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WORKING PAPERS ON FINANCE NO. 2013/19

SWISS INSTITUTE OF BANKING AND FINANCE (S/BF – HSG)

NOVEMBER 2013
THIS VERSION: DECEMBER 2017

Deposit Withdrawals from Distressed Banks: Client Relationships Matter

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December 2017

Abstract: We study retail deposit withdrawals from commercial banks which were differentially exposed to distress during the 2007-2009 financial crisis. We show that the propensity of households to withdraw deposits increases with the severity of bank distress. Withdrawal risk is, however, substantially mitigated by strong bank-client relationships. Considering the most distressed bank in our sample, 23 percent of its clients shifted deposits away from the bank during the crisis. Our estimates suggest that this withdrawal risk is eliminated if a client banked exclusively with this financial institution before the crisis, and is more than halved if the client had a mortgage with this bank. Our findings provide empirical support to the Basel III liquidity regulations which emphasize the role of well-established client relationships for the stability of bank funding.

Keywords: Liquidity Risk, Relationship Banking, Market Discipline

JEL Codes: D14, G21, G28

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This paper was previously circulated under the title "*Switching Costs, Deposit Insurance and Deposit Withdrawals from Distressed banks*". We thank Christoph Basten, Tobias Berg, Marieke Bos, Emilia Garcia-Appendini, Vasso Ioannidou, Rajkamal Iyer, Charles Kahn, Catherine Koch, Karthik Krishnan, Adi Mordel, Steven Ongena, Lev Ratnovski, Jean-Charles Rochet, Enrico Sette, Simon Straumann, Gregory Udell and Jan Wrampelmeyer for helpful comments. We also thank seminar participants at *Aalto University*, *Banco de Portugal*, *Columbia University*, *Magyar Nemzeti Bank*, *Singapore Management University*, *Swiss Financial Market Supervisory Authority (FINMA)*, *Swiss National Bank (SNB)*, *University of Bonn*, *University of Essex*, *University of St.Gallen* and *University of Zurich* as well as conference participants at the *EEA-ESEM 2014*, *FIRS 2015*, *Financial Safety Net Conference 2015*, *IBEFA 2014*, *International Risk Management Conference 2014*, *7th Swiss Winter Conference Financial Intermediation*, *EFMA 2014*, *6th IFABS Conference 2014*, *Annual Conference of Verein für Socialpolitik 2015* and the *2015 FGN-CEPR conference on Finance, Capital Reallocation and Growth* for helpful comments. We are grateful to the *Swiss National Science Foundation* for financial support. Moreover, we gratefully acknowledge financial support from the *European Investment Bank Institute* through its *EIBURS* initiative. The findings, interpretations and conclusions presented in this article are entirely those of the authors and should not be attributed in any manner to the *European Investment Bank* or its Institute. The views expressed in this paper are solely those of the authors and should not be taken to represent those of the Bank of England or the Prudential Regulatory Authority (PRA). Any errors are the authors' responsibility.

1. Introduction

The 2007-2009 financial crisis demonstrated forcefully that the sudden withdrawal of wholesale and retail funds can jeopardize the liquidity and solvency of large commercial banks leading to costly policy interventions (e.g. Northern Rock in the U.K. or Washington Mutual in the U.S.). The crucial role of liquidity risk during that crisis has led policy makers to harmonize minimum liquidity requirements for banks within the regulatory framework of Basel III. A key feature of these regulations is that required liquidity depends not only on the contractual features of bank funding, but also on the characteristics of bank-client relationships: Banks with tighter customer relationships may hold less liquidity as the corresponding deposits are presumed to be a more stable source of funding (BIS, 2013).

Theory suggests that strong bank-client relationships may mitigate withdrawal risk for at least three reasons: First, clients may face explicit transaction costs of switching deposit accounts from bank to another bank (Sharpe, 1997). Second, customers may be wary of losing informational-rents within existing bank relationships (Sharpe, 1990). Third, customers who maintain strong ties with one particular bank may have a preference for the differentiated services of that bank (Salop, 1979) or benefit from improvements in bank services over time (Zephirin, 1994).

In this paper we examine how bank-client relationships affect the withdrawal of retail deposits from distressed commercial banks. We study the reallocation of deposits across banks in Switzerland during the 2007-2009 financial crisis, exploiting exogenous shocks to two banks operating in the retail market. Specifically, the two largest Swiss banks (UBS and Credit Suisse) suffered substantial trading losses and asset write-downs on financial instruments which were exposed to the U.S. subprime crisis. These financial losses triggered significant recapitalizations at both banks and a bailout of UBS in October 2008. Importantly, these losses were unrelated to the domestic retail market in Switzerland which we study.

In order to study the role of bank-client relationships for withdrawal risk at distressed banks it is imperative to have detailed information on all bank relationships that a client maintains. This data should indicate whether the client has a relationship with a distressed bank and how tight this relationship is. Importantly though, the data should also inform about whether the client has accounts with other (non-distressed) banks. In the absence of comprehensive deposit registry data (or administrative data from tax authorities) in most countries, such information is typically only available from consumer finance surveys.

We study consumer finance survey data which covers 1,475 households in Switzerland and provides information on whether they reallocated deposits across banks during 2008-2009. The survey is representative of the underlying population with respect to household characteristics which are important for our study, income and location. As a significant share of households in our sample maintains multiple bank accounts, we are able to compare the withdrawal behavior from distressed banks to that from non-distressed banks for the same households. By doing so we can control for unobserved heterogeneity in the clientele of distressed versus non-distressed banks.

We first document that the propensity of households to withdraw deposits is strongly related to the level of bank distress. Compared to accounts at non-distressed banks, accounts at the most distressed bank in our sample (UBS) are eighteen times (or 22.1 percentage points) more likely to experience an outflow of deposits. Accounts at the weakly distressed bank (Credit Suisse) are four times (or 4.3 percentage points) more likely to feature an outflow of deposits than accounts at non-distressed banks.

We then show that the propensity of households to withdraw deposits from the most distressed bank (UBS) is mitigated by strong bank-client relationships. Our survey provides information on the number and scope of bank relationships held by each respondent before the crisis. Based on this information we establish a measure of the *exclusivity* (if the respondent had only one account) and the *scope* of each bank relationship (if the client had a consumer loan or

mortgage with the bank). Our results show that among clients who banked exclusively with UBS before the crisis, the propensity to withdraw deposits from the bank is eliminated. Moreover, among clients who had a loan with UBS prior to the crisis the propensity to withdraw deposits is halved.

Our main findings are qualitatively robust across subsamples of respondents who differ by deposit insurance coverage and financial sophistication. Importantly though, households with higher wealth (and thus less insurance coverage) are more likely to withdraw from the strongly distressed bank and less likely to be deterred in doing so by a strong pre-crisis relationship with the bank.

Our results relate to the literature on the disciplining of distressed banks by depositors (Diamond and Rajan, 2001; Calomiris and Kahn, 1991). We hereby contribute to the scarce empirical literature which uses client-level data to examine differential withdrawal behavior across client types (Iyer et al., 2016; Davenport and McDill, 2006; Martin et al. 2017).[1] We add to these studies in two crucial dimensions: First, we study an event in which the distressed banks are systemically important commercial banks. Thus, we can examine to what extent financial distress triggers retail deposit withdrawals from banks which are commonly viewed to be "too-big-to-fail". By comparison, Davenport and McDill (2006) and Martin et al. (2017) study the collapse of a small U.S. (commercial) bank, while Iyer et al. (2016) study withdrawals from a

[1] Numerous empirical studies use bank-level balance sheet data or interest rate data to study the impact of bank distress on the flow and pricing of insured vs. non-insured deposits. However, these studies provide only a coarse understanding of the behavior of retail depositors as (i) they can rarely distinguish household deposits from those of non-financial firms, (ii) cannot relate withdrawal behavior to socioeconomic characteristics of households, and (iii) cannot relate withdrawal behavior to the number and scope of bank relations that a household has. Studies which examine bank balance-sheet data provide evidence that distressed banks suffered stronger deposit outflows during the Great Depression (Saunders and Wilson, 1996; Calomiris and Mason, 1997), the U.S. Savings and Loan crisis (Goldberg and Hudgins, 2002), the financial crises in Latin America in the 1980s and 1990s (Peria and Schmukler, 2001; Schumacher, 2000) and Eastern Europe (Karas et al., 2013; Hasan et al., 2013). Studies of bank-level interest rates provide evidence for market discipline by relating bank risk to changes in deposit interest rates for uninsured deposits (Demirguç-Kunt and Huizinga, 2004; Ellis and Flannery, 1992; Hannan and Hanweck, 1988). Calomiris and Kahn (1991) and Diamond and Rajan (2001) provide theories of market discipline emphasizing ex-ante withdrawal and ex-post withdrawals by depositors, respectively. Studies which examine the role of bank size in market discipline provide evidence both for the too big to fail hypothesis (Oliveira et al., 2015; Cubillas et al., 2017) as well as the too big to save hypothesis (Bertay et al., 2013).

small Indian cooperative bank.[2] Second, our data provides us with household-level survey data which covers all bank relationships of each respondent. We can thus study not only to what extent the scope of the relationship with the distressed bank affects withdrawal risk, but also the exclusivity of this relationship. By comparison, Davenport and McDill (2006), Martin et al. (2017) as well as Iyer et al. (2016) use client-level administrative data from the distressed banks only. The existence of other bank relations is likely to be of first-order importance to understand withdrawal behavior in the context of large commercial banks, given that many clients hold multiple bank accounts.

Using comprehensive account information from individual tax records, Iyer et al. (2017) study the reallocation of deposits in Denmark following a reduction in the deposit insurance threshold. They document that this reduction leads to a reallocation of deposits from uninsured to insured accounts. Moreover, this reallocation is stronger for clients of non-systemic banks, for clients with lower transaction costs and for financially sophisticated households. We add to the findings of Iyer et al. (2017) by providing empirical evidence on the importance of bank-client relationships in explaining depositor reaction to another type of financial sector shock: the distress of large commercial banks.

We also contribute to the literature on relationship banking in the retail banking sector. We add to it by documenting that strong bank-client relationships can mitigate withdrawal risk at distressed banks. The industrial organizational literature argues that switching costs (fees, opportunity costs of time) may reduce the effective competition in service markets such as the retail banking sector (Klemperer, 1987; Sharpe, 1997).[3] In this framework, transaction costs prevent retail clients from changing banks and provide a rational for exclusive, long-term and broad-scoped bank-customer relationships. Moreover, if banking services are differentiated

[2] Iyer and Puri (2012) provide household-level evidence on withdrawal behavior in a banking panic. Iyer and Peydro (2011) study interbank contagion in the same context of Indian cooperative banks.

[3] In an empirical test, Sharpe (1997) exploits differences in migration levels across regional banking markets (e.g. a proxy for customers with low switching costs) and documents that a high proportion of movers increases the deposit rates paid by banks. These findings have been confirmed by Carbo-Valverde et al. (2011) and Hannan and Adams (2011). Kim et al. (2003) estimate the size of switching costs for small business borrowers in Norway.

exclusive, long-term bank-customer relationships may arise as a result of the initial choice of heterogeneous depositors (Salop, 1979) or the endogenous improvement of service quality over time (Zephirin, 1994). Kiser (2002) provides survey evidence documenting that retail bank customers in the U.S. rarely change their main bank relationship. Her findings suggest that both preferences for differentiated products as well as explicit switching costs are responsible for the stickiness of customer-bank relations. Brunetti et al. (2016) document that the number of bank relationships, as well as the intensity (number of services used), and the scope (bank services used) of the individual relationship are relevant for households' decision to switch. We contribute to these papers by showing that switching costs are relevant for households' withdrawal decisions in periods of financial distress.

Alternatively, the financial intermediation literature argues that information asymmetries rationalize the existence of long-term and broad scoped relationships between banks and their clients (Boot, 2000). Sharpe (1990) and Von Thadden (2004) show how asymmetric information between banks may prevent borrowers from switching banks and that this can also lead to a hold-up within banking relationships. In line with this framework, Puri et al. (2017) show that commercial lenders are able to better assess the creditworthiness of their retail clients when they maintain long-term and broad-scoped relationships with them.[4] Ioannidou and Ongena (2010) document that banks hold up small business borrowers when they have information advantages over competitor banks.

[4] For an overview of the extant empirical literature on relationship banking in corporate and small business lending see Kysucky and Norden (2016).

2. Background

During the 2008-2009 global financial crisis the retail banking sector in Switzerland was exposed to large, exogenous shocks. The two largest Swiss commercial banks (UBS and Credit Suisse) suffered substantial write downs on their assets. The losses at UBS and Credit Suisse were caused by their exposure to the U.S. subprime crisis and were unrelated to their domestic retail banking activities. The financial distress incurred due to the write down on international assets and was exacerbated by the banks' exposure to the intensified international tax-dispute over offshore wealth management services These investigations were again exogenous to the domestic retail operations of the two banks.

Figure 1 here

The Swiss retail banking market is served by three main groups of banks: The two globally systemically important banks Credit Suisse and UBS; 25 state-owned banks of which 24 are regionally operating commercial banks (Cantonal Banks) and one is a nationwide savings bank (Postfinance); as well as 332 regional savings banks.[5] The balance sheet volumes of Credit Suisse or UBS dwarf those of other Swiss banks (see Appendix 1, Panel A).[6] However, they do not have a dominating position in the domestic retail market where together they hold roughly one-third of domestic customer deposits. Moreover, their share of the retail market varies considerably across region within Switzerland (see Appendix 1, Panel B).

During 2007-2009 the largest Swiss bank, UBS, accumulated losses amounting to 59 percent of its pre-crisis equity (see Figure 1, Panel A). In 2007:Q4 and 2008:Q1 UBS posted a combined loss of CHF 25 billion (CHF 1 = USD 0.83 in 2007), followed by a further loss of CHF 10 billion in 2008:Q4. These losses mainly originated in trading activities, whereas their

[5] At end 2015 there were 270 mutually owned Raiffeisen banks and 62 other regional savings banks.
[6] As reported in Appendix 1 UBS had a total balance sheet volume of CHF 2,346 billion while Credit Suisse had a balance sheet total of CHF 1,226 billion. By comparison Swiss GDP in 2006 amount to just CHF 429 billion.

net interest income was stable and even increasing (see Appendix 1, Panel A). The net trading loss of CHF 25.8 billion in 2008 was entirely driven by a loss of CHF 35 billion in their trading activities in fixed income, currencies, and commodities within the investment banking division. In response to these losses UBS was forced to raise additional shareholder capital.[7] Despite these capital infusions, UBS required a government bailout in October 2008.[8] This intervention was the only government bail-out in the Swiss banking industry during the financial crisis. The impact of the crisis on the profitability of the second largest bank in Switzerland, Credit Suisse, was less severe. As shown by Figure 1 (Panel A) the bank actually accumulated profits over the period 2007-2009 to the amount of 14 percent of its pre-crisis equity. That said, at the height of the crisis in 2008 Credit Suisse posted an annual loss of more than CHF 11 billion, amounting to 26 percent of its pre-crisis equity. In response to these losses Credit Suisse required a recapitalization and secured a capital infusion of CHF 10 billion in October 2008 from a group of private investors (Credit Suisse, 2008).

The losses incurred by the two largest Swiss banks were almost entirely driven by trading losses and write-downs on international securities and were thus unrelated to conditions or activities in the domestic retail market. In Appendix 1 (Panel A) we report annual profits of the 18 largest Swiss banks with domestic retail banking activities after UBS and Credit Suisse in terms of balance sheet assets (e.g. each bank commands an asset size of at least CHF 10 billion in 2006) and show that none of these banks reported an annual loss over the 2007-2009 period. In contrast to, Germany where regional state-owned banks had also heavily invested in U.S. asset backed securities (see Puri et al., 2011), this was not the case for the state-owned commercial banks or savings banks in Switzerland. We also observe that the net interest income remained stable or slightly increased for all banks between 2007 and 2009. Besides UBS and Credit Suisse

[7] The bank raised CHF 13 billion of seasoned equity (mainly from sovereign wealth funds) at the end of 2007 and another CHF 16.3 billion through an equity rights offering to its shareholders in mid-2008 (UBS, 2007; UBS, 2008a).

[8] The Swiss National Bank agreed to take over CHF 68 billion of illiquid assets from the balance sheet of UBS via a special purpose vehicle. At the same time, UBS received CHF 6 billion of additional capital in the form of mandatory convertible notes fully placed with the Swiss Confederation (UBS, 2008b).

no significant trading losses had to be absorbed by the other banks in 2007-2009.[9] We therefore argue that the losses of Credit Suisse and UBS during the financial crisis are not related to their domestic retail banking activities , but due to their significant international activities representing areas in which the other Swiss banks were not active at a large scale.

