31270, 2023.

T. J. Jordan. Price and financial stability - a demanding year for the SNB. 115th Ordinary General Meeting of Shareholders of the Swiss National Bank, Apr. 2023.

J. Lintner. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics*, 47(1):13–37, 1965.

A. C. MacKinlay. Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1):13 – 39, 1997.

F. S. Mishkin and E. N. White. Unprecedented Actions: The Federal Reserve's Response to the Global Financial Crisis in Historical Perspective. *National Bureau of Economic Research Working Paper Series*, No. 20737, 2014.

J. Moen and E. W. Tallman. The Bank Panic of 1907: The Role of Trust Companies. *The Journal of Economic History*, 52(3):611–630, 1992.

J. Mossin. Equilibrium in a capital asset market. *Econometrica*, 34(4):768–783, 1966.

A. D. Noyes. A year after the panic of 1907. *Quarterly Journal of Economics*, 23: 185–212, 1909.

K. A. Odell and M. D. Weidenmier. Real Shock, Monetary Aftershock: The 1906 San Francisco Earthquake and the Panic of 1907. *The Journal of Economic History*, 64(4):1002–1027, 2004.

B. Purchart. Die Finanzkrise von 1907 und ihre Übertragung auf die Schweiz. *Schweizerisches Jahrbuch für Wirtschafts- und Sozialgeschichte = Annuaire Suisse d'histoire économique et sociale*, 30:199–220, 2015.

M. T. Rodgers and J. E. Payne. How the Bank of France Changed U.S. Equity Expectations and Ended the Panic of 1907. *The Journal of Economic History*, 74(2):420–448, 2014.

M. T. Rodgers and B. K. Wilson. Systemic Risk, Missing Gold Flows and the Panic of 1907. *Quarterly Journal of Austrian Economics*, 14(2):158–187, 2011.

K. Rydquist and R. Guo. Performance and development of a thin stockmarket: the Stockholm Stock Exchange 1912-2017. *Financial History Review*, 28(1):26 – 44, 2021.

M. Salinger. Standard Errors in Event Studies. *The Journal of Financial and Quantitative Analysis*, 27(1):39–53, 1992.

G. W. Schwert. Indexes of U.S. Stock Prices from 1802 to 1987. *The Journal of Business*, 63(3):399–426, 1990.

W. F. Sharpe. Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19(3):425–442, 1964.

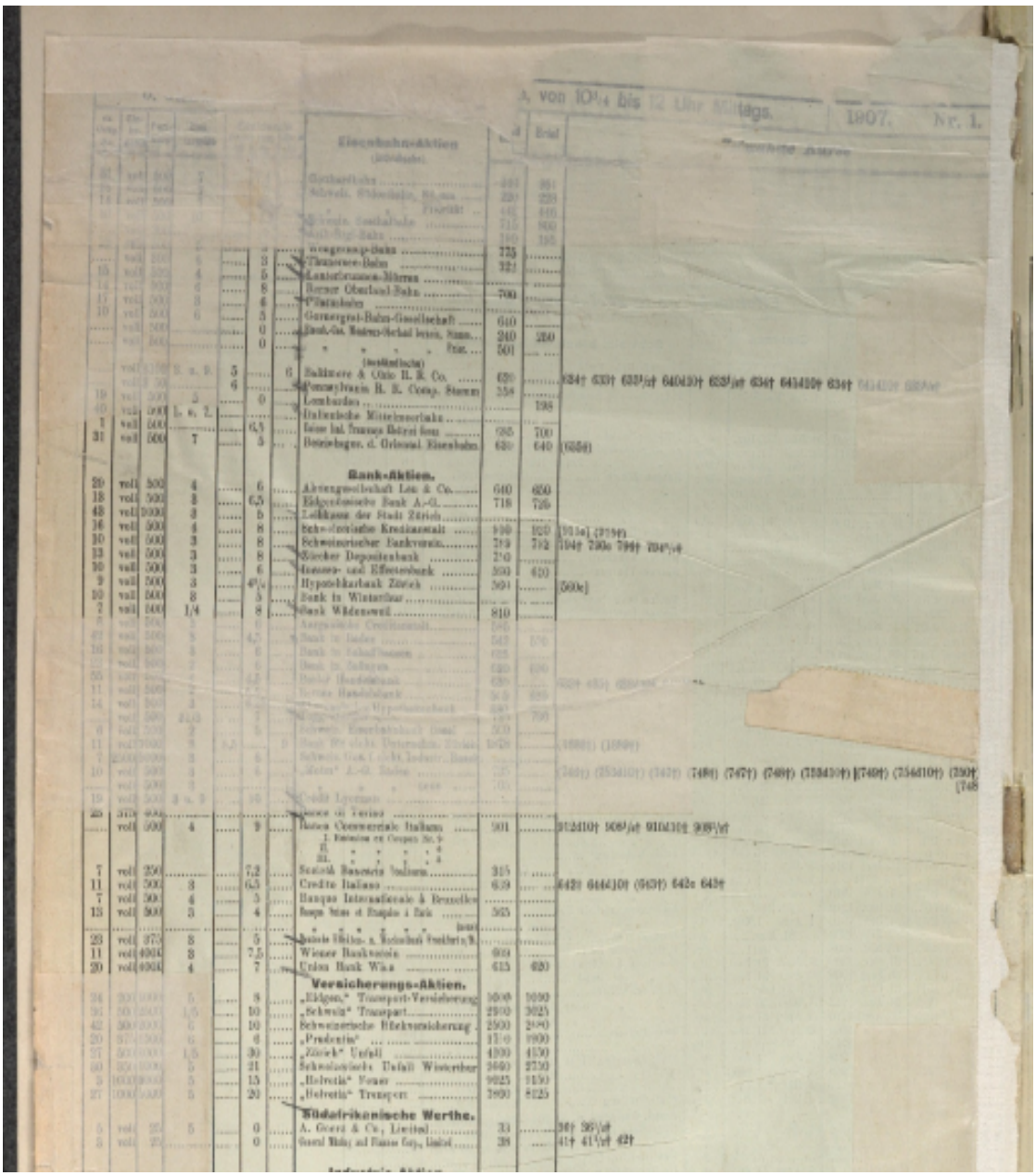
O. M. W. Sprague. The American Crisis of 1907. *The Economic Journal*, 18(71): 353–372, 1908.