Financial market data and bank-level deposit data suggest that as a result of their significant losses Credit Suisse and UBS were disciplined by investors and depositors. Between mid-2007 and the end of 2008 bond spreads for Credit Suisse and UBS bonds rose by more than 250 and 350 basis points respectively, while the yields on other Swiss banks hardly increased at all.[10] More important for this study, the two largest banks experienced a significant decline in customer deposits as displayed in Figure 1 (Panel B). Between 2007:Q4 and 2009:Q4 total customer deposits at UBS declined by 36 percent. Over the same period customer deposits at Credit Suisse declined by 15 percent. As shown by the figure the decline in deposits did not happen overnight with the bailout of UBS and the recapitalization of Credit Suisse in October 2008. By contrast, the withdrawal of deposits started at the beginning of 2008 and continued steadily even after the recapitalizations and bailout in October 2008. Appendix 1 (Panel A) shows that while customer deposits declined strongly at the two distressed banks, deposits at all other Swiss banks increased throughout the crisis. The 18 largest Swiss banks, besides Credit Suisse and UBS, experienced increases in customer deposits between 2007-2009, with deposit growth varying from 14 to 72 percent across banks. One might argue that decreasing customer obligations of CS and UBS between 2007 and 2009 (see Figure 1 (Panel B)) are not only a function of alienated investors or depositors withdrawing their assets, but a decision of the banks' management to comply with minimum capital ratios (measured in % of the overall balance sheet) by voluntarily repaying outstanding customer obligations. As we exclusively focus on the level of households and study their behavior of deposit shifts, our survey allows us

[9] Please note, that UBS occurred negative trading income in 2007-2009, Credit Suisse in 2008. All other banks did not experience any trading losses at all. The only exception is Migros Bank, which experienced a loss of CHF 18mn in 2007, which equals 0.06% of its equity (2006).
[10] See e.g. the *2010 Financial Stability Report* of the *Swiss National Bank*.

to disentangle these two effects. Additionally, we track in Figure 3 the movement of interest rates on CHF denominated demand deposit accounts between 2007 and 2009 revealing that both CS and UBS were not offering unattractive low interest rates to their depositors in order to induce them to withdraw.

The financial distress of UBS and Credit Suisse due to their losses on international assets was exacerbated by the international tax dispute over off-shore private banking services which intensified at the onset of the financial crisis. In 2008, UBS was investigated by the U.S. authorities for assisting U.S. citizens in tax-evasion. In 2009, UBS agreed to pay a fine of USD 780 million to the U.S. government and entered into a deferred prosecution agreement.[11] Note that the fine paid by UBS to the U.S. authorities amounted to less than 5 percent of its financial losses during 2007-2009. Nevertheless, it was widely accepted during this period that a failure of UBS to settle with U.S. authorities could have jeopardized the solvency of the bank (Emmenegger, 2017). As a result of subsequent investigations eleven other Swiss banks have been prosecuted by the U.S. Department of Justice since 2013. Among these, Credit Suisse, pleaded guilty to assisting tax evasion of U.S. Nationals and agreed to pay USD 2.6 billion in fines in 2014. A further 80 banks have reached settlement agreements with the U.S. authorities and have paid fines totaling USD 1.5 billion. In our empirical analysis we control for bank-specific involvement in the international tax dispute.

[11] Moreover, a settlement was reached in which the Swiss Financial Market Supervisory Authority (FINMA) revealed information on thousands of off-shore accounts of U.S. citizens with UBS to the U.S. authorities.

3. Data

Our analysis is based on a survey of 1,475 households in the German-speaking area of Switzerland.[12] The survey sample was constructed to be representative of the underlying population with respect to gender and geographical location.[13] The survey population is also comparable to the Swiss population in terms of income and education (see Appendix 2, Panel A). The survey was implemented with telephone interviews which lasted on average 15 minutes. The respondents were not remunerated for their participation. However, at the beginning of each interview the respondent was informed about the academic purpose of the survey in order to encourage participation and reduce the number of non-responses.[14]

The survey questionnaire was designed to elicit information on all bank relationships maintained by each respondent as well as their reallocation of funds between banks during the crisis.[15] Information was also gathered on socioeconomic characteristics (e.g. age, education, gender, household income and wealth), financial literacy, knowledge about deposit insurance, behavioral traits (risk aversion and time preferences) and the geographical location of the households. We match the location of each household with hand-collected information on the geographical location of all bank branches in Switzerland.[16] Appendix 3 provides definitions of all variables employed in our analysis. Appendix 4 displays summary statistics.

[12] This survey was conducted by GfK, a leading international market research institute, on behalf of the University of St.Gallen in 2011. The sample size corresponds to 0.05% of the targeted population, which is an adequate coverage compared to large surveys in the U.S. or the E.U. (e.g. the Health and Retirement Study in the U.S. covers about 0.03% and the Survey of Health, Aging and Retirement in Europe about 0.04% of the targeted population).

[13] Respondents were limited to those with an age of 20-74 years, with sufficient German skills to be able to understand the questions, and to respondents which were not self-employed.

[14] In total 9,361 households were contacted, of which 6,696 refused to participate and 1,151 interviews were terminated early (primarily due to a lack of German language knowledge or to ensure that survey participants are representative for the Swiss population according to social economic household characteristics). According to GfK the response rate for the survey is comparable to other academic-orientated surveys and higher than that for regular market research surveys in the field of financial services. The reasons for non-participation do not seem to suggest that non-participation is largely related to withdrawal behavior or bank-client relationships. A large population of the contacted persons, who didn't participate in the survey, is not interested in the topic. To ensure that our results are not biased, we also asked the survey participants with regard to their interest in the financial crisis and performed robustness checks accordingly in the empirical part of our paper.

[15] The questionnaire is available upon request.

[16] We use data for the network of bank branches in Switzerland as per December 2012. Distance calculations are based on zip code information for both households and bank branches, and computed through the Google maps API.

3.1 Pre-crisis bank relations and the reallocation of deposits during the crisis

The observations in our study are at the bank relationship level. The 1,475 respondents in our sample report a total of 2,563 pre-crisis bank relationships. Out of these relationships 2,414 feature demand deposits, i.e. either a savings or a current account.[17] Figure 2 illustrates the network of pre-crisis deposit relationships in our sample.[18]

Figure 2 here

For each respondent we elicit information on the reallocation of assets across banks during the financial crisis. Specifically, each respondent was asked whether he /she "*(…) reallocated bank assets during the financial crisis, i.e. at the end of 2008 or in 2009. With reallocation we understand the transfer of (savings) deposits or securities from one bank to another.*" We explicitly focus on *reallocation* of assets as opposed to all withdrawals which also include cash withdrawals. We do this to alleviate concerns that withdrawals were triggered by idiosyncratic liquidity shocks of households (e.g. households investing themselves in assets whose values decreased) or household-specific consumption patterns (e.g. purchasing new cars). All respondents who replied that they reallocated funds were subsequently asked which bank they withdrew funds from. For each bank relationship that funds were withdrawn from respondents were asked which share of their assets they withdrew from this bank (less than 25 percent, 25-50 percent, 50-75 percent, more than 75 percent), what type of assets they withdrew (deposits, securities portfolios, voluntary retirement savings) and which bank they transferred the assets to.

[17] Our survey does not provide us directly with information on all bank relationships and products used by households prior to the crisis. However, we can construct this information using questions on relationships and products used at the time of the survey (2011) and questions on the shifts of assets during the crisis (2008/2009). Our constructed measures may be imprecise to the extent that some households altered bank relationships and products used during 2010 but not during 2008/2009. Given that in non-crisis times bank relationships are largely stable (Kiser, 2002) such changes are likely to be negligible.

[18] Deposit market shares calculated on the basis of the number of bank relationships derived from the survey are consistent with data on the allocation of the number of deposit accounts across groups of banks as reported by the Swiss National Bank (see Appendix 2, Panel B).

Finally, all respondents which reallocated funds were asked to state their motives for doing so. In total, 113 of the 1,475 respondents in our survey report that they reallocated deposits across banks during the crisis.

The main dependent variable in our analysis is the binary variable *Withdrew deposits* which takes on the value of one if the respondent shifted demand deposits away from a bank where it had such deposits during 2008/2009 (zero otherwise). Summary statistics in Appendix 4 show that 5 percent of the pre-crisis deposit relations experience a deposit withdrawal during the crisis. In robustness tests (see section 7) we use alternative measures of asset reallocations which capture (i) the shift of non-deposit assets, (ii) the magnitude of asset reallocations and (iii) whether a bank relationship was ceased.

3.2 Bank distress, size and ownership

The bank-level explanatory variables in our analysis are indicators of bank distress. Based on our discussion in section 2 the variable *Strong Distress* takes on the value one for a pre-crisis deposit relationship with the most distressed bank, i.e. UBS. The variable *Weak Distress* takes on the value one for a pre-crisis deposit relationship with Credit Suisse. All other household-bank relations are classified as *No Distress*. Note that we choose to use bank-specific dummies for the severity of distress rather than a continuous measure of bank performance. Our choice is based on the observation that - as shown in Appendix 1 (Panel A) - UBS and Credit Suisse were the only Swiss banks to post financial losses during the 2007-2009 period crisis. Hereby, the losses incurred by UBS were significantly larger than those incurred by Credit Suisse. Moreover, UBS was the only Swiss bank to be officially investigated and fined during 2008-2009 for its role in assisting tax evasion of off-shore private banking clients.

The two distressed banks in our sample are large, internationally operating commercial banks, with significant operations in investment banking and wealth management. As a consequence there are other potential reasons - besides financial distress - why depositors may

have withdrawn funds from these two banks during 2008-2009. First, it is possible that - independent of their bank-specific losses - UBS and Credit Suisse were associated with negative reports on the financial sector throughout the global financial crisis. However, as we employ two dummy variables *Strong Distress* and *Weak Distress* we can disentangle the effect of bank distress from the pure effect of being an international commercial bank. In particular, if individual bank distress drives depositor behavior we expect to see a stronger effect of *Strong Distress* compared to *Weak Distress*.

Second, it is possible that - due to their size - clients of UBS and Credit Suisse had different expectations than clients of other banks with respect to the implicit and explicit insurance of their deposits. This may have triggered a different reaction to the global financial crisis, independent of the distress of the two banks themselves. On the one hand, both banks were considered too big to fail which may have dampened deposit withdrawals (Cubillas et al., 2017). On the other hand, clients may have considered that UBS and Credit Suisse were too big to save (Bertay et al., 2013), spurring more withdrawals than from other banks.[19] We control for potential expectations regarding the implicit insurance of deposits at too big to fail banks. Specifically we classify those five banks as *Too big to fail* which have pre-crisis assets exceeding CHF 50 billion (see Appendix 1). These five banks are today officially considered too big to fail by the Swiss National Bank. We further include a dummy variable *State-owned* to account for perceived explicit and implicit guarantees of deposits at state-owned banks. Figure 2 documents that the two distressed banks together accounted for 546 (22 percent) of the pre-crisis bank relationships in our sample. Importantly, a large share of bank relationships is held at other too big to fail banks or state-owned banks. This structure of the data allows us to disentangle the effect of bank

[19] Moreover, given that the Swiss deposit insurance scheme features an upper limit of CHF 6 billion on total payouts, depositors may have considered that even insured deposits were unlikely to be safe at the biggest Swiss banks, including UBS and Credit Suisse, as the total amount of insured deposits exceed the upper limit of CHF 6 billion on total payouts for one financial institution. See also our discussion of the Swiss deposit insurance scheme in section 6.

distress at UBS and Credit Suisse from the pure effect of being a large bank or expectations about a bail-out guarantee.

Finally, both UBS and Credit Suisse had significant operations in off-shore private banking activities. During 2008-2009 international efforts to cut down on tax evasion in off-shore banking intensified (Emmenegger, 2017). Thus - independent of their level of financial distress - deposit withdrawals from the two banks may have been exacerbated by their perceived role in assisting tax evasion of private banking clients and the potential implications for future bank solvency. Fortunately for our analysis, a large number of Swiss banks, including several of the state-owned cantonal banks also had significant off-shore private banking operations and were thus subsequently also involved in the offshore banking tax dispute. We can thus control for any effects of bank involvement in the tax-dispute on deposit withdrawals which are unrelated to the immediate financial distress of the banks in 2008/2009. Specifically, the variable *Tax dispute* captures a bank's involvement in the tax-dispute between Switzerland and the U.S.[20]

3.3 Bank-client relationships

We employ two measures of the intensity of bank-customer relationships. Our first indicator *Single account* captures the exclusivity of a bank relationship. It takes on the value of one if the account is the only deposit account that the respective respondent had prior to the crisis.[21] Our second indicator *Credit linkage* captures the scope of a bank relationship. It takes on the value of one if the respondent had a consumer loan or a residential mortgage with the same bank.

[20] Besides UBS, 11 other Swiss banks (including Credit Suisse and two large cantonal banks) were prosecuted by the U.S. authorities. In addition, a further 80 banks (category 2 banks) agreed to pay fines to the U.S. Department of Justice as they were likely to have broken U.S. law with their off-shore wealth management activities. This category includes 20 of the banks listed in Appendix 1. The remaining banks have not sought agreements with the U.S. authorities on the basis that they exclusively serve domestic clients. For all banks which were prosecuted by or paid fines to the U.S authorities the variable "Off-Shore tax dispute" takes on the value of 1 (see Appendix 1). For further details on this tax dispute we refer to https://www.sif.admin.ch/sif/en/home/themen/internationale-steuerpolitik/us-steuerstreit.html.

[21] Note that as we elicit the number of bank relationships at the respondent level rather than at the household level, the variable *Single account* may underestimate the effect of exclusive bank relationships. In particular in multi-person households the respondent may have only one account himself or herself, but may have the opportunity to transfer funds to the account of his or her partner. That said, one could argue that even single-person households could have the opportunity to transfer funds to the account of a family member should they want to do so.

Summary statistics in Appendix 4 show that in our sample 52 percent of the respondents have only one deposit account prior to the crisis, and 21 percent of the deposit relations are with a bank where the respondent has a credit linkage prior to the crisis. The overwhelming majority of credit linkages are due to residential mortgages (98%).[22] In section 7 we report on robustness tests using alternative measures of the scope of bank relationships, i.e. the existence of a *Securities account* or a tax deferred *Retirement account*.

Theory suggests that strong bank-customer relationships may mitigate withdrawal risk for at least three reasons: First, consumers may face explicit transaction costs of moving deposit accounts or related bank services to another bank (Sharpe, 1997). Second, customers who maintain strong ties with one particular bank may have a preference for the differentiated services of that bank in the first place (Salop, 1979) or might benefit from improvements in service quality over time (Zephirin, 1994). Third, consumers with strong ties to one bank may yield quasi-rents from this relation, as the bank has superior information about the client than its competitors (Sharpe, 1990; Von Thadden, 2004).

Recent regulatory policies emphasize the stabilizing role of well-established, broad-scoped customer relationships for bank funding. In particular the Basel III Liquidity Coverage Ratio (LCR) assumes lower run off rates for customer deposits if depositors have "other established relationships with the bank that make deposit withdrawals highly unlikely" or "the deposits are transactional accounts, i.e. accounts where salaries are automatically deposited" (BIS, 2013). Note that while the regulations emphasize the intensity of the existing banking relationship they do not single out any particular driving force behind such relationships (switching costs, informational rents, or differentiated products).

Our measure of relationship exclusivity *Single account* is likely to capture all three mitigating effects of bank-client relationships on withdrawal risk. First, having only one deposit

[22] Consumer loans in Switzerland are typically provided by specialized providers or subsidiaries of commercial banking groups. By contrast, residential mortgages are overwhelmingly provided by commercial and savings banks.

account implies high explicit switching costs because the household would have to incur the transaction costs (fees, opportunity costs of time) of opening a new account in order to reallocate deposits. Second, consumers who bank exclusively with one financial institution may be wary of losing informational benefits from that bank. For example, they may expect better future access to overdrafts or consumer credit at their incumbent bank, should they experience liquidity shocks. Third, conditional on the local supply of banking services, those consumers who choose to deal exclusively with one bank may have a strong preference for the services of that bank. We have to acknowledge that we cannot single out pre-crisis housebank relationships within our survey data, but 50% of the survey households have only one bank relationship (please refer to Appendix 3 Panel C). Single account holders are an extreme example of housebank relationships allowing us to control for established relationships with a bank via single account holders.