J. R. Stahl. Changes in the electorate and firm values: Evidence from the introduction of female suffrage in Switzerland. *Journal of Empirical Finance*, 70: 386–402, 2023.

E. W. Tallman and J. R. Moen. The transmission of the financial crisis in 1907: an empirical investigation. *Cliometrica*, 12(2):277–312, 2018.

A Sources of historical stock market data

A.1 Kursblatt der Zürcher Börse



A.2 Market Commentary in Kursblatt der Zürcher Börse

Börsenbericht.

Mittagsbörse. Angeregt durch die an den italienischen Börsen eingetretene kräftige Erholung entwickelte die Spekulation heute auf allen Gebieten eine lebhafte Tätigkeit, so dass der Verkehr zeitweise ein recht erregtes Aussehen gewann. Die schwächeren New Yorker Notierungen wurden kaum beachtet. Im Vordergrund standen die Aktien der Banca Commerciale Italiana, die etwa 10 Franken über den gestrigen Abendpreisen eröffneten und in denen sich auf dem erhöhten Niveau ein bewegtes Geschäft entwickelte. Auch in den Aktien des Credito Italiano und der Società Bancaria Italiana fanden Rückkäufe statt, was beiden Valoren ebenfalls eine Erholung von über 10 Franken eintrug.

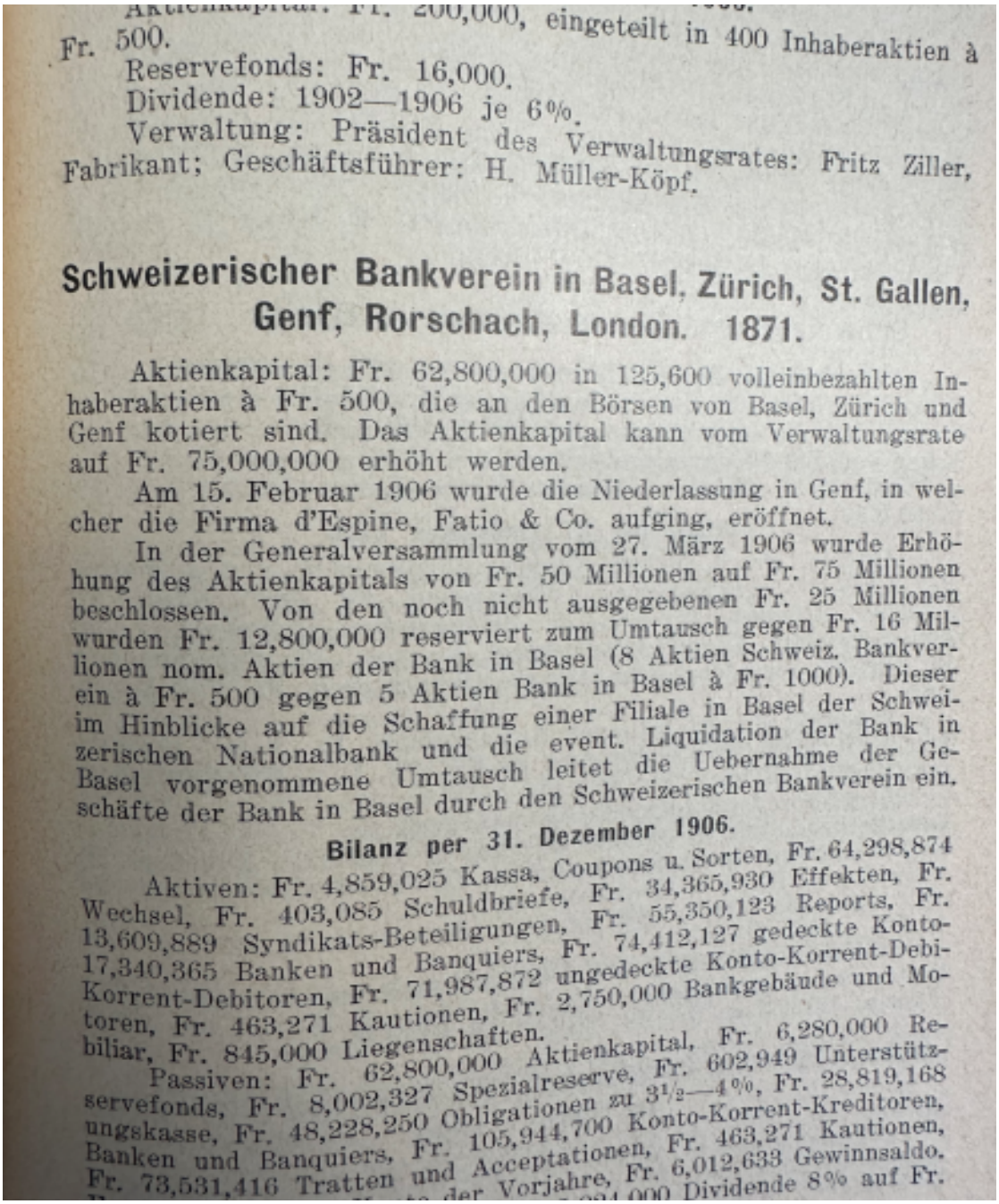
Am Schluss blieben freilich alle drei Valoren etwas niedriger ausgeboten. Reges Interesse zeigte sich für die Aktien der Nestlé-Chamer Milch-Gesellschaft und der Bank für Elektrische Unternehmungen, wobei namentlich erstere kräftig im Kurse anzogen. Die Aktien der Société Franco Suisse, des Schweiz. Bankvereins und des Motor A.-G. verkehrten zu ungefähr den gestrigen Kursen, während Aluminium-Aktien bei bedeutend ruhigerem Geschäft etwa 20 Franken niedriger erlassen wurden. Eine Maggi-Aktie wurde zu 9300 umgesetzt, der Titel blieb à 9350 gefragt. Anrechte waren zu 800 gefragt und zu 840 ausgeboten.

Obligationen ruhig.

Abendbörse. Allgemein schwächer.

Zürich, den 17. Oktober 1907.

A.3 Finanzjahrbuch Schweiz



Aktienkapital: Fr. 200,000, eingeteilt in 400 Inhaberaktien à Fr. 500.
Reservefonds: Fr. 16,000.
Dividende: 1902—1906 je 6%.
Verwaltung: Präsident des Verwaltungsrates: Fritz Ziller, Fabrikant; Geschäftsführer: H. Müller-Köpf.

Schweizerischer Bankverein in Basel, Zürich, St. Gallen, Genf, Rorschach, London. 1871.

Aktienkapital: Fr. 62,800,000 in 125,600 volleinbezahlten Inhaberaktien à Fr. 500, die an den Börsen von Basel, Zürich und Genf kotiert sind. Das Aktienkapital kann vom Verwaltungsrate auf Fr. 75,000,000 erhöht werden.

Am 15. Februar 1906 wurde die Niederlassung in Genf, in welcher die Firma d'Espine, Fatio & Co. aufging, eröffnet.

In der Generalversammlung vom 27. März 1906 wurde Erhöhung des Aktienkapitals von Fr. 50 Millionen auf Fr. 75 Millionen beschlossen. Von den noch nicht ausgegebenen Fr. 25 Millionen wurden Fr. 12,800,000 reserviert zum Umtausch gegen Fr. 16 Millionen nom. Aktien der Bank in Basel (8 Aktien Schweiz. Bankverein à Fr. 500 gegen 5 Aktien Bank in Basel à Fr. 1000). Dieser im Hinblicke auf die Schaffung einer Filiale in Basel der Schweizerischen Nationalbank und die event. Liquidation der Bank in Basel vorgenommene Umtausch leitet die Uebernahme der Geschäfte der Bank in Basel durch den Schweizerischen Bankverein ein.

Bilanz per 31. Dezember 1906.

Aktiven: Fr. 4,859,025 Kassa, Coupons u. Sorten, Fr. 64,298,874 Wechsel, Fr. 403,085 Schuldbriefe, Fr. 34,365,930 Effekten, Fr. 13,609,889 Syndikats-Beteiligungen, Fr. 55,350,123 Reports, Fr. 17,340,365 Banken und Banquiers, Fr. 74,412,127 gedeckte Konto-Korrent-Debitoren, Fr. 71,987,872 ungedeckte Konto-Korrent-Debitoren, Fr. 463,271 Kautionen, Fr. 2,750,000 Bankgebäude und Mobiliar, Fr. 845,000 Liegenschaften.

Passiven: Fr. 62,800,000 Aktienkapital, Fr. 6,280,000 Reservefonds, Fr. 8,002,327 Spezialreserve, Fr. 602,949 Unterstützungskasse, Fr. 48,228,250 Obligationen zu 3½—4%, Fr. 28,819,168 Banken und Banquiers, Fr. 105,944,700 Konto-Korrent-Kreditoren, Fr. 73,531,416 Tratten und Acceptationen, Fr. 463,271 Kautionen, [illegible] der Vorjahre, Fr. 6,012,633 Gewinnsaldo. [illegible],000 Dividende 8% auf Fr.

A.4 Comparison with the Swiss stock market in the 21st century

In the early 20th century, the Zurich exchange was one of three major stock trading places in Switzerland besides Basel and Geneva (Hauzenberger, Kaufmann, Stuart, and Tille, 2022).

In 1995, the three major Swiss exchanges merged into the SWX (today SIX) exchange and trading switched from open outcry on the trading floor (in place since the foundation of the Zurich exchange) to electronic trading in 1996. As of 2024, about 120 national and international banks were members of the SIX exchange. Corresponding numbers for the early 20th century are not publicly available. Still, the exchanges at that time were also open to commercial banks as members (and thus traders) of the Zurich exchange as long as they met the requirements of the cantonal (federal state) supervisors of the exchange.

The stock market segments of the Zurich exchange between 1905 and 1909 and the SIX exchange as of 2024 share the similarity that the market shares of a few firms are relatively high. As of March 2024, three firms (Nestlé, Roche and Novartis) made up more than 35% of the total market capitalization of the Swiss Performance Index (SPI), the index that captures almost all of the listed Swiss firms. One of those firms, Nestlé together with precursors (*Schweizerischer Bankverein* and *Schweizerische Kreditanstalt*) of former and current big, internationally active Swiss banks (Credit Suisse, UBS) was already one of the three largest companies on the Zurich exchange between 1905 and 1909. These three firms accounted for approximately 60% of the total market capitalization on average during this period.

However, there are sizable differences in stock market capitalizations relative to GDP. At the end of 2023, the Swiss stock market capitalization amounted to approximately 200% of GDP. In 1909, the total stock market capitalization of the Zurich exchange made up less than 20% of GDP.[9] Even considering that the Zurich exchange was only one of three major Swiss exchanges at that time, this

[9]These figures are based on nominal GDP from the Statistical Federal Office of Switzerland and the Historical Statistics Switzerland as well as on market capitalization figures from the Swiss National Banks' data portal and own calculations for 1909.

comparison indicates that stock markets played a more important role in corporate funding in the 21st century than in the early 20th century.