Our measure of relationship scope *Credit linkage* is also likely to capture diverse mitigating effects of bank-client relationships on withdrawal risk.[23] First, consumers who conduct their savings, payment and credit services at the same bank are likely to benefit from low transaction costs of dealing only with one bank. Indeed, consumer research emphasizes that "convenience" is major reason for consumers to bundle financial services at one bank (Devlin, 2002).[24] Second, consumers who use deposit and credit services with the same bank are likely to enjoy better credit terms (credit limits, interest rates). Puri et al (2017) document that information from deposit and transaction accounts is valuable assessing and monitoring the creditworthiness of

[23] The overwhelming majority of credit linkages in our sample are residential mortgages (98%). Swiss banks urge new mortgage clients to move their transaction accounts and other products (savings accounts, tax-preferred retirement savings accounts and wealth management custody accounts) to the bank. However there is no legal requirement for clients to do so (even if they pledge their retirement savings as a down payment on the mortgage) and there is no legal impediment preventing them from moving deposits away from a bank where they have an outstanding mortgage.

[24] Note that in our sample the majority of credit linkages are mortgage loans. In Switzerland, the overwhelming majority of mortgages have a maturity of 10 years at origination (SNB) and the costs of prepayment are prohibitively high. This implies that a household which moves deposits to another bank would be likely to keep its mortgage at the incumbent bank. There is no legal barrier preventing mortgage borrowers from moving their deposits to another bank. However, in this case the consumer would incur higher transaction costs of dealing with multiple banks. For example, borrowers typically make their monthly loan installments by direct debit from their deposit account. A switching client must spend time and effort to redirect the respective direct debit transaction.

retail clients. Third, those consumers who choose to use credit and non-credit services from the same bank may simply have a strong preference for the services of that bank.

Strong bank-customer relationships may also affect the propensity of clients to withdraw if these clients have better information about the fundamentals of the banks.[25] Iyer and Puri (2012) show that customers with credit linkages or with longer relationships are less likely to withdraw deposits during a panic-based run. Moreover, Iyer et al. (2016) show that clients with credit relationships are more likely to run on an insolvent bank in the same economic environment. In our setting we conjecture that superior information about the banks' solvency conditions is unlikely to be responsible for any correlation between bank-customer relationships and deposit withdrawals. The two distressed banks in our sample are large publicly listed banks which publish detailed financial statements on a quarterly basis. The quarterly performance of both banks is regularly commented on in the national media. In particular, the financial distress of UBS and Credit Suisse in 2007-2008 was broadly covered by national media channels, including the popular press. Furthermore, the public bail out of UBS in October 2008 was broadly covered and discussed among the Swiss population. It is thus unlikely that - conditional on socioeconomic characteristics - a UBS or Credit Suisse customer with a strong relationship to one the two banks would have been better informed than a customer with a weaker relationship.[26]

3.4 Socioeconomic controls and local banking sector conditions

It is likely that client structure of the two distressed banks may differ systematically from that of banks with *No Distress* in ways which may affect withdrawal behavior. In particular, the large internationally operating banks UBS and Credit Suisse may cater to wealthier and more

[25] See, for example, Chari and Jagannathan (1988) and Goldstein and Pauzner (2005) for models in which depositors receive heterogeneous signals about bank solvency.

[26] Our results confirm this conjecture: In unreported robustness checks, we split our sample by the degree of "interest in the financial crisis" that the respondent reported. There we find no difference in the effect of credit linkages on the withdrawal behavior of respondents when we compare respondents with strong interest in the crisis to those with weak interest in the crisis.

financially sophisticated households. Iyer et al. (2016) and Kim (2016) document that household wealth and financial sophistication strongly influence depositor behavior. Our survey provides us with detailed socioeconomic information on each respondent and the respondent's household. Our vector of respondent-level / household-level control variables includes indicators of household income, household wealth, age, gender, education, nationality, risk aversion, and time preferences. Appendix 3 and 4 provide definitions and summary statistics of these respondent-level / household-level control variables. A comparison of depositors across banks confirms that, on average, the clients of the two distressed banks have higher income, higher wealth and higher education compared to clients at non-distressed banks (see Appendix 5). Moreover, households with an account at Credit Suisse or UBS are more financial literate. Besides, they are more knowledgeable about deposit insurance. In our empirical analysis, we alternatively employ household-level controls or household fixed effects to account for these potential confounding variables.

The local supply of banking services to households who are clients of the banks with *Strong Distress* and *Weak Distress* may also differ systematically from that of households who are clients of banks with *No Distress* in ways which may affect withdrawal behavior. To account for this, we add control variables to capture variation in the local and regional banking sector. For each household we use the number of bank branches in the zip code where the household lives as an indicator of local supply of financial services and competition.[27] In addition we measure the geographical proximity of the municipality in which the household lives to the nearest branch of UBS, the nearest branch of Credit Suisse and the nearest branch of a non-distressed bank as this is likely to affect whether households choose to be clients with particular banks and whether they choose to withdraw from one of these banks if it is in distress. To account for variation in

[27] One municipality can consist of several zip codes. The households in our sample are located in 707 different zip codes. The number of bank branches per zip code ranges from 0 to 10 averaging 1.9 branches per ZIP code (Appendix 4).

competition at the broader regional level we add 20 canton-level fixed effects to our main multivariate analyses.

4. Bank distress and deposit withdrawals

In this section we show that the propensity of respondents to withdraw deposits is strongly related to the magnitude of bank distress. Table 1 compares the propensity of households to withdraw deposits from banks with *Strong Distress* (UBS), *Weak Distress* (Credit Suisse) and *No Distress* (all other banks). The table shows that for the bank with strong distress the propensity to withdraw (23.4 percent) is eighteen-times higher than for banks with no distress (1.3 percent) and four times higher than for the bank with weak distress (5.6 percent).

Table 1 here

The magnitude of deposit withdrawals displayed in Table 1 is consistent with that presented in recent studies using bank-level and client-level data. Rose (2015) provides an overview of deposit withdrawals from U.S. banks during the 2007-2009 crisis. He shows that among the five large U.S. banks which experienced significant deposit outflows during 2008, the share of deposits withdrawn varied between 7.8% and 15%. Shin (2009) documents that customer deposits at the U.K. retail bank Northern Rock fell by 54% during the fall of 2007, with branch deposits falling by 45%. Davenport and McDill (2006) document that, in the case of a severely distressed small U.S. commercial bank, total deposits dropped by 27% within 9 months, with retail deposits falling by 20%. For the case of an insolvent cooperative bank in India, Iyer et al. (2016) document that 4% (29%) of the insured (uninsured) deposit accounts experience a substantial withdrawal.

A comparison of our Table 1 results with the bank-level data presented in Figure 1 suggests that the incidence of withdrawals rates observed in our sample of households is much lower than

the share of the deposit volume withdrawn from the two distressed banks. However, the bank-level data in Figure 1 reports the volume of all (non-bank) customer deposits, including large corporate and institutional investors while our survey data reports the incidence of household deposits only. Existing evidence suggests that retail clients are less prone to withdraw deposits than business clients or institutional investors (Davenport and McDill, 2006; Rose, 2015; Carlson and Rose, 2016). To reconcile our survey data with bank-level withdrawals we therefore draw on sector-level data on customer deposits as reported by the Swiss National Bank for the two largest banks together. This data suggests a 7% drop in the volume of deposits by domestic households between August 2008 and December 2009 for UBS and Credit Suisse together. The data presented in Table 1 is in line with this, suggesting that the joint of the two banks fell by 10%.[28]

4.1 Methodology

We estimate linear parametric models using ordinary least squares in which the dependent variable $Withdrew\ deposits_{i,j}$ captures whether respondent *i* who lives in canton *c* withdraws deposits from bank *j*. As our dependent variable is categorical we conduct robustness checks in which we replicate our main analysis using non-linear (logit) models (see section 7).

[1a] $$Withdrew\ deposits_{i,j,c} = \alpha_c + \beta_1 \cdot Strong\ Distress_j + \beta_2 \cdot Weak\ Distress_j + \delta_1 \cdot Z_j + \delta_2 \cdot X_i + \delta_3 \cdot Y_i + \varepsilon_{i,j}$$

[1b] $$Withdrew\ deposits_{i,j} = \alpha_i + \beta_1 \cdot Strong\ Distress_j + \beta_2 \cdot Weak\ Distress_j + \delta_1 \cdot Z_j + \varepsilon_{i,j}$$

[28] As documented in Table 1 among the UBS clients, 16.1% withdraw at least 50% of their assets, and an additional 7.6% withdraw less than 50% of their deposits. Among the Credit Suisse clients, 2.4% withdraw at least 50%, and 2.9% withdraw less than 50% of their deposits. Weighing the withdrawal rates by the number of relationships in our sample yields an average withdrawal of 10% of deposits for the two large banks.

As illustrated by equations [1a-1b] the estimate of β_1 for the variable $Strong\ Distress$ and the estimate of β_2 for the variable $Weak\ Distress$ are our coefficients of interest. The difference in magnitude between the estimated coefficients β_1 and β_2 captures how the severity of bank distress impacts on withdrawal behavior. Our estimation model includes the vector Z_j of bank-level covariates (*Too big to fail, State-owned bank, Tax dispute*) discussed in section 3. In Model [1a] the vector of household-level socioeconomic characteristics X_i accounts for observable heterogeneity in socioeconomic characteristics across households. We further include a vector of variables Y_i which capture the local supply / competition of bank services (Distance to bank branches of UBS, Credit Suisse and non-distressed banks as well as the number of bank branches in the ZIP code where the household lives). Finally, we include fixed effects α_c (at the canton-level) to account for regional bank competition.

It is questionable whether we observe and correctly measure all household-level variables that jointly affect withdrawals of deposits and the decision to have a relationship with one of the distressed banks. We therefore replicate our analysis on a sub-sample of respondents that had a pre-crisis relationship with at least one of the distressed banks (either UBS or Credit Suisse) and at least one non-distressed bank. Figure 2 shows that the majority of clients of the distressed banks have multiple bank relationships. This large share of multiple account holders in our sample allows us to compare the withdrawal behavior of the same household from accounts at distressed versus non-distressed banks. As illustrated in equation [1b], in this sample of respondents we can control for unobserved heterogeneity at the household level with household fixed effects α_i.[29] The estimated effects of β_1 and β_2 in model [1b] are not biased by unobserved heterogeneity across clients of distressed and non-distressed banks. However, the identified effects are not representative for the average effect across all households, because they are

[29] As we introduce household-level fixed effects we must for reasons of collinearity drop region fixed effects as well as controls for the supply of local banking services.

estimated in the sample of clients with at least two bank accounts. In particular, if we conjecture that exclusive bank-customer relationships reduced the propensity of households to withdraw deposits then the estimated effect in this subsample of multiple account holders should be higher than in the full sample including households with only one deposit account. In Table 2 we therefore report estimates for model [1a] based on the full sample of deposit accounts (columns 1-4) as well as for model [1b] on the subsample of households with accounts at both distressed and non-distressed banks (column 5).

4.2 Results

The multivariate analysis presented in Table 2 confirms that the incidence of deposit withdrawals is highly correlated with the magnitude of bank distress. In all models we calculate heteroscedasticity-robust standard errors by clustering at the regional level.[30] Controlling only for observable differences in socioeconomic characteristics between respondents, we find that the propensity to withdraw is 21.7 percentage points higher at the bank with strong distress compared to non-distressed banks (column 1). Adding additional bank-level controls (column 2) and controls for regional bank supply and competition (columns 3-4) hardly changes the estimated effect. In our preferred specification (column 4) we find that the propensity to withdraw from the strongly distressed bank is 22.8 percentage points higher than for non-distressed banks. The point estimates for *Weak distress* in column (4) suggests that the propensity to withdraw deposits from the weakly distressed bank (Credit Suisse) is 5.1 percentage points higher than for non-distressed banks. An F-test confirms that the point estimate for *Strong Distress* is significantly higher than that for *Weak Distress.* Thus, the magnitude of bank distress impacts on withdrawal behavior. At the same time this finding alleviates concerns that withdrawals are driven by a general concern about internationally

[30] Switzerland is divided into 106 MS-regions (i.e. spatial mobility regions) which represent local labor markets. Our survey population includes respondents from 76 German-speaking MS-regions. For expositional reasons Table 2 does not report the estimated coefficients for household-level and bank-level controls. These are presented in Appendix 6.

operating commercial banks. If this were the case, we would expect similar results for *Strong Distress* and *Weak Distress*.

In column (5) we replicate our estimates for the subsample of households which hold deposit accounts at least one distressed and one non-distressed bank. In these specifications we include household fixed effects to account for unobserved heterogeneity in the client structure across banks (see equation 1b). The results suggest that the observed relation between bank distress and depositor behavior is not driven by unobserved heterogeneities in the clientele across banks.

Table 2 here

Table 2 documents that a substantial share of retail clients withdraws deposits from distressed commercial banks. This is especially the case when a bank is in severe distress. These findings are somewhat surprising given that both of the distressed Swiss banks were considered to be "too big to fail". Our results suggest that the "too-big-to-fail" status may not insulate a bank from retail deposit withdrawals when the bank itself is in distress. This finding is in line with van der Cruijsen et al. (2012) who document that customers at bailed out banks are subsequently more likely to spread their savings across accounts at different banks. It is important to note, however, that we can make no statement on how the observed withdrawal risk for large distressed commercial banks would compare to the potential withdrawal risk for smaller distressed banks. Existing evidence suggests that systemically important banks may attract deposits in a banking crisis (Iyer et al., 2017; Oliveira et al., 2015). But the evidence is not conclusive on whether large distressed banks experience stronger or weaker market discipline than small distressed banks (Cubillas et al., 2017; Bertay et al., 2013).

4.3 The reasons behind deposit withdrawals

Why do almost one-quarter of the retail customers of UBS withdraw funds from the bank given that the bank is widely perceived to be too big to fail and is actually bailed out in October 2008? One reason for deposit withdrawals from too big to fail banks is that government intervention may act as a public signal which triggers or maintains concerns among depositors. Shin (2009) documents that in the 2007 case of the U.K. bank Northern Rock, the provision of liquidity support by the Bank of England was the trigger for subsequent retail deposit withdrawals.[31] In the case of the 1984 run on the U.S. Bank Continental Illinois, Carlson and Rose (2016) document that a blanket guarantee on all bank liabilities provided by the FDIC slowed down but by no means halted deposit outflows.

An alternative explanation is that retail clients are angered or disappointed by a bank which has to be bailed out with public funds. The consumer research literature provides ample evidence that corporate crises damage organizational reputations and affect how clients interact with a company (see Jorgensen, 1996; Pearson and Clair, 1998). Since 2007 banks and their senior executives have repeatedly been subject to public anger.[32] It is thus reasonable to assume that the withdrawals of deposits from UBS in our context were at least partly driven by anger with the bank and its management, and not just by the fear of losing savings.[33]

In our survey, all respondents which withdrew assets from a bank during the financial crisis were asked about their motivations for doing so. Respondents were asked to what extent they agreed (on a scale of 0 to 4) to the propositions that they withdrew their funds because they (i) were offered better conditions or better services at other banks, (ii) feared that their funds were at risk at the current bank, or (iii) because they did not agree with the corporate policy of the bank. The absolute number of respondents in our sample which withdraw deposits and state their

[31] See Brown et al. (2016) for experimental evidence on the role of salience in bank runs.
[32] For example, public outcry over the involvement of Barclays Bank in the recent LIBOR scandal contributed to the dismissal of their CEO in 2012. See Diamond misjudged public anger over bankers. Available online at http://www.ft.com/cms/s/0/2f869726-b33b-11e2-b5a5-00144feabdc0.html, retrieved on October 1st, 2013.
[33] See Teichert and Wagenführer (2012) for survey evidence of changes in attitudes of retail clients towards German banks and how this impacts their intentions to switch banks in the aftermath of the financial crisis.

reasons for doing so is too small (103) to enable a formal analysis of motivations across banks. Moreover, the large majority of these households withdrew from UBS (78) while only very few withdrew from Credit Suisse (7) or from banks with no distress (18). Nevertheless, a descriptive analysis of motivations presented in Table 3 yields interesting insights. First, we find that – also in the case of the systematically important bank UBS - the perceived riskiness of the bank was a major concern of depositors who withdrew funds. Second, we confirm that disagreement with corporate policy was also an important motivation for households to withdraw deposits.

Table 3 here

Figure 3 here

Table 3 suggests that the substantial withdrawal of deposits from UBS (or Credit Suisse) is not predominantly driven by changes in interest rates or other conditions relative to their competitors. This finding is supported by the pattern of banks' deposit rates during our observation period. Figure 3 reports the distribution (median, p25, p50) of interest rates on demand deposits across banks as published by the Swiss National Bank on a monthly basis from December 2007 onwards. Based on information from press-releases we match this data to the interest rates offered by UBS and Credit Suisse on demand deposits over the period 2007 – 2009. Figure 3 shows that while the interest rate level responded to changes in monetary conditions, the variation in deposit rates across banks was quite limited. In December 2007 the median interest rate on new savings deposits stood at 0.75% with the inter-quartile range varying from 0.75% to 0.88%. By December 2008 the median interest rate increased to 1%, with the inter-quartile range varying from 0.63% to 1%. By December 2009 the median interest rate decreased to 0.38%, with the inter-quartile range varying from 0.25% to 0.5%.

Figure 3, provides further support to the claim that the outflow of deposits from the two distressed banks cannot be explained by less attractive interest rate conditions compared to their competitors. Prior to the crisis UBS and Credit Suisse offered interest rates below or at the lower end of the interquartile range. In 2008 and 2009 UBS offered deposit rates at the top of the interquartile range. Meanwhile, the deposit rates of Credit Suisse converged to the median rate during 2009. Thus if anything the two large banks raised their interest rates relative to their competitors, most likely as a reaction to the outflow of deposits triggered by their distress.[34]

5. Bank-customer relationships and withdrawal risk

In this section we document that strong bank-client relationships as measured by exclusive bank accounts (*Single account*) or a broad relationship scope (*Credit linkage*) play a crucial role in mitigating withdrawal risk of retail deposits. Our analysis focusses on the 368 respondents which have a pre-crisis deposit relation with the strongly distressed bank (UBS). We focus our attention on this subsample because only in this sample do we observe a significant number of respondents who actually withdraw deposits (N=86).[35]

Table 4 provides univariate evidence that strong client relationships reduce the propensity to withdraw deposits from the strongly distressed bank. We compare the 86 UBS clients which withdraw deposits from the bank during the crisis to the 282 households which do not withdraw. The table shows that households which withdraw are 26.2 percentage points less likely to bank exclusively with UBS before the crisis. Moreover, those clients who withdraw from UBS are 11.5 percentage points less likely to maintain a credit relationship with the bank.

[34] Besides the interest rate other price (fees) and non-price conditions (e-banking, ATM network) may affect the allocation of customer deposits to banks. Previous research suggests that customer deposits are largely sticky (Kiser, 2002). However, it is feasible that major changes in products or services during our observation period may have triggered deposit flows. To capture major innovations in product offerings over the period 2007-2009 we checked the press releases and historical websites of the largest ten banks in Switzerland. We could not identify any major change to product offerings which would have made deposit accounts at UBS or Credit Suisse less attractive than those of their domestic competitors.

[35] By comparison, among the 178 households with a deposit account at the weakly distressed bank (Credit Suisse) only 10 withdraw. Among the 1868 deposit relations with a non-distressed bank only 24 experience a withdrawal.

Table 4 shows that households which withdraw from the strongly distressed bank do not differ significantly from those who do not withdraw in terms of income and education. However, households which withdraw do display higher wealth levels, a better knowledge of deposit insurance and higher levels of financial literacy. While these differences are not statistically significant they do suggest that when examining the role of bank-client relationships it is important to account for potential confounding household characteristics. The only significant difference relates to the self-perceived risk aversion of households.[36] Households withdrawing their deposits are more risk averse as compared to the households who do not withdraw their assets. This finding is not surprising as deposit withdrawal in a distress environment is expected to be correlated with the individual level of risk aversion of a household.

Table 4 here

Again we estimate linear parametric models using ordinary least squares in which the dependent variable $Withdrew\ deposits_{i,j}$ captures whether respondent i reallocates deposits away from the strongly distressed bank j.[37] Our key variables of interest are the indicators of exclusivity and scope of the bank relationship: *Single account* and *Credit linkage*. As illustrated by equation [2] we control for observable household characteristics X_i and indicators of the supply of local banking services Y_i, α_c which may confound the relationship between the strength of bank-relationships and deposit withdrawals.

$$[2] \quad Withdrew\ deposits_{i,j} = \alpha_c + \beta_1 \cdot Single\ account_{i,j} + \beta_2 \cdot Credit\ linkage_{i,j} + \delta_1 \cdot Y_i + \delta_2 \cdot Y_i + \varepsilon_i$$

[36] Survey participants are asked, on a scale from 1 to 6, how much risk they would be willing to accept under the condition that they might lose (part of) their wealth consisting of deposit and securities accounts. Based on this survey question we created the variable *Risk aversion*, which takes the value of 1 if the respondent has high risk aversion (below 3 on a scale from 1 (high) to 6 (low)) and 0 otherwise.

[37] Robustness tests using non-linear logit estimates are presented in Appendix 10.

where *j*: strongly distressed bank only

Table 5 reports estimates for our variables of interest in equation [2]: *Single account* and *Credit linkage*. In column (1) we report estimates controlling for observable household characteristics X_i only. In column (2) and column (3) we subsequently add controls for local banking supply and competition Y_i as well as region fixed effects α_c. In this sample of clients of the strongly distressed bank the average propensity to withdraw deposits is 23.1%. The column (3) estimate for *Single account* suggests that an exclusive bank relationship eliminates this propensity to withdraw completely, i.e. reduces it by 26.5 percentage points. The estimate for *Credit linkage* shows that having a loan with a distressed bank more than halves the withdrawal risk (12.6 percentage points). Thus both the exclusivity and the scope of bank-client relationships strongly mitigate withdrawal risk from this distressed bank. Comparing the magnitude of the estimates of *Single account* to that of *Credit linkage* suggests, however, that the exclusivity of a client-relationship is more important in mitigating liquidity risk than the scope of the relationship.

Table 5 here

The Table 5 results suggest that among the clients of the strongly distressed bank (UBS) the strength of the relationship with this bank plays a crucial role in mitigating withdrawal risk. However, these results do not inform us whether strong bank relationships are especially important in deterring deposit withdrawals from a strongly distressed bank as opposed to a weakly distressed bank or bank in no distress. In Appendix 7 we disentangle the role of bank-client relationships at the strongly distressed bank (UBS) as opposed to the weakly distressed bank (Credit Suisse) and non-distressed banks. We estimate equation [2] on our full sample of bank-relationships (Panel A) as well as on a subsample excluding relationships with non-

distressed banks (Panel B). We hereby add the interaction terms $Strong\ distress_j \cdot Single\ account_{i,j}$ and $Strong\ distress_j \cdot Credit\ linkage_{i,j}$ to the model.[38] These interaction terms capture whether the exclusivity and scope of a bank relationship reduce the propensity of households to withdraw from the strongly distressed bank more than it reduces the probability to withdraw from a non-distressed bank and/or the weakly-distressed bank.

The results reported in Appendix 7 suggest that the scope of a bank relationship hardly affects withdrawal risk from non-distressed banks (Panel A) or the weakly distressed bank (Panel B). The estimated coefficient for the main effect of *Credit linkage* is small and statistically insignificant in both panels. By contrast, the exclusivity of a bank relationship also mitigates withdrawal risk when a bank is not in severe distress. The main effect of *Single account* is negative and significant in both panels. In Panel A the point estimate for the main effect of *Single account* suggests that not having another bank account reduces withdrawal risk by 2.1 percentage points when banks are not strongly distressed. This effect is small compared to than the estimate for the interaction term *Strong distress* * *Single account* in the same panel (22 percentage points). That said, Table 1 shows that the average propensity to withdraw deposits from banks which are not distressed (1.3 percent) or only weakly distressed (5.6 percent) is much lower than for the strongly distressed bank (23.4 percentage points). This means that in relative terms the mitigating effect of an exclusive bank relationship (as captured by *Single account*) is also strong when the solvency of a bank is not severely impaired. Panel B of Appendix 7 reports similar findings when we exclude all bank relationships with non-distressed banks. Thus, in relative terms exclusive bank relationships also play an important role in mitigating withdrawal risk at the weakly distressed bank.

[38] In Appendix 9 we introduce the interaction terms one-by-one to avoid multicollinearity.

6. The role of deposit insurance and financial sophistication

In this section we examine to what extent our main results reported in Tables 2 and 5 vary across households depending on their coverage by deposit insurance and their financial sophistication.

6.1 Deposit insurance

All banks that maintain branches in Switzerland are required by law to participate in the depositor protection scheme.[39] In December 2008 the coverage threshold of the scheme was increased from CHF 30,000 to CHF 100,000 per depositor and bank. Our survey data does not provide information on the volume of deposits held by households with each of their banks. However, it does include information on the total financial wealth of each household. We therefore use the variable *Low wealth* - indicating that total financial wealth (and thus also the volume of deposits at any bank) is below CHF 100,000 - as a proxy for deposit insurance coverage and split the sample based on this indicator. Summary statistics (reported in Appendix 4) show that 72 percent of the households in our survey are covered by the deposit insurance according to this proxy. In section 7 we report robustness checks in which we use alternative proxies of insurance coverage taking into account the number of bank accounts that households have and their allocation of financial wealth to bank deposits as opposed to non-deposit financial assets.

The survey further elicited the knowledge of respondents about deposit insurance protection: Respondents were asked if they knew whether a deposit insurance scheme existed in Switzerland or not. If they responded correctly, they were then asked whether they knew the current coverage threshold. We split our sample based on the binary variable *Insurance knowledge* which takes on the value of one if the respondent correctly answered both questions on the deposit insurance scheme. We acknowledge that this variable is potentially endogenous

[39] See www.einlagensicherung.ch/en for details of the Swiss depositor protection scheme.

with regard to the following analysis as survey participants are asked *after* the financial crisis. Households with a bank account at a distressed bank may have better knowledge with regard to deposit insurance as they acquired knowledge throughout the financial crisis because they were exposed to a distress situation.[40] Summary statistics (reported in Appendix 4) show that only 25 percent of all respondents are knowledgeable about the scheme. This finding is consistent with recent survey evidence suggesting that households are not well informed about the coverage by and procedures of deposit insurance schemes across Europe (Bartiloro, 2011; Sträter et al., 2008). That said, the low-level of deposit insurance knowledge among the respondents in our sample is surprising, given that there was a substantial public debate about the Swiss deposit insurance system during the crisis.[41]

In Table 6, we replicate our analysis of bank distress and deposit withdrawals (Table 2, column 4) for subsamples of respondents. Columns (1-2) of Table 6 present subsample splits by the level of financial wealth which proxies for deposit insurance coverage, while columns (3-4) report subsample splits by deposit insurance knowledge. The results show that our main finding is robust across all four subsamples: Households are much more likely to withdraw from the strongly distressed bank than from non-distressed banks. Households are also more likely to withdraw from the weakly distressed bank as compared to non-distressed banks but this effect is

[40] This endogeneity issue potentially also holds for the variable *Financial literacy* as it was also collected after the financial crisis. Households exposed to a distressed bank during the financial crisis may have acquired more financial knowledge due to the very event of a distress situation.

[41] During 2008 depositors received conflicting signals about the ability of the Swiss deposit insurance scheme *esisuisse* to pay out in the case of a bank failure. On the one hand, the collapse of the Swiss branch of the Icelandic bank Kaupthing demonstrated that the scheme was in a position to swiftly pay out insured depositors of small banks. In October 2008, the Swiss Federal Banking Commission declared receivership of Kaupting's Swiss branch. At that point of time, the branch had a total volume of CHF 37 million deposits of which CHF 30 million were covered by the deposit insurance scheme. Kaupthing deposits accounts with less than CHF 5,000 were paid back within one week, while remaining guaranteed accounts were paid back within four weeks (SFBC, 2008). The "Kaupthing" case was widely reported in the Swiss press. On the other hand, in autumn 2008 several media outlets questioned whether *esisuisse* would have sufficient funds to cover all insured deposits of one of the larger banks (e.g. UBS). The background to this discussion is the fact that *esisuisse* is an unfunded scheme. The payouts of insured deposits are expected to be covered first by liquid assets of the distressed bank itself. If a bank cannot make required payments to insured depositors, the other banks in the system are obliged to make up the difference. However, the joint liability of the other banks in the system is capped at CHF 6 billion (CHF 4 billion prior to the crisis). This is less than any of the largest Swiss banks have in terms of customer deposits (see Appendix 1).

much smaller - and due to the lower number of observations in the subsamples - not always significant.

The results presented in columns (1-4) of Table 6, however, also reveal that the propensity to withdraw deposits from the strongly distressed bank (UBS) is higher among households with high wealth than among households with low wealth (27 vs. 21 percentage points). Likewise, households with more knowledge of the deposit insurance scheme are more likely to withdraw than households with low knowledge (26 vs. 22 percentage points). Formal tests suggest that the differences in the point estimate of *Strong distress* between columns (1-2) and between columns (3-4) are statistically significant.[42]

In Table 7, we replicate our analysis of client relationships and withdrawal risk at the strongly distressed bank for different subsamples of households. Specifically, we replicate column (3) from Table 5 for each subsample. Columns (1-2) of Table 7 present subsample splits by wealth, while columns (3-4) split the sample by deposit insurance knowledge. The column (1-4) results suggest that our main finding is again robust across all four subsamples: Our indicators of bank relationship exclusivity (*Single account*) and scope (*Credit linkage)* are associated with lower propensities to withdraw deposits from the strongly distressed bank. However, comparing the magnitude and significance of the point estimates across columns (1-2) reveals that strong client relationships are less likely to deter withdrawals among households with high-wealth.[43] There is no consistent impact of deposit insurance knowledge on the relation between client relationships and withdrawal risk (column 3-4).

Together the column (1-4) results in Tables 6 and 7 show that our main results are robust across subsamples which differ in their coverage by and knowledge of deposit insurance. Importantly though, deposit insurance coverage does seem to affect the propensity to withdraw

[42] A Wald test (based on a seemingly unrelated estimation) comparing the estimate for *Strong distress* in column (1) versus (2) yields a p-value < 0.001 (chi2 (2) = 112.64). An identical test comparing the estimate in column (3) versus (4) yields a p-value < 0.001 (chi2 (2) = 116.40).

[43] Wald tests (based on a seemingly unrelated estimation) comparing the estimate for *Single account* (p-value < 0.001; chi2 (2) = 30.63) and *Credit linkage* (p-value < 0.003; chi2 (2) = 12.02) in column (1) versus (2) both reject the hypothesis of equality.

deposits as well as the potential for strong bank relationships in mitigating withdrawal risk. Those households who are less likely to be covered by deposit insurance are more likely to withdraw deposits from the strongly distressed bank and less likely to be deterred from doing so by strong client relationships. These findings are consistent with recent evidence suggesting that deposit insurance may affect the reaction of depositors to distressed banks (Iyer et al., 2016) or banking crises (Iyer et al., 2017).

Table 6 here

Table 7 here

Our Table 7 results also suggest that the mitigating effect of credit linkages on withdrawal risk is hardly driven by consumers who expect their outstanding debts to be netted off with their deposits. The Swiss deposit insurance scheme explicitly prohibits any set-off of customer debts and this information is clearly communicated.[44] However, given that the households in our sample have only limited knowledge of the details of the deposit insurance scheme we cannot rule out that some households wrongfully expect a set-off of their debts. However, our findings from columns (1-2) in Table 7 suggest that net-offs cannot explain why households with credit linkages are less likely to withdraw. If this was the case, the households with deposits exceeding the insurance threshold, should be more sensitive to credit linkages than households with deposits below the insurance level. In contrast with this conjecture, our results show that the effect of credit-linkages on withdrawals is stronger among households with low wealth (column 1) than among households with high wealth (column 2).[45]

[44] *https://www.esisuisse.ch/en/media/20170509-300-all-faq_en_new-iro.pdf/view*, last accessed on 24 May 2017.
[45] Iyer and Puri (2012) also provide evidence that clients with insured deposits are less likely to withdraw during a bank run if they have credit linkages. They also conclude that expected net-offs cannot explain this behavior.