Tables

Table 1: Size (in CHF millions): 1905 to 1909

Sector	mean	median	min	max	q25	q75	No.obs
banks	44.62	32.14	1.66	127.14	13.35	77.60	35
industrials	18.32	8.78	0.15	161.45	3.44	19.76	88
insurances	21.43	16.06	1.69	48.75	12.52	37.37	25
railways	5.24	2.23	0.41	95.60	1.56	2.80	27

Notes: This table presents descriptive statistics of the market capitalization of Swiss firms in four different sectors. The underlying data are daily and expressed in Swiss franc millions. 25% and 75% quantiles are abbreviated with q25 and q75 respectively. The sample period runs from 3 January 1905 to 31 December 1909.

Table 2: B/M: 1905 to 1909

Sector	mean	median	min	max	quant25	quant75	No.obs
banks	0.74	0.73	0.41	1.16	0.65	0.84	35
industrials	0.90	0.71	0.13	20.41	0.53	0.93	88
insurances	0.14	0.13	0.09	0.22	0.12	0.16	25
railways	1.70	1.66	0.52	6.06	0.97	2.26	27

Notes: This table presents descriptive statistics of the ratio of book equity to market equity (B/M) of Swiss firms in four different sectors. The underlying data are daily. B/M is the ratio of book equity per share divided by the market price of a share (midpoint between bid and ask prices). 25% and 75% quantiles are abbreviated with q25 and q75 respectively. The sample period runs from 3 January 1905 to 31 December 1909.

Table 3: GARCH estimation

	Market Return	Bid-Ask Spread
μ	-0.0468^{*}	0.0170^{***}
	(-1.7401)	(31.5938)
γ	0.0281	0.0013^{**}
	(0.1703)	(2.0194)
ω	1.0713^{***}	0.0000^{***}
	(8.1830)	(13.9752)
α	0.5781^{***}	0.0000
	(7.7678)	(0.0000)
β	0.0628	0.9677^{***}
	(1.2095)	(468.8270)
Log likelihood	-2531.2385	4882.1327
AIC	3.4675	-6.6600
BIC	3.4928	-6.6347

Notes: This table presents coefficient estimates (t-statistics in parentheses) from GARCH(1,1) estimations of the mean return on the Zurich stock market (Market Return) and the mean market-wide bid-ask spread (Bid-Ask Spread) in the sample period from 3 January 1905 to 31 December 1909. The coefficient μ represents the estimate of the mean value of the dependent variable in the sample period. The coefficients ω, α and β are estimates of parameters in the volatility equation of the GARCH(1,1) specification. The coefficient of the dummy for the Panic of 1907 event window, γ, indicates whether the dependent variable was different from its average value in the period spanning 20 trading days before and 20 trading days after the bankruptcy of the Knickerbocker Trust on 22 October 1907. ***, ** and * indicate estimates significant at the 1%, 5% and 10% level.

Table 4: Testing the significance of abnormal returns with dummy regressions

	Banks	Industrials
(Intercept)	-0.0006^{***}	-0.0012
	(-3.8912)	(-0.9419)
MarketReturn	0.0000	0.0003
	(0.2336)	(0.3789)
d.copper.b1	-0.0001	0.0072
	(-0.022)	(0.2636)
d.copper	-0.0007	0.0143
	(-0.1062)	(0.3015)
d.copper.a1	0.0011	-0.0097
	(0.1608)	(-0.287)
d.copper.a2	-0.0092^{**}	0.0170
	(-2.684)	(0.6213)
d.copper.a3	-0.0051	
	(-0.7452)	
d.knicker.b1	0.0055	0.0163
	(0.7985)	(0.3423)
d.knicker	-0.0020	0.0057
	(-0.2953)	(0.1703)
d.knicker.a1	-0.0159^{**}	0.0037
	(-3.277)	(0.079)
d.knicker.a2	0.0043	-0.0220
	(0.6216)	(-0.4621)
d.knicker.a3	0.0008	0.0027
	(0.2178)	(0.0588)

continued on next page

	Banks	Industrials
d.clha	−0.0015	0.0117
	(−0.3799)	(0.3502)
d.clha.a1	−0.0067	−0.0062
	(−1.3814)	(−0.1310)
d.clha.a2	−0.0086*	
	(−1.7593)	
d.clha.a3	−0.0014	−0.0136
	(−0.213)	(−0.2847)
d.boe	0.0006	−0.0051
	(0.1412)	(−0.1516)
d.boe.a1	0.0123*	−0.0035
	(1.7882)	(−0.104)
d..boe.a2	−0.0025	0.0190
	(−0.3605)	(0.5652)
d.boe.a3	0.0032	0.0065
	(0.6558)	(0.1376)
d.bdf	0.0013	−0.0008
	(0.7479)	−0.0645
R^2	0.0149	0.0014
Adj. R^2	0.0059	−0.0125
Num. obs.	1869	1315

Notes: This table presents coefficient estimates (t-statistics in parentheses) from regressions of daily returns on stocks of banks or industrial companies on a constant, the return on the empirical proxy of the market portfolio and dummies that take values of one on the day of a key event during the Panic of 1907 and zero otherwise. The regression estimates of the event dummies are interpretable as abnormal returns (Gibbons, 1980; Salinger, 1992). The key events are the collapse of United Copper on 16 October 1907 (*d.copper*), the bankruptcy of the Knickerbocker Trust on 22 October 1907 (*d.knicker*) and the suspension of deposit convertibility by the New York Clearing House on 26 October 1907 (*d.clha*). Moreover, I specify a dummy for the decision of the Bank of England to increase its discount rate on 31 October 1907 (*d.boe*). Furthermore, the dummy *d.bdf* takes values of one from 22 November 1907 to 3 December 1907 when the

Banque de France announced its measures to stem gold outflows to New York. In addition, I specify dummies for each of the first three trading days after one of those events ($.a1$, $.a2$,$.a3$) and dummies for the day before an event ($.b1$). The sample period for the regression runs from 3 January 1905 to 31 December 1907. The regression is estimated separately for samples of Swiss banks and Swiss industrial companies. ***, ** and * indicate estimates significant at the 1%, 5% and 10% level.

Table 5: Abnormal return analysis after collapse of United Copper

Dependent Variable:	AR			
Model:	(1)	(2)	(3)	(4)
after	20 days	30 days	60 days	90 days
Variables				
Constant	0.0883	0.0878	0.1355	0.1042*
	(0.7890)	(0.9351)	(1.443)	(1.808)
US	0.0641	0.0209	0.0988	0.0760
	(0.4208)	(0.0900)	(0.6646)	(0.4500)
size	-0.0034	-0.0042	-0.0071	-0.0052
	(-0.5493)	(-0.8009)	(-1.376)	(-1.665)
BM	-0.0612***	-0.0302***	-0.0232*	-0.0256***
	(-5.967)	(-3.470)	(-1.741)	(-2.834)
d.bank	0.0157*	0.0061	0.0044	0.0068
	(1.774)	(0.9934)	(0.7049)	(1.636)
Observations	51	77	156	228
R^2	0.77135	0.19689	0.10865	0.13336
Adjusted R^2	0.75147	0.15227	0.08504	0.11781

Notes: This table presents coefficient estimates from regressions of abnormal returns on the stock of firm i, $AR_{i,t}$, on an intercept and a dummy variable (d.bank) that takes a value of one if a firm is a bank and zero otherwise in a given estimation period. In addition, it presents the regression controls for the log market capitalization (size) and the book-to-market equity ratio (B/M) of a firm. Moreover, I include a proxy of the US stock market return (US) as additional control in the regression. The estimation periods start one day after the United Copper collapse and end 20, 30, 60 or 90 trading days after that event. T-statistics of the coefficients are reported in parentheses and are based on standard errors clustered at the firm level. ***, ** and * indicate estimates significant at the 1%, 5% and 10% level.

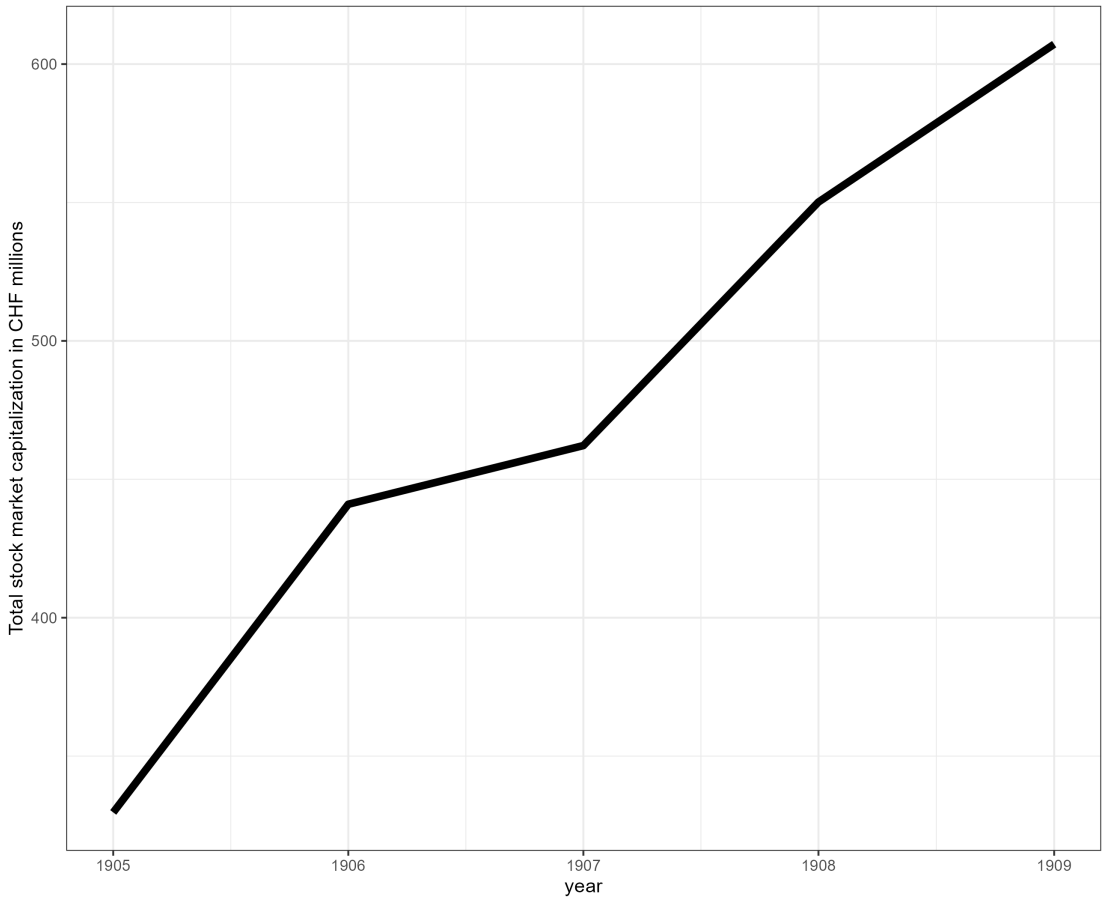
Table 6: Abnormal return analysis after collapse of United Copper

Dependent Variable:	AR	
Model:	Banks	Industrials
Variables		
Constant	0.0883	0.0311
	(0.7890)	(0.2764)
US	0.0641	0.0442
	(0.4208)	(0.2992)
size	-0.0034	0.0003
	(-0.5493)	(0.0465)
BM	-0.0612***	-0.0579***
	(-5.967)	(-4.972)
d.bank	0.0157*	
	(1.774)	
d.ind		0.0013
		(0.1002)
Observations	51	51
R^2	0.77135	0.75012
Adjusted R^2	0.75147	0.72839

Notes: This table presents coefficient estimates from regressions of abnormal returns on the stock of firm i, $AR_{i,t}$, on an intercept and a dummy variable d.bank (d.ind) that takes a value of one if a firm is a bank (industrial company) and zero otherwise in a given estimation period. In addition, the regression controls for the log market capitalization (size) and the book-to-market equity ratio (B/M) of a firm are presented. Moreover, I include a proxy of the US stock market return (US) as an additional control in the regression. The estimation period starts one day after the United Copper collapse and ends 20 trading days after that event. T-statistics of the coefficients are reported in parentheses and are based on standard errors clustered at the firm level. ***, ** and * indicate estimates significant at the 1%, 5% and 10% level.