6.2 Financial sophistication

Recent evidence suggests that financial literacy and numerical ability is strongly related to household financial behavior, i.e. retirement savings (Van Rooij et al., 2012), financial market participation (Van Rooij et al., 2011), consumer borrowing (Lusardi and Tufano, 2015; Agarwal and Mazumder, 2013), mortgage default (Gerardi et al., 2013), and savings account choice (Deuflhard et al., 2017). Related to our study, Kim (2016) documents that regional variation in financial literacy in the U.S. is associated with different reactions of local depositors to bank distress. Our data allows us to examine the relationship between financial literacy and withdrawal behavior at the household level.

We employ a measure of financial sophistication available from the survey and split our sample based on this indicator: The dummy variable *Financial literacy* measures whether households answer correctly to three standard financial literacy questions on interest, inflation and risk diversification.[46] Our summary statistics show that 50 percent of the respondents have a high level of financial literacy (see Appendix 4).

In columns (5-6) of Tables 6 and 7 we replicate our main analysis for subsamples of respondents with low vs. high financial literacy. The Table 6 results show that our main finding is again robust across these two subsamples: Households are much more likely to withdraw from the strongly distressed bank than from non-distressed banks. However, the magnitude of the point estimate for *Strong distress* suggests that the propensity to withdraw deposits from the strongly distressed bank (UBS) is higher among households which are more financial literate (24 vs. 21 percentage points).[47] The Table 7 column (5-6) results suggest that in both subsamples strong client relationships are associated with lower propensities to withdraw deposits from the strongly distressed bank. However, comparing the magnitude and significance of the point

[46] See Lusardi and Mitchell (2011) for a cross-country comparison of financial literacy using these three questions. See Brown and Graf (2013) for evidence on financial literacy in Switzerland based on the survey data used in this study.

[47] A Wald test (based on a seemingly unrelated estimation) comparing the estimate for *Strong distress* in column (5) versus (6) yields a p-value < 0.001 (chi2 (2) = 117.93).

estimates across columns reveals no consistent association between financial literacy and the role of client relationships in deterring withdrawal risk.

7. Robustness checks

In this section we report on a series of robustness checks to our main analysis as presented in Tables 2, 5, 6 and 7. We examine to what extent our results are affected by (i) estimation method, (ii) our chosen indicators of withdrawals, (iii) our chosen indicators of the scope of bank relationships, and (iv) our measures of deposit insurance coverage. We further report on subsample analyses which examine whether our results are (v) robust to the local presence (and thus saliency) of the distressed banks and (vi) robust to households having securities accounts as opposed to households not having such accounts (to alleviate concerns of idiosyncratic wealth shocks of households triggering deposit withdrawals).

Our multivariate analysis presented in Tables 2 and 5 is based on linear parametric models. As our dependent variable is categorical we replicate our analysis using a non-linear (logit) model. The corresponding estimates are presented in Appendix 8 for Table 2 and Appendix 9 for Table 5, respectively. The non-linear estimates confirm the findings from our linear regressions. Appendix 8 confirms that households are more likely to withdraw from the strongly distressed bank than from the weakly distressed bank and more likely to withdraw from the weakly distressed bank than the non-distressed banks. Appendix 9 confirms that households with an exclusive relationship or a loan at the strongly distressed bank are less likely to withdraw deposits, and that the exclusivity of the relationship has a stronger effect than the scope of the bank relationship.

While our study is focused on the withdrawal of demand deposits by retail customers, it is interesting to examine whether there were similar movements in non-deposit assets. If withdrawals of demand deposits are accompanied by the withdrawal of other assets under

management, i.e. securities portfolios, the profitability and thus solvency of the bank is further impaired. In Appendix 10 and Appendix 11 we replicate our main regression analysis replacing our dependent variable *Withdrew deposits* with the variable *Withdrew non-deposits*. This variable measures whether a household withdrew funds from a securities account or a retirement account. We bundle securities accounts and retirement accounts together as tax deferred retirement accounts in Switzerland often include mutual fund holdings. Among the 2,563 pre-crisis bank-relationships in our sample 1,086 feature a securities account and/or a retirement account. As shown in Table 1 the incidence of withdrawals of non-deposit assets is 14.5% for the strongly distressed bank, 3.8% for the weakly distressed bank and 1.9% for non-distressed banks. The Appendix 10 (column 1) estimates confirm that households are significantly more likely to withdraw non-deposit assets from the strongly distressed bank than from non-distressed banks. However, the point estimate of *Strong distress* (16.1 percentage points) is smaller than that reported for demand deposits in Table 2. The point estimate for *Weak distress* is also smaller than that reported in Table 2 and is not significant. The Appendix 11 (column 1) estimates suggest that our indicators of the exclusivity and scope of bank-relationships (*Single accoun*t, *Credit Linkage*) are associated with less withdrawals of non-deposit assets. However, the point estimates of Single account and Credit linkage are smaller and less precisely estimated than those reported for deposits in Table 5. Thus, qualitatively our findings for the withdrawal of demand deposits seem also to hold for non-deposit assets. However, the effects for non-deposit assets are much weaker than for demand deposits.

The variables *Withdrew deposits* and *Withdrew non-deposits* both capture the incidence of asset withdrawals, but have little to say about the magnitude of these withdrawals. In our survey respondents report what share of their total assets with a bank they reallocated during the crisis and whether they ceased the respective bank relationship. Based on this information we establish three indicators of the magnitude of asset withdrawals: *Withdrew assets (less 50%), Withdrew*

assets (at least 50%), and *Bank relationship ceased*. Table 1 shows that large withdrawals are much more frequent than small withdrawals at the strongly distressed bank (16.1% versus 7.6%). This is neither the case for the weakly distressed bank (2.4% versus 2.9%) nor for the non-distressed banks (1% versus 0.7%). Moreover, the closure of bank relationships is much more frequent for the strongly distressed bank (11%) than for the weakly distressed bank (1%) or non-distressed banks (0.7%). The estimates in Appendix 10 (columns 3-5) confirm that significant asset withdrawals (at least 50% of assets) and account closures are much more frequent at the strongly distressed bank than the other banks. The estimated difference between the strongly distressed bank and the other banks is less pronounced for small withdrawals (less than 50% of assets). The Appendix 11 estimates show that strong bank-client relationships (as proxied by *Single account* and *Credit linkage*) are particularly effective in mitigating significant asset withdrawals (column 4) and account closures (column 5). By contrast, strong client-bank relationships seem to play little role in deterring less significant asset withdrawals (column 3).

Our main indicators of the strength of bank-client relationships capture the exclusivity (*Single account*) and scope (*Credit linkage)* of each relationship. However, a credit linkage is only one dimension of the scope of a bank relationship. In Appendix 12 we employ two alternative measures of relationship scope *Securities account* and *Retirement account* and replicate our main analysis from Table 5. The Appendix 12 results confirm that a broader relationship scope as measured by the presence of a securities account or a retirement account mitigate withdrawal risk from the strongly distressed bank. The magnitude and significance of the estimate for *Securities account* (column 4) is similar to that for *Credit Linkage* (column 2), while the estimate for Retirement account is smaller and less precisely estimated. Comparing the column (2-4) estimates in Appendix 12 to that of *Single account* in column 1 confirms that the exclusivity of a bank relationship has a stronger mitigating effect on withdrawal risk than the scope of the relationship.

Our next robustness test relates to our indicators of deposit insurance coverage as employed in the sample splits in Table 6 and Table 7. Compared to recent studies based on administrative data our survey provides only an approximate indicator of deposit insurance coverage. In our main analysis we use the dummy variable *Low wealth* as our proxy of insurance coverage. This proxy is equal to one if households have total financial wealth below the insurance coverage threshold of CHF 100,000. However, households with total financial wealth exceeding CHF 100,000 may be fully covered by deposit insurance if these funds are spread across multiple bank accounts, or if some of their financial wealth is invested in securities. In Appendix 13 and 14 we replicate the Table 6 and Table 7 subsample splits using two alternative proxies of deposit insurance coverage. First, we account for the fact that not all financial wealth is held in deposit accounts. In our survey, households report which share of their total financial wealth is held in deposits and which share is held in securities. Based on this information we establish the indicator *Low wealth (deposits)* which is 1 for households with total financial wealth below CHF 100,000 or total financial wealth between CHF 100,000 and 250,000 but not more than 50% in bank deposits. Second, we account for the fact that households with multiple bank accounts may be fully covered by deposit insurance even if they have a total deposit volume exceeding CHF 100,000. We therefore define those households as *Insured* which have total financial wealth of less than CHF 100,000, or between CHF 100,000 and 250,000 but at least 2 accounts. The Appendix 13 results confirm that the propensity of households to withdraw from the strongly distressed bank is higher for uninsured households. The Appendix 14 results confirm that strong bank-client relationships are less likely to mitigate withdrawals from the strongly distressed banks when households are uninsured.

In a further robustness test we examine to what extent the deposit withdrawals at the two distressed banks are affected by their local market presence. The two large internationally operating banks UBS and Credit Suisse may have been associated with negative reports about

the banking sector as a whole. Thus, the two distressed banks in our sample may have potentially experienced deposit outflows even if they had not experienced financial distress simply because they were more salient. As we show in section 2 the balance sheet volume of UBS or Credit Suisse dwarf those of other Swiss banks but they do not have a dominating position in the Swiss domestic retail market (Appendix 1). Moreover, their share of the retail market varies considerably across region within Switzerland. As we show in Appendix 1 (Panel B) the regional market share of customer deposits of UBS and Credit Suisse in the market for customer deposits varies from less than 10% to more than 50% across the cantons. Likewise, the regional share of bank branches of UBS and Credit Suisse varies from less than 10% to more than 30% across the cantons. We replicate the Table 2 estimates for cantons in which UBS and Credit Suisse jointly have at least 17% of regional bank branches (which equals the average countrywide share), and cantons where they have less than 17% of regional bank branches. The results of this sample-split are presented in Appendix 15. These suggest that the propensity to withdraw deposits from the distressed banks is similar across regions which vary in the local presence and thus saliency of these two banks.

In a last robustness test, we alleviate concerns of reverse causality. Clients at the distressed banks, UBS and Credit Suisse, might have experienced idiosyncratic liquidity shocks because they themselves had directly invested in financial assets that lost value. As a result they might have withdrawn their deposits from these banks. As argued above, we argue that this is unlikely as (i) we focus on reallocations of deposits which do not include cash withdrawals and (ii) we provide results for specifications in which we control for all household characteristics via household fixed effects. To further alleviate these concerns, we run a robustness test in which replicate the main results displayed in column 4 of Table 2 using subsamples of households that had securities accounts and compare the results to subsamples of households that did not have securities accounts. The results displayed in Appendix 16 suggest that the withdrawal propensity

of UBS clients not having a securities account is even larger (26 percent) compared to households having securities account (16 percent). We conclude that investments losses incurred by clients of the two distressed banks, UBS and Credit Suisse, are almost certainly not driving our results.

8. Conclusions

We study retail deposit withdrawals from Swiss commercial banks which were differentially exposed to distress during the 2007-2009 global financial crisis. Our analysis is based on consumer finance survey data providing information on 2,563 pre-crisis bank relations of 1,475 consumers and documenting their reallocation of assets across banks during 2008-2009. This data allows us to examine to what extent strong relationships with a distressed bank mitigate deposit withdrawal risk.

We document that retail clients do discipline - in our case - systemically-important commercial banks when these banks are subject to financial distress. Importantly though, strong bank-client relationships play a crucial role in mitigating withdrawal risk at distressed banks. Clients who maintain exclusive or broad relationships with a distressed bank are less likely to withdraw funds. Strong client-bank relationships mitigate withdrawal risk even for those banks which are not in distress or are only weakly distressed. However, in absolute terms the magnitude of this mitigating effect is substantially larger when a bank is distressed. In our setting, 23 percent of the clients of the most distressed bank withdraw funds from the bank during 2008-2009. Our estimates suggest that this effect is eliminated if a client banked exclusively with this institution and is more than halved if the client had a mortgage with this bank. Thus the exclusivity of a bank relationship seems to be more important for the mitigation of withdrawal risk than the scope of the relationship.

Our results provide empirical support to the configuration of the recently introduced Basel III minimum liquidity requirements for banks. The Liquidity Coverage Ratio (LCR), for example, requires banks to hold sufficient highly liquid assets in order to withstand expected fund outflows over a 30 day period in a severe distress scenario. This severe distress scenario includes market wide disruptions in wholesale funding as well as an idiosyncratic solvency risk to the bank. This scenario much resembles that of the strongly distressed bank in our setting. The LCR regulations assume that in such a scenario the expected fund outflows will not only depend on the contract type and maturity of the underlying bank funding, but also on the characteristics of depositors that a bank caters to. It assumes a run-off rate for stable deposits of 3% to 5% or more, whereas unstable deposits are factored in on the basis of run-off rates of at least 10% (BIS, 2013). In Table 5 we observed that in case of a strongly distressed bank the average propensity to withdraw deposits (23%) was eliminated in case a strong banking relationship was existing (e.g. single account holders (credit linkage) reduced the probability to withdraw by 27% (13%)). Our findings support the conjecture that banks with tighter depositor relationships should hold less liquidity as the corresponding deposits are a more stable source of funding even in a severe distress situation as specified by the Basel Committee in the LCR. If at all, our findings show that the current regulatory run-off rates for stable deposits are rather conservative.

The incidence of deposit withdrawals which we report for the distressed banks in our sample is consistent with that of recent studies documenting very different incidences of distress, for very different types of banks in very different economic conditions (Rose, 2015; Davenport and McDill, 2006; Shin, 2009; Iyer et al., 2016). Nevertheless, more research is required to guide policy makers on the potential magnitude of run-off rates for “stable” and “less stable” deposits in different bank stress scenarios. The stress scenario reported in this paper is very particular: The distressed banks are systemically important, internationally operating commercial banks. The main source of financial distress to these banks was losses on international assets. This financial distress was further exacerbated by their involvement in the international dispute over

tax evasion in offshore banking services. More research is required to examine how bank-client relationships mitigate withdrawal risk among banks that are not too big to fail and/or are primarily focused on the domestic retail market.

References

Agarwal, S. and B. Mazumder (2013). Cognitive Abilities and Household Financial Decision Making. *American Economic Journal: Applied Economics* 5, 193-207.

Bartiloro, L. (2011). Is Your Money Safe? What Italians Know about Deposit Insurance. *Banca D'Italia Occasional Paper* 104.

Bertay, A. C., A. Demirguç-Kunt, and H. Huizinga (2013). Do we need big banks? Evidence on performance, strategy and market discipline. *Journal of Financial Intermediation* 22, 532–558.

BIS (2013). Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools. Available online at http://www.bis.org/publ/bcbs238.pdf; retrieved on July 2nd, 2013.

Boot, A. (2000). Relationship Banking: What do we know?. *Journal of Financial Intermediation* 9, 7-25.

Brown, M. and R. Graf (2013). Financial Literacy and Retirement Planning in Switzerland. *Numeracy* 6.

Brown, M., S. Trautmann, and R. Vlahu (2016). Understanding Bank-Run Contagion. *Management Science* 63, 2272-2282.

Brunetti, M., R. Ciciretti, and Lj. Djordjevic (2016). The determinants of household's bank switching. *Journal of Financial Stability* 26, 175-189.

Calomiris, C. W. and C. M. Kahn (1991). The Role of Demandable Debt in Structuring Optimal Banking Arrangements. *American Economic Review* 81, 497-513.

Calomiris, C. W. and J. R. Mason (1997). Contagion and Bank Failures during the Great Depression: The June 1932 Chicago Banking Panic. *American Economic Review* 87, 863-883.

Carbo-Valverde, S., T. H. Hannan, and F. Rodriguez-Fernandez (2011). Exploiting old customers and attracting new ones: The case of bank deposit pricing. *European Economic Review* 55, 903-915.

Carlson, M.A. and J. D. Rose (2016). Can a Bank Run be stopped? Government Guarantees and the Run on Continental Illinois. Finance and Economics Discussion Series 2016-003. Washington: Board of Governors of the Federal Reserve System.

Chari, V., R. Jagannathan (1988). Banking Panics, Information and Rational Expectations Equilibrium. *Journal of Finance* 43, 749-761.

Credit Suisse (2008). Credit Suisse builds on strong capital position. Press Release. Available online at https://www.credit-suisse.com/news/en/media_release.jsp?ns=40924, retrieved on September 22th, 2013.

Cubillas, E., A. I. Fernandez, and F. Gonzalez (2017). How Credible is a too-big-to-fail policy? International evidence from market discipline. *Journal of Financial Intermediation* 29, 46-67.

Davenport, A. M., and K. M. McDill (2006). The Depositor Behind the Discipline: A Micro-Level Case-Study of Hamilton Bank. *Journal of Financial Services Research* 30, 93-109.