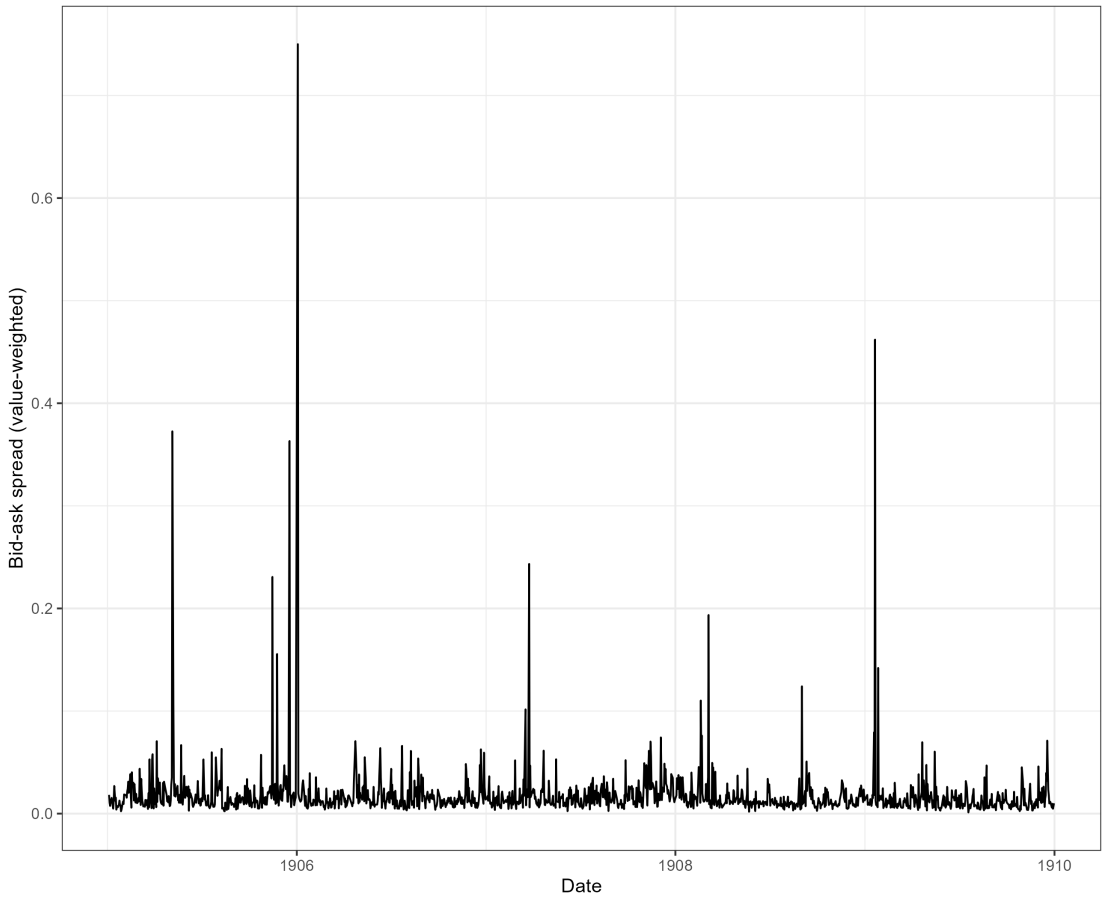
Figures

Figure 1: Average yearly market capitalization: 1905 to 1909



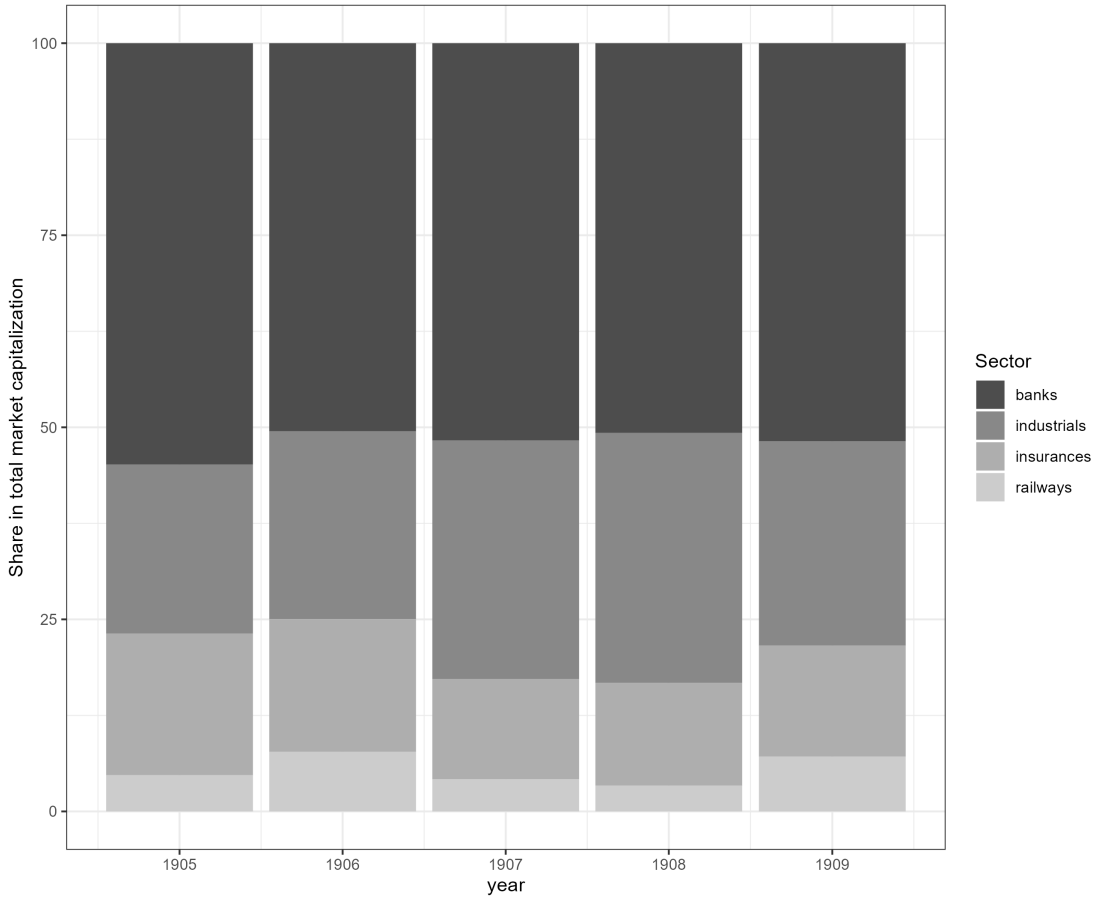
Notes: This figure depicts the average yearly (yearly average of daily observations) market capitalization of all stocks traded on the Zurich exchange for the years 1905 to 1909.