Demirguç-Kunt, A. and H. Huizinga (2004). Market discipline and deposit insurance. *Journal of Monetary Economics* 51, 375-399.

Deuflhard, F., D. Georgarakos, and R. Inderst (2017). Financial literacy and savings account returns. *Journal of the European Economic Association. forthcoming.*

Devlin, J. F. (2002). Customer Knowledge and Choice Criteria in Retail Banking. *Journal of Strategic Marketing* 10, 273–290.

Diamond, D. W. and R. Rajan (2001). Liquidity Risk, Liquidity Creation and Financial Fragility: A Theory of Banking. *Journal of Political Economy* 109, 287-327.

Ellis, D. M. and M. J. Flannery (1992). Does the debt market assess large banks, risk?: Time series evidence from money center CDs. *Journal of Monetary Economics* 30, 481-502.

Emmenegger, P. (2017). Swiss banking secrecy and the problem of international cooperation in tax matters: A nut too hard to crack? *Regulation & Governance* 11. 24-40.

Gerardi K., L. Goette, and S. Meier (2013). Numerical ability predicts mortgage default. *Proceedings of the National Academy of Sciences (PNAS)* 110, 11267-11271.

Goldberg, L. G. and S. C. Hudgins (2002). Depositor Discipline and Changing Strategies for Regulating Thrift Institutions. *Journal of Financial Economics* 63, 263-274.

Goldstein, I. and A. Pauzner (2005). Demand Deposit Contracts and the Probability of Bank Runswith, *Journal of Finance* 60, 1293-1328.

Hannan, T. H. and G. A. Hanweck (1988). Bank insolvency risk and the market for large certificates of deposit. *Journal of Money, Credit and Banking* 20, 203-211.

Hannan, T. H. and R. M. Adams (2011). Consumer Switching Costs and Firm Pricing: Evidence from Bank Pricing of Deposit Accounts. *Journal of Industrial Economics* 59 (2), 296-320.

Hasan, I., K. Jackowicz, O. Kowalewski, and L. Kozlowski (2013). Market Discipline during Crisis: Evidence from Bank Depositors in Transition Countries. *Journal of Banking and Finance* 37, 5436-5451.

Ioannidou, V. and S. Ongena (2010). Time for a Change: Loan Conditions and Bank Behavior when Firms switch Bank. *Journal of Finance* 65 (5), 1847-1877.

Iyer, R. and J. Peydro (2011). Interbank Contagion at Work: Evidence from a Natural Experiment. *Review of Financial Studies* 24, 1337-1377.

Iyer, R. and M. Puri (2012). Understanding bank runs: The importance of depositor bank relationships and networks. *American Economic Review* 102, 1414-1445.

Iyer, R., M. Puri, and N. Ryan (2016). A Tale of two Runs: Depositor Responses to Bank Solvency Risk. *Journal of Finance* 71, 2687-2726.

Iyer, R., T. Jensen, N. Johannesen and A. Sheridan (2017). The Run for Safety: Financial Fragility and Deposit Insurance. *Working Paper.* Available at SSRN: http://dx.doi.org/10.2139/ssrn.2780073.

Jorgensen, B. (1996). Components of Consumer Reaction to Company-Related Mishaps: a Structural Equation Model Approach. *Advances in Consumer Research Volume* 23, 346-351.

Karas, A., W. Pyle, and K. Schoors (2013). Deposit Insurance, Banking Crises, and Market Discipline: Evidence from a Natural Experiment on Deposit Flows and Rates. *Journal of Money, Credit and Banking* 45, 179-200.

Kim, D. (2016). Depositor Runs and Financial Literacy. *Working Paper.*

Kim, M., D. Kliger, and B. Vale (2003). Estimating Switching Costs and Oligopolistic Behavior. *Journal of Financial Intermediation* 12, 25-56.

Kiser, E. K. (2002). Predicting household switching behavior and switching costs at depository institutions. *Review of Industrial Organization* 20, 349-365.

Klemperer, P. (1987). Markets with consumer switching costs. *Quarterly Journal of Economics* 102, 375-394.

Kysucky, V., and L. Norden (2016). The Benefits of Relationship Lending in a Cross-Country Context: A Meta-Analysis. *Management Science* 62, 90-110.

Lusardi, A. and O. S. Mitchell (2011). Financial literacy around the world: an overview. *Journal of Pension Economics and Finance* 10, 497-508.

Lusardi, A. and P. Tufano (2015). Debt Literacy, Financial Experiences and Overindebtdness. *Journal of Pension Economics and Finance* 14, 329-365.

Martin, C., M. Puri and A. Ufier (2017). On Deposit Stability in Failing Banks. *Working Paper.*

Oliveira, R. de F., R. F. Shiozer and L. A. B. de C. Barros (2015). Depositors' Perception of 'Too Big Too Fail'. *Review of Finance* 19, 191-227.

Pearson, C. M. and J. A. Clair (1998). Reframing Crisis Management. *Academy of Management Review* 23, 59-76.

Peria, M. S. M. and S. L. Schmukler (2001). Do Depositors Punish Banks for Bad Behavior? Market Discipline, Deposit Insurance, and Banking Crises. *Journal of Finance* 56, 1029-1051.

Puri, M., J. Rocholl, and S. Steffen (2011). Global Retail Lending in the Aftermath of the US Financial Crisis: Distinguishing between Demand and Supply Effects. *Journal of Financial Economics* 100, 556-578.

Puri, M., J. Rocholl, and S. Steffen (2017). What Do a Million Observations Have to Say About Loan Defaults? Opening the Black Box of Relationships. *Journal of Financial Intermediation* 31, 1-15.

Rose, J.D. (2015). Old-Fashioned Deposit Runs. *Finance and Economics Discussion Series 2015-111.* Washington: Board of Governors of the Federal Reserve System.

Salop, S. C. (1979). Monopolistic Competition with Outside Goods. *The Bell Journal of Economics* 10, 141-156.

Saunders, A. and B. Wilson (1996). Contagious bank runs: Evidence from the 1929-1933 period. *Journal of Financial Intermediation* 5, 409-423.

Schumacher, L. (2000). Bank runs and currency run in a system without a safety net: Argentina and the 'tequila' shock. *Journal of Monetary Economics* 46, 257-277.

SFBC (2008). Jahresbericht 2008 Swiss Federal Banking Commission. https://www.finma.ch/de/~/media/finma/dokumente/dokumentencenter/myfinma/finma-publikationen/geschaeftsbericht/jb08_d_ebk.pdf?la=de; retrieved on Feb 2nd, 2017.

Sharpe, S. (1990). Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships. *Journal of Finance* 45, 1069-1087.

Sharpe, S. (1997). The Effect of Consumer Switching Costs on Prices: A Theory and its Application to the Bank Deposit Market. *Review of Industrial Organization* 12, 79-94.

Shin, H. S. (2009). Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis. *Journal of Economic Perspectives* 23, 101-119.

Sträter, N., M. Cornelissen, and A. Pfingsten (2008). Deposit Insurance: An Empirical Study of Private Investors‘ Knowledge and Perception. Working Paper, University of Muenster.

Teichert, T. and D. Wagenführer (2012). Effects of Disruptive Events on Consumer Loyalty: Bank Switching after the 2008’s Crisis. *Journal of Business and Policy Research* 7, 195-205.

UBS (2007). UBS strengthens capital base and adjusts valuations. Available online at http://www.ubs.com/global/en/about_ubs/investor_relations/releases/adhocre/news_display_page_adhocre.html/en/2007/12/10/ubs_strengthens_capital_base_and_adjusts.html; retrieved on January 2nd, 2013.

UBS (2008a). UBS AG successfully completes its rights offering. Available online at http://www.ubs.com/global/en/about_ubs/investor_relations/releases/adhocre/news_display_page_adhocre.html/en/2008/06/13/ubs_ag_successfully_completes_its_rights_offering.html; retrieved on January 2nd, 2013.

UBS (2008b). UBS further materially de-risks balance sheet through transaction with Swiss National Bank. Available online at http://www.ubs.com/global/en/about_ubs/about_us/news/news.html/en/2008/10/16/2008_10_16a.html; retrieved on January 2nd, 2013.

Van der Cruijsen, A. B., J. De Haan, D.-J. Jansen, and R. H. J. Mosch (2012). Households’ Decisions on Savings Accounts after Negative Experiences with Banks During the Financial Crisis. *Journal of Consumer Affairs* 46, 436-456.

Van Rooij, M., A. Lusardi and R. J. M. Alessie (2012). Financial Literacy, Retirement Planning and Household Wealth. *Economic Journal* 122, 449-478.

Van Rooij, M., A. Lusardi and R. J. M. Alessie (2011). Financial Literacy and Stock Market Participation. *Journal of Financial Economics* 101, 449-472.

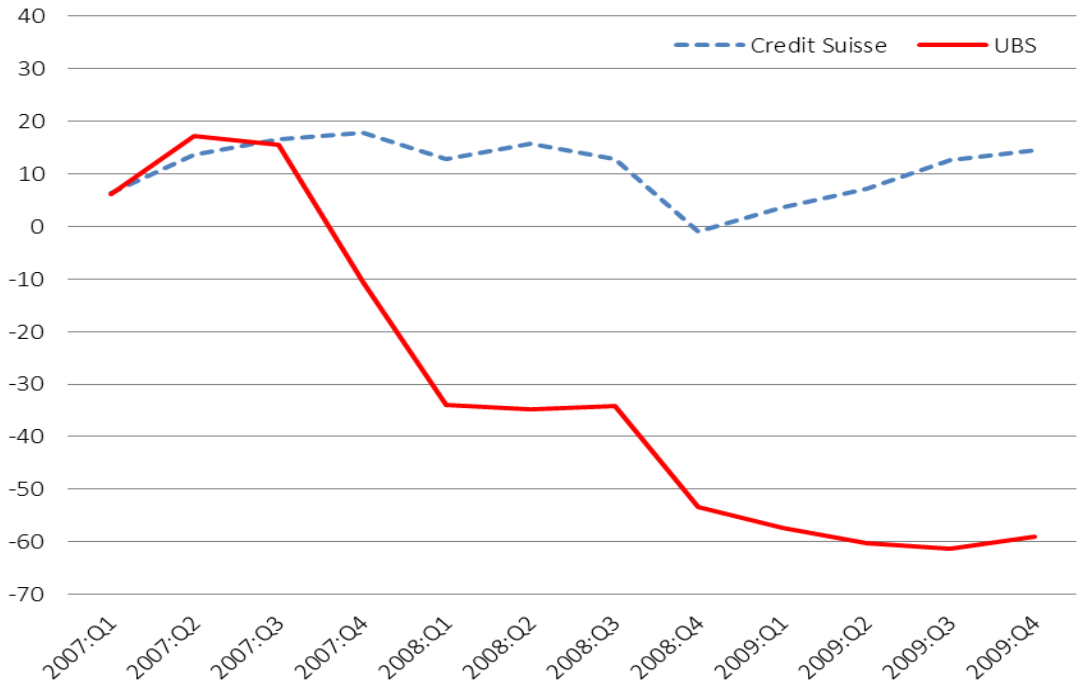
Von Thadden, E. (2004). Asymmetric Information, Bank Lending and Implicit Contracts. *Finance Research Letters* 1, 11-23.

Zephirin, M. G. (1994). Switching Costs in the Deposit Market. *Economic Journal* 104, 455-461.

Figure 1. Net income and customer deposits at UBS and Credit Suisse, 2006-2009

Panel A displays the evolution of cumulated quarterly profits between 2007 and 2009 relative to equity in December 2006 by bank. Panel B displays the evolution of customer obligations between 2006 and 2009 relative to customer obligations in December 2006 (=100) by bank.
Source: quarterly reports published by UBS and Credit Suisse.

Panel A. Cumulated quarterly profits in % of pre-crisis equity (2006:Q4)



Panel B. Outstanding customer obligations (2006:Q4=100)

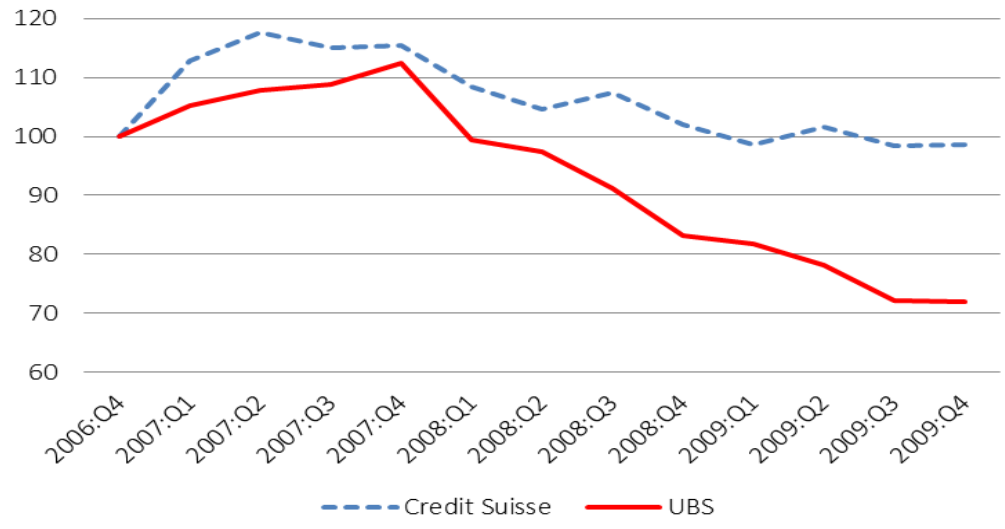


Figure 2. Deposit relationships prior to the crisis

This figure shows the number of respondents that had pre-crisis deposit accounts with large & private-owned banks (Raiffeisenbank, Credit Suisse, UBS), large & state-owned banks (Postfinance, Zürcher Kantonalbank), small & state-owned banks (Cantonal banks) and small & private-owned banks indicated by the red, dark blue and light blue circles. The lines connecting two circles indicate the number of respondents that had pre-crisis deposit accounts with the corresponding two banks.

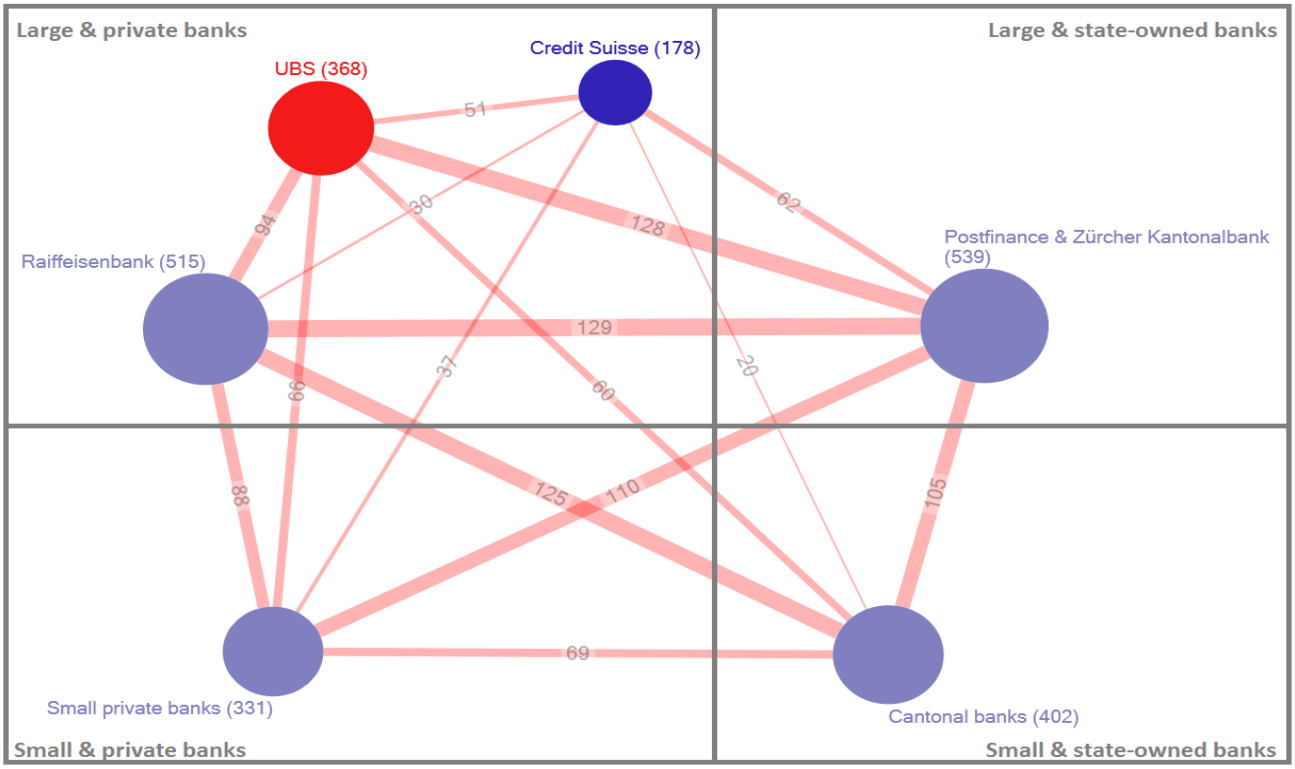


Figure 3. Interest rates on demand deposits

This figure displays the median and interquartile range of interest rates (in %) on CHF denominated demand deposits by month as reported by banks to the Swiss National Bank. The figure further displays the interest rate offered by UBS and Credit Suisse on demand deposits. Source: Swiss National Bank, Press releases of UBS and Credit Suisse.

Table 1. Bank distress and asset withdrawals

This table shows univariate t-tests that compare mean asset withdrawals from accounts at the strongly-distressed bank *(UBS),* the weakly-distressed bank *(Credit Suisse)* and non-distressed banks (other banks). The dependent variables are *Withdrew deposits, Withdrew non-deposits, Withdrew assets, Withdrew assets (less 50%), Withdrew assets (at least 50%)* and *Bank relationship ceased.* Ordinary standard errors are reported in parentheses. ***, **, * denote statistical significance of the univariate tests at the 0.01, 0.05 and 0.10-level respectively. Definitions and sources of the variables are provided in Appendix 3.

Deposit relationship	Strong distress (UBS)	Weak distress (Credit Suisse)	No distress (other banks)	Difference	Difference	Difference
Dependent variable	(1)	(2)	(3)	(1)-(3)	(2)-(3)	(1)-(2)
Withdrew deposits	0.234 (N=368)	0.056 (N=178)	0.013 (N=1,868)	0.221*** (0.011) (N=2,236)	0.043*** (0.010) (N=2,046)	0.178*** (0.034) (N=546)
Withdrew non-deposits	0.145 (N=186)	0.038 (N=105)	0.019 (N=795)	0.126*** (0.009) (N=981)	0.019 (0.015) (N=900)	0.107*** (0.037) (N=291)
Withdrew assets	0.237 (N=397)	0.054 (N=205)	0.017 (N=1,956)	0.220*** (0.012) (N=2,353)	0.037*** (0.010) (N=2,161)	0.183*** (0.032) (N=602)
Withdrew assets (less 50%)	0.076 (N=397)	0.029 (N=205)	0.007 (N=1,956)	0.069*** (0.007) (N=2,353)	0.023*** (0.007) (N=2,161)	0.046** (0.020) (N=602)
Withdrew assets (at least 50%)	0.161 (N=397)	0.024 (N=205)	0.010 (N=1,956)	0.151*** (0.010) (N=2,353)	0.014* (0.008) (N=2,161)	0.137*** (0.027) (N=602)
Bank relationship ceased	0.110 (N=400)	0.010 (N=205)	0.007 (N=1,958)	0.103*** (0.008) (N=2,358)	0.003 (0.006) (N=2,163)	0.100*** (0.022) (N=605)

Table 2. Bank distress and deposit withdrawals

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* Columns 1-4 report the results for the full sample of all deposit relationships with distressed or non-distressed banks. Column 5 reports the results for the subsample of deposit relationships held by households with deposits relationships with at least one distressed bank and at least one non-distressed bank. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits	Withdrew deposits	Withdrew deposits	Withdrew deposits	Withdrew deposits
Sample (deposit accounts)	All deposit accounts	All deposit accounts	All deposit accounts	All deposit accounts	Multiple deposit accounts
	(1)	(2)	(3)	(4)	(5)
Strong distress (UBS)	0.217***	0.225***	0.228***	0.228***	0.358***
	[0.022]	[0.022]	[0.022]	[0.022]	[0.041]
Weak distress (Credit Suisse)	0.039*	0.046*	0.050**	0.051**	0.152***
	[0.022]	[0.024]	[0.024]	[0.025]	[0.044]
Household Controls	YES	YES	YES	YES	NO
Bank Controls	NO	YES	YES	YES	YES
Bank Competition Controls	NO	NO	YES	YES	NO
Household Fixed Effects	NO	NO	NO	NO	YES
Regional Fixed Effects	NO	NO	NO	YES	NO
Observations	2,093	2,093	2,093	2,093	822
Households	1,231	1,231	1,231	1,231	315
Mean of dependent variable	0.050	0.050	0.050	0.050	0.111
R-squared	0.144	0.145	0.147	0.159	0.264
Clustered standard errors	YES	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS	OLS

Table 3. Motivation for asset withdrawals

This table shows the motivation for asset withdrawals as reported by 103 households which withdrew assets. The variables of interest are *Corporate policy* (column 1), *Bank risk* (column 2), *Prices* (column 3), *Corporate policy = Bank risk > Prices* (column 4) and *Other* (column 5). *Corporate policy* takes on the value of one if the respondent states that the reason *Corporate policy* was more important than *Bank risk* and *Prices* (zero otherwise). *Bank risk* takes on the value of one if the respondent states that the reason *Bank risk* was more important than *Corporate policy* and *Prices* (zero otherwise). *Prices* takes on the value of one if the respondent states that the reason *Prices* was more important than *Bank risk* and *Corporate policy* (zero otherwise). *Corporate policy = Bank risk > Prices* takes on the value of one if the respondent states that *Corporate policy* and *Bank risk* were equally important and more important than *Prices. Other* takes on the value of one otherwise. Row 1 reports the relative frequencies for the subsample of households that withdrew assets only from the strongly-distressed bank (*UBS*). Row 2 shows the relative frequencies for the subsample of households that withdrew assets only from the weakly-distressed bank (*Credit Suisse*). Row 3 shows the relative frequencies for the subsample of households that withdrew assets only from non-distressed banks. In total 113 households in our sample report that they reallocated assets during the crises. This table omits 10 households of which 5 households did not respond to the questions on why they withdrew assets and 5 withdrew from multiple banks.

Motivation for asset withdrawals	Corporate policy	Bank risk	Prices	Corporate policy = Bank risk > Prices	Other	Observations
	(1)	(2)	(3)	(4)	(5)	(6)
Withdrew from strongly-distressed bank (UBS)	0.23	0.22	0.14	0.22	0.19	N=78
Withdrew from weakly-distressed bank (Credit Suisse)	0.00	0.29	0.14	0.14	0.43	N=7
Withdrew from non-distressed banks	0.06	0.11	0.44	0.17	0.22	N=18

Table 4. Characteristics of clients with deposits at the strongly-distressed bank (UBS)

The table compares household characteristics of clients of the strongly-distressed bank (UBS) conditional on whether they withdrew deposits from that bank during the crisis. The last column tests the differences in means (t-test). The number of households (N) are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively (calculated using ordinary standard errors). Definitions and sources of the variables are provided in Appendix 3.

Dependent variable	Withdrew	Did not withdraw	Difference
	(1)	(2)	(3)
Bank relationship variables			
Single account	0.093	0.355	-0.262***
	(N=86)	(N=282)	(N=368)
Credit linkage	0.314	0.429	-0.115*
	(N=86)	(N=282)	(N=368)
Household control variables			
Low wealth	0.571	0.646	-0.074
	(N=77)	(N=257)	(N=334)
Low income	0.342	0.328	0.014
	(N=79)	(N=259)	(N=338)
University	0.419	0.404	0.014
	(N=86)	(N=282)	(N=368)
Insurance knowledge	0.372	0.287	0.085
	(N=86)	(N=282)	(N=368)
Financial literacy	0.593	0.521	0.072
	(N=86)	(N=282)	(N=368)
Age	3.840	3.799	0.041
	(N=86)	(N=282)	(N=368)
Male	0.477	0.475	0.002
	(N=86)	(N=282)	(N=368)
Risk averse	0.729	0.583	0.146**
	(N=85)	(N=276)	(N=361)
Time preference	0.306	0.231	0.075
	(N=85)	(N=281)	(N=366)
Bank competition control variables			
Distance UBS km	4.008	3.556	0.452
	(N=86)	(N=282)	(N=368)
Distance Credit Suisse km	6.262	5.926	0.336
	(N=86)	(N=282)	(N=368)
Distance non-distressed bank km	0.543	0.837	-0.294
	(N=86)	(N=282)	(N=368)
Banks / ZIP code	2.035	2.202	-0.167
	(N=86)	(N=282)	(N=368)

Table 5. Bank-client relationships and deposit withdrawals

This table displays the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* All columns show the results for the subsample of deposit relationships with the strongly-distressed bank (*UBS* Other deposit relationships are excluded. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits		
Sample (deposit accounts)	Deposit accounts with strongly-distressed bank (UBS)		
	(1)	(2)	(3)
Single account	-0.266***	-0.260***	-0.265***
	[0.045]	[0.044]	[0.047]
Credit linkage	-0.147***	-0.136***	-0.126**
	[0.041]	[0.042]	[0.048]
Household Controls	YES	YES	YES
Bank Controls	NO	NO	NO
Bank Competition Controls	NO	YES	YES
Household Fixed Effects	NO	NO	NO
Regional Fixed Effects	NO	NO	YES
Observations	321	321	321
Households	321	321	321
Mean of dependent variable	0.231	0.231	0.231
R-squared	0.141	0.150	0.188
Clustered standard errors	YES	YES	YES
Method	OLS	OLS	OLS

Table 6. Bank distress and deposit withdrawals: Subsample analyses

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* The full sample of all deposit relationships with distressed or non-distressed banks is split by *Wealth* (column 1-2), *Insurance knowledge* (column 3-4), *Financial literacy* (column 5-6). Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits		Withdrew deposits		Withdrew deposits	
Sample (deposit accounts)	All deposit accounts		All deposit accounts		All deposit accounts	
Subsample (households)	Low wealth	High wealth	Low insurance knowledge	High insurance knowledge	Low financial literacy	High financial literacy
	(1)	(2)	(3)	(4)	(5)	(6)
Strong distress (UBS)	0.208***	0.271***	0.217***	0.263***	0.213***	0.239***
	[0.033]	[0.041]	[0.030]	[0.055]	[0.031]	[0.036]
Weak distress (Credit Suisse)	0.033	0.076*	0.027	0.102**	0.065**	0.038
	[0.025]	[0.043]	[0.020]	[0.049]	[0.031]	[0.031]
Household Controls	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES
Bank Competition Controls	YES	YES	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	1,383	710	1,469	624	925	1,168
Households	879	352	908	323	586	645
Mean of dependent variable	0.040	0.068	0.041	0.071	0.042	0.056
R-squared	0.150	0.206	0.180	0.187	0.160	0.191
Clustered standard errors	YES	YES	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS	OLS	OLS

Table 7. Bank-client relationships and deposit withdrawals: Subsample analyses

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* The subsample of deposit relationships with the strongly-distressed bank (UBS) is split by *Wealth* (column 1-2), *Insurance knowledge* (column 3-4), *Financial literacy* (column 5-6). Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits		Withdrew deposits		Withdrew deposits	
Sample (deposit accounts)	Deposit accounts with strongly-distressed bank (UBS)		Deposit accounts with strongly-distressed bank (UBS)		Deposit accounts with strongly-distressed bank (UBS)	
Subsample (households)	Low wealth	High wealth	Low insurance knowledge	High insurance knowledge	Low financial literacy	High financial literacy
	(1)	(2)	(3)	(4)	(5)	(6)
Single account	-0.256***	-0.002	-0.242***	-0.287*	-0.220***	-0.251***
	[0.052]	[0.203]	[0.052]	[0.152]	[0.079]	[0.077]
Credit linkage	-0.168***	-0.086	-0.126*	-0.055	-0.158*	-0.086
	[0.061]	[0.095]	[0.064]	[0.125]	[0.096]	[0.077]
Household Controls	YES	YES	YES	YES	YES	YES
Bank Controls	NO	NO	NO	NO	NO	NO
Bank Competition Controls	YES	YES	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	201	120	223	98	139	182
Households	201	120	223	98	139	182
Mean of dependent variable	0.209	0.267	0.215	0.265	0.201	0.253
R-squared	0.258	0.265	0.256	0.327	0.294	0.270
Clustered standard errors	YES	YES	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS	OLS	OLS

Appendix 1. The performance and regional presence of Swiss banks

Panel A. Profitability and customer deposits of the 20 largest retail banks, 2006-2009

This table compares the net income and change in customer deposits of the 20 largest banks in Switzerland as measured by total assets in 2006 (all banks with assets > CHF 10 billion). Data source: Consolidated annual financial statements of each bank. For Credit Suisse and UBS the figures in this table are based on the corresponding consolidated financial statements of the whole group, the net income/ net profit is related to net income attributable to shareholders, the equity is the equity attributable to shareholders exculding minority interests. For Credit Suisse and UBS the net income figures attributable to shareholdes are derived from the annual report 2009. Annual write downs are defined as the annual net position of allowances, provisions and losses. For Credit Suisse and UBS annual write downs are defined as annual net credit losses.

	Assets 2006 (Mio CHF)	Equity 2006 (Mio CHF)	Deposits 2006 (Mio CHF)	Net Income 2007 (Mio CHF)	Net Income 2008 (Mio CHF)	Net Income 2009 (Mio CHF)
	(1)	(2)	(3)	(4)	(5)	(6)
UBS	2,396,511	49,686	570,565	-5,247	-21,292	-2,736
Credit Suisse	1,255,956	43,586	290,864	7,760	-8,218	6,724
Raiffeisenbank	113,998	6,663	75,371	701	564	645
Züricher Kantonalbank	95,205	6,843	44,884	843	503	751
Postfinance	52,100	n/a	40,600	318	229	441
Banque Cantonale Vadoise	33,030	3,419	18,192	473	356	301
Migros Bank	28,889	2,154	19,869	101	124	138
Basler Kantonalbank	25,668	2,498	8,045	280	173	239
Berner Kantonalbank	21,077	1,085	15,197	104	113	118
St.Gallener Kantonalbank	19,800	1,706	10,524	227	171	168
Luzerner Kantonalbank	18,902	1,613	10,542	150	143	141
Neue Aargauer Bank	17,611	882	10,327	156	115	108
Valiant Bank	17,185	1,648	11,508	152	149	149
Aargauische Kantonalbank	16,328	1,294	9,404	99	80	84
Basellandschaftliche Kantonalbank	14,995	1,413	9,233	101	96	106
Thurgauer Kantonalbank	14,923	1,237	7,524	57	61	68
Graubündner Kantonalbank	13,815	1,543	8,653	105	123	144
Banque Cantonale de Geneve	12,571	814	7,807	77	68	72
Bank Cler	11,559	797	6,824	82	65	71
Kantonalbank Schwyz	10,162	975	5,727	73	74	75

Panel A - continued

	Sum of Net Income (2007 until 2009)/ Equity 2006	Sum of Net Interest Income (2007 until 2009)/ Equity 2006	Sum of Trading Income (2007 until 2009)/ Equity 2006	Sum of Write Downs (2007 until 2009)/ Equity 2006	Change in Customer Deposits (2009 minus 2007)/ 2007
	(1)	(2)	(3)	(4)	(5)
UBS	-0.59	0.36	-0.69	0.10	-0.36
Credit Suisse	0.14	0.55	0.19	0.04	-0.15
Raiffeisenbank	0.29	0.86	0.05	0.00	0.18
Züricher Kantonalbank	0.31	0.54	0.13	0.06	0.35
Postfinance	n/a	n/a	n/a	n/a	0.72
Banque Cantonale Vadoise	0.33	0.44	0.06	0.01	0.14
Migros Bank	0.17	0.62	0.03	0.01	0.21
Basler Kantonalbank	0.28	0.48	0.11	0.04	0.31
Berner Kantonalbank	0.31	0.89	0.08	0.09	0.21
St.Gallener Kantonalbank	0.33	0.54	0.06	0.02	0.37
Luzerner Kantonalbank	0.27	0.56	0.06	0.03	0.38
Neue Aargauer Bank	0.43	0.95	0.08	0.04	0.08
Valiant Bank	0.27	0.58	0.02	0.01	0.25
Aargauische Kantonalbank	0.20	0.60	0.07	0.07	0.16
Basellandschaftliche Kantonalbank	0.21	0.55	0.03	0.03	0.14
Thurgauer Kantonalbank	0.15	0.56	0.03	0.02	0.18
Graubündner Kantonalbank	0.24	0.49	0.04	0.00	0.23
Banque Cantonale de Geneve	0.27	0.74	0.06	0.04	0.20
Bank Cler	0.27	0.65	0.05	0.07	0.16
Kantonalbank Schwyz	0.23	0.53	0.02	0.01	0.22

Panel B. Market shares by bank type and region, 2006

This table displays the regional market share of customer deposits and bank branches by bank group (as defined by the Swiss Natonal Bank) at end 2006. Source: SNB Data Portal.