Figure 2: Illiquidity of the Zurich stock exchange: 1905 to 1909



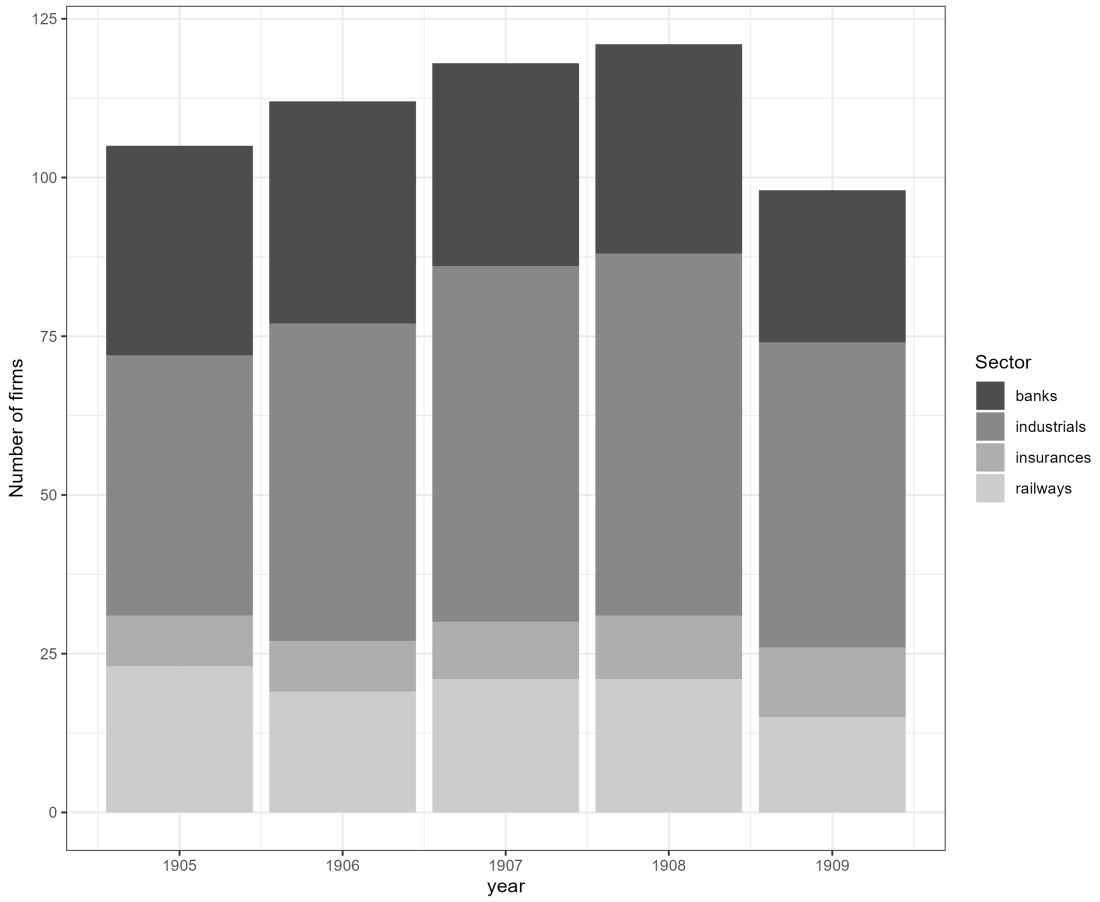
Notes: This figure depicts the value-weighted average bid–ask spread of stocks traded on the Zurich exchange as a measure of illiquidity in the stock market segment of the Zurich exchange. The higher the bid–ask spread, the more illiquid the stock market.

Figure 3: Yearly market capitalization: sectoral breakdown



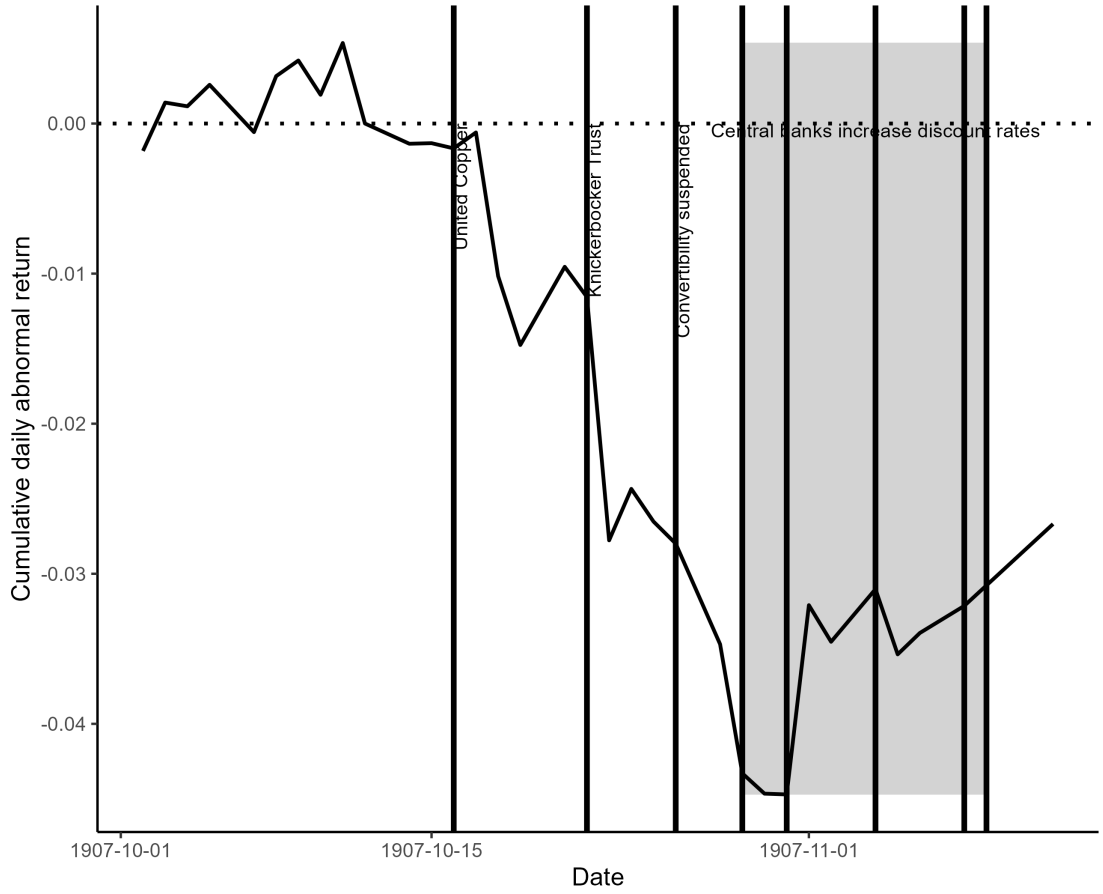
Notes: This figure depicts the sectoral breakdown of the average yearly (yearly average of daily observations) market capitalization of all stocks traded on the Zurich exchange for the years 1905 to 1909.

Figure 4: Yearly average number of firms on Zurich stock exchange: 1905 to 1909



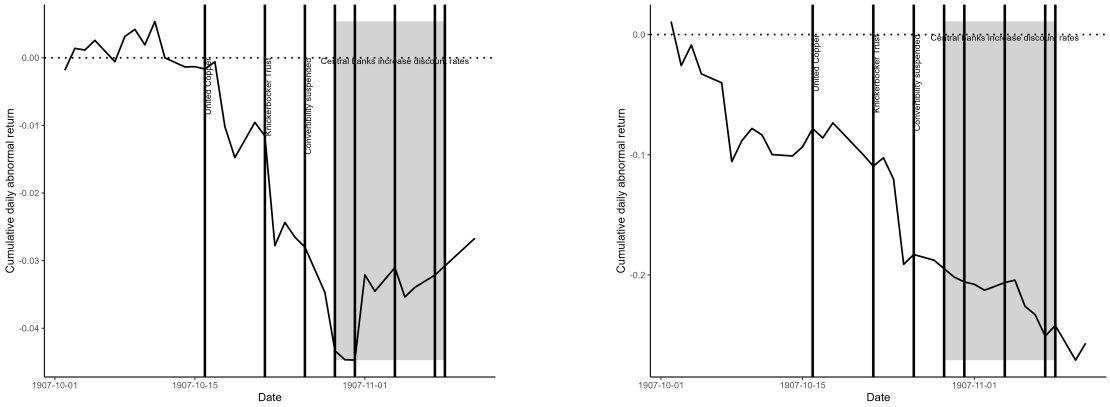
Notes: This figure depicts the sectoral breakdown of the average yearly (yearly average of daily observations) number of firms whose stocks were traded on the Zurich exchange in the years 1905 to 1909.

Figure 5: Cumulative average returns: banks



Notes: This figure depicts the cumulative abnormal return on stocks of Swiss banks from 20 trading days before the bankruptcy of the Knickerbocker Trust until 20 trading days after the Knickerbocker event. The vertical lines indicate key events during this period. The key events are the collapse of United Copper on 16 October 1907, the bankruptcy of the Knickerbocker Trust on 22 October 1907 and the suspension of deposit convertibility by the New York Clearing House on 26 October 1907. The shaded area marks the period when European central banks took countermeasures to stem gold outflows to the US.

Figure 6: Cumulative average returns: banks vs. industrials



(a) *banks* **(b) *industrials***

Notes: This figure depicts the cumulative abnormal returns on stocks of Swiss banks (left) and Swiss industrial firms (right) from 20 days before the bankruptcy of the Knickerbocker Trust until 20 days after the Knickerbocker event. The vertical lines indicate key events during this period. The key events are the collapse of United Copper on 16 October 1907, the bankruptcy of the Knickerbocker Trust on 22 October 1907 and the suspension of deposit convertibility by the New York Clearing House on 26 October 1907. The shaded area marks the period during which European central banks took countermeasures to stem gold outflows to the US.