Market share	Share of Customer Deposits (2006)			Share of Bank Branches (2006)		
Bank group	UBS & Credit Suisse	Cantonal banks	Raiffeisen & Regional Banks	UBS & Credit Suisse	Cantonal banks	Raiffeisen & Regional Banks
	(1)	(2)	(3)	(4)	(5)	(6)
Cantons						
Aargau	0.17	0.21	0.57	0.08	0.11	0.75
Appenzell Ausserrhoden	0.40	0.18	0.38	0.33	0.11	0.56
Appenzell Innerrhoden	0.08	0.55	0.36	0.11	0.33	0.56
Baselland	0.29	0.47	0.15	0.27	0.37	0.33
Basel-Stadt	0.51	0.29	0.02	0.29	0.29	0.03
Berne	0.27	0.24	0.42	0.17	0.22	0.57
Fribourg	0.23	0.34	0.39	0.15	0.21	0.59
Geneva	0.57	0.26	0.09	0.28	0.18	0.15
Glarus	0.15	0.61	0.23	0.13	0.44	0.44
Graubünden	0.19	0.55	0.23	0.12	0.40	0.42
Jura	0.20	0.22	0.56	0.07	0.20	0.72
Lucerne	0.20	0.39	0.36	0.13	0.20	0.60
Neuchâtel	0.38	0.37	0.16	0.18	0.26	0.42
Nidwalden	0.23	0.44	0.30	0.20	0.35	0.45
Obwalden	0.15	0.56	0.27	0.13	0.47	0.40
Schaffhausen	0.24	0.38	0.29	0.22	0.22	0.43
Schwyz	0.22	0.50	0.26	0.17	0.46	0.37
Solothurn	0.23	0.07	0.65	0.09	0.09	0.76
St Gallen	0.18	0.26	0.51	0.13	0.18	0.64
Thurgau	0.17	0.44	0.36	0.11	0.33	0.53
Ticino	0.40	0.14	0.34	0.17	0.09	0.42
Uri	0.16	0.45	0.39	0.06	0.44	0.50
Valais	0.29	0.24	0.45	0.12	0.32	0.51
Vaud	0.36	0.38	0.19	0.16	0.33	0.34
Zug	0.26	0.40	0.27	0.14	0.39	0.36
Zurich	0.40	0.37	0.11	0.30	0.33	0.18
Total						
Switzerland	0.31	0.32	0.30	0.17	0.25	0.47

Appendix 2. Survey representativeness

Panel A compares socioeconomic characteristics of the surveyed households to official data provided by the Federal Statistical Office in Switzerland *(Income, Age, Male, Swiss nationality),* Swiss Federal Tax Administration *(Wealth)* and OECD *(University).* Panel B compares the share of bank relationships in the survey to the share of total domestic deposits (savings and sight & time deposits) by bank group *(Large Banks, Cantonal Banks, Savings Banks, Other Banks)* as reported by the *Swiss National Bank* (as per end 2010).

Panel A. Socioeconomic characteristics

	Survey	Official data
	(1)	(2)
*Income**	106,405	115,248
*Wealth***		
Wealth below CHF 100,000	71.7%	66.0%
Wealth above CHF 100,000 & below CHF 1,000,000	26.8%	29.2%
Wealth above CHF 1,000,000	1.5%	4.8%
*Education****		
University	32.0%	35.2%
Age		
20-39 years	42.3%	33.6%
40-64 years	45.4%	44.7%
65+ years	12.4%	21.7%
Male	47.4%	49.6%
Swiss nationality	90.4%	76.7%

* Arithmetic average. Survey mean calculated as follows: income dummies weighted by share of households (assuming an average of CHF 2,250 of *First income dummy* and CHF 24,000 of *Sixth income dummy* and the middle of the income intervals for the other income dummies) for all households. Official data taken from the Swiss Federal Statistical Office. ** Official data taken from Swiss Federal Tax Administration (Gesamtschweizerische Vermögensstatistik der natürlichen Personen 2010). *** Official data taken from OECD (Factbook 2011-2012).

Panel B. Bank relationships

	Survey: Share of bank relationships May 2011	Official data: Share of domestic deposit volume (accounts)* December 2010
	(1)	(2)
Distressed Banks (UBS & Credit Suisse)	23.6%	21% (22%)
Cantonal Banks	23.5%	29% (26%)
Savings Banks	24.3%	26% (28%)
Other Banks (incl. Postfinance)	28.6%	24% (24%)

* Source: Swiss National Bank (Banks in Switzerland 2010).

Appendix 3. Variable definitions and sources

This table presents definitions and sources of the variables used in the empirical analysis. The first column indicates the variable name. The second column indicates the definition of the variable. The third column shows the data source.

Variable name	Definition	Source
Bank-relationship-level variables		
Withdrew deposits	Dummy = 1 if deposits were withdrawn from transaction or savings accounts of this relationship in 2008-2009, = 0 otherwise	Survey
Withdrew non-deposits	Dummy = 1 if assets other than deposits were withdrawn from securities or pension savings accounts of this relationship in 2008-2009, = 0 otherwise	Survey
Withdrew assets	Dummy = 1 if any assets were withdrawn from this relationship in 2008-2009, = 0 otherwise	Survey
Withdrew assets (less 50%)	Dummy = 1 if any assets (less than 50%) were withdrawn from this relationship in 2008-2009, = 0 otherwise	Survey
Withdrew assets (at least 50%)	Dummy = 1 if any assets (at least 50%) were withdrawn from this relationship in 2008-2009, = 0 otherwise	Survey
Bank relationship ceased	Dummy = 1 if the bank relationship was ceased during or after the financial crisis, = 0 otherwise	Survey
Credit linkage	Dummy = 1 if the pre-crisis relationship included a credit linkage with the bank (consumer or mortgage loan), = 0 otherwise	Survey
Retirement account	Dummy = 1 if the pre-crisis relationship experienced shifts of retirement savings in 2008-2009 or includes a retirement savings account in 2011, = 0 otherwise	Survey
Securities account	Dummy = 1 if the pre-crisis relationship experienced shifts of securities in 2008-2009 or includes a securities account in 2011, = 0 otherwise	Survey
Bank-level variables		
Strong distress (UBS)	Dummy = 1 if the pre-crisis relationship was with the strongly-distressed bank (UBS), = 0 otherwise	Survey
Weak distress (Credit Suisse)	Dummy = 1 if the pre-crisis relationship was with the weakly-distressed bank (Credit Suisse), = 0 otherwise	Survey
Too big to fail	Dummy = 1 if the pre-crisis relationship was with a too big to fail bank (UBS, Credit Suisse, Raiffeisenbank, Zürcher Kantonalbank, Postfinance), = 0 otherwise	Survey, SNB
State-owned	Dummy = 1 if the pre-crisis relationship was with a state-owned bank bank (all cantonal banks, Postfinance), = 0 otherwise	Survey
Tax dispute	Dummy = 1 if the pre-crisis relationship was with UBS or a bank classified in category 1 or 2 of the "Swiss Bank Program" of the U.S. Department of Justice, = 0 otherwise	fuw.ch
Respondent-level / Household-level variables		
Single account	Dummy = 1 if the household had deposit relationships with only one bank, = 0 otherwise	
Low wealth	Dummy = 1 if the household wealth is below CHF 100,000, = 0 otherwise	Survey
Low wealth (deposits)	Dummy = 1 if the household wealth is below CHF 100,000 or at least CHF 100,000 and below CHF 250,000 and up to 50% in bank accounts, = 0 otherwise	Survey
Insured	Dummy = 1 if the household wealth is below CHF 100,000 or at least CHF 100,000 and below CHF 250,000 and at least two deposit accounts, = 0 otherwise	Survey
Wealth	Household wealth; five wealth dummy variables (below CHF 50,000, at least CHF 50,000 and below CHF 100,000, at least CHF 100,000 and below CHF 250,000, least CHF 250,000 and below CHF 1 mio., at least CHF 1 mio.)	Survey
Low income	Dummy = 1 if the monthly household income is below CHF 7,000, = 0 otherwise	Survey
Income	Monthly household income; six income dummy variables (below CHF 4,500, at least CHF 4,500 and below CHF 7,000, at least CHF 7,000 and below CHF 9,000, at least CHF 9,000 and below CHF 12,000, at least CHF 12,000 and below CHF 15,000, at least CHF 15,000)	Survey

Respondent-level / Household-level variables (continued)

Variable name	Definition	Source
Insurance knowledge	Dummy = 1 if the respondent correctly responds to two questions about the existence & coverage of deposit insurance, = 0 otherwise	Survey
Financial literacy	Dummy = 1 if the respondent correctly responds to the three questions on financial literacy, = 0 otherwise	Survey
Age	Age of the respondent in years (natural logarithm)	Survey
Male	Dummy = 1 if the respondent is male, = 0 otherwise	Survey
University	Dummy = 1 if the respondent has a university degree, = 0 otherwise	Survey
Swiss nationality	Dummy = 1 if the respondent is Swiss, = 0 otherwise	Survey
Risk aversion	Dummy = 1 if the respondent has high risk aversion (below 3 on a scale from 1 (high) to 6 (low)), = 0 otherwise	Survey
Time preference	Dummy = 1 if the respondent has high time preference (above two on a scale from 1 (low) to 4 (high)), = 0 otherwise	Survey
Distance UBS km	Travel distance by car between the household and the closest UBS bank branch in km	Googlemaps
Distance Credit Suisse km	Travel distance by car between the household and the closest Credit Suisse bank branch in km	Googlemaps
Distance non-distressed bank km	Travel distance by car between the household and the closest non-distressed bank branch in km	Googlemaps
Banks / ZIP code	Number of bank branches per ZIP code in which the household is located	Googlemaps

Appendix 4. Summary statistics

This table reports the summary statistics of variables which include the mean values, standard deviations, the minimum and maximum values, as well as the number of observations. Panel A reports the summary statistics of bank relationships that existed at the beginning of the financial crisis (end 2008) on the level of the bank relationship. Panel B reports summary statistics of the bank-level variables on the level of the bank. Panel C reports the summary statistics of household characteristics of households that had bank relationships that existed at the beginning of the financial crisis (end 2008) on the level of the household/respondent. Definition and sources of the variables are provided in Appendix 3.

Panel A. Bank-relationship-level variables

	Mean	Std. Dev.	Minimum	Maximum	Observations
Withdrew deposits	0.05	0.22	0	1	2,414
Withdrew non-deposits	0.04	0.20	0	1	1,086
Withdrew assets	0.05	0.23	0	1	2,558
Withdrew assets (less 50%)	0.02	0.14	0	1	2,558
Withdrew assets (at least 50%)	0.03	0.18	0	1	2,558
Bank relationship ceased	0.02	0.15	0	1	2,563
Credit linkage	0.21	0.41	0	1	2,563
Retirement account	0.27	0.44	0	1	2,563
Securities account	0.27	0.44	0	1	2,563

Panel B. Bank-level variables

	Mean	Std. Dev.	Minimum	Maximum	Observations
Strong distress (UBS)	0.01	0.12	0	1	73
Weak distress (Credit Suisse)	0.01	0.12	0	1	73
Too big to fail	0.07	0.25	0	1	73
State-owned	0.27	0.45	0	1	73
Tax dispute	0.27	0.45	0	1	73

Panel C. Respondent-level / Household-level variables

	Mean	Std. Dev.	Minimum	Maximum	Observations
Single account	0.52	0.50	0	1	1,432
Low wealth	0.72	0.45	0	1	1,288
Low wealth (deposits)	0.75	0.43	0	1	1,288
Insured	0.82	0.38	0	1	1,288
First wealth dummy	0.47	0.50	0	1	1,288
Second wealth dummy	0.25	0.43	0	1	1,288
Third wealth dummy	0.18	0.38	0	1	1,288
Fourth wealth dummy	0.09	0.29	0	1	1,288
Fifth wealth dummy	0.01	0.12	0	1	1,288
Low income	0.39	0.49	0	1	1,315
First income dummy	0.09	0.28	0	1	1,315
Second income dummy	0.30	0.46	0	1	1,315
Third income dummy	0.25	0.43	0	1	1,315
Fourth income dummy	0.19	0.39	0	1	1,315
Fifth income dummy	0.09	0.29	0	1	1,315
Sixth income dummy	0.07	0.25	0	1	1,315
Insurance knowledge	0.25	0.44	0	1	1,432
Financial literacy	0.50	0.50	0	1	1,432
Age	3.78	0.30	3	4	1,432
Male	0.47	0.50	0	1	1,432
University	0.32	0.47	0	1	1,432
Swiss nationality	0.90	0.29	0	1	1,432
Risk aversion	0.68	0.47	0	1	1,405

Respondent-level / Household-level variables (continued)

	Mean	Std. Dev.	Minimum	Maximum	Observations
Time preference	0.28	0.45	0	1	1,419
Distance UBS km	5.08	5.95	0	85	1,432
Distance Credit Suisse km	7.38	7.35	0	58	1,432
Distance non-distressed bank km	0.80	1.66	0	14	1,432
Banks / ZIP code	1.94	1.78	0	10	1,432

Appendix 5. Characteristics of depositors by banks

This table compares household characteristics of those households with deposit relationships at the strongly-distressed bank (UBS), households with deposit relationships at the weakly-distressed bank (Credit Suisse) and households with deposit relationships *only* with non-distressed banks. In this table, *Credit linkage* is defined by having at least one deposit relationship including a credit linkage. The last two columns test the differences in means (t-test). The number of households (N) are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively (calculated using ordinary standard errors). Definitions and sources of the variables are provided in Appendix 3.

	Strong distress (UBS) (1)	Weak distress (Credit Suisse) (2)	No Distress (only) (3)	Difference (1)-(3)	Difference (2)-(3)
Bank-level variables					
Single account	0.293	0.303	0.616	-0.322***	-0.312***
	(N=368)	(N=178)	(N=937)	(N=1,305)	(N=1,115)
Credit linkage	0.402	0.472	0.360	0.043	0.112***
	(N=368)	(N=178)	(N=937)	(N=1,305)	(N=1,115)
Household-level variables					
Low wealth	0.629	0.533	0.768	-0.139***	-0.235***
	(N=334)	(N=152)	(N=848)	(N=1,182)	(N=1,000)
Low income	0.331	0.287	0.429	-0.098***	-0.142***
	(N=338)	(N=164)	(N=860)	(N=1,198)	(N=1,024)
University	0.408	0.444	0.274	0.133***	0.170***
	(N=368)	(N=178)	(N=937)	(N=1,305)	(N=1,115)
Insurance knowledge	0.307	0.393	0.213	0.094***	0.180***
	(N=368)	(N=178)	(N=937)	(N=1,305)	(N=1,115)
Financial literacy	0.538	0.545	0.478	0.060*	0.067
	(N=368)	(N=178)	(N=937)	(N=1,305)	(N=1,115)

Appendix 6. Bank distress and deposit withdrawals (all coefficients reported)

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* Column 1 reports the results for the full sample of all deposit relationships with distressed or non-distressed banks. Column 2 reports the results for the subsample of deposit relationships held by households with deposits relationships with at least one distressed bank and with at least one non-distressed bank. Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits	Withdrew deposits
Sample (deposit accounts)	All deposit accounts	Deposit accounts of households with deposit accounts at a distressed and non-distressed bank
	(1)	(2)
Strong distress (UBS)	0.228***	0.358***
	[0.022]	[0.041]
Weak distress (Credit Suisse)	0.051**	0.152***
	[0.025]	[0.044]
Bank-level contol variables		
Too big to fail	-0.008	-0.054**
	[0.007]	[0.021]
State-owned	0.006	0.050
	[0.010]	[0.036]
Tax dispute	-0.008	-0.011
	[0.011]	[0.041]
Household-level control variables		
Second wealth dummy	0.022*	
	[0.012]	
Third wealth dummy	0.043***	
	[0.013]	
Fourth wealth dummy	0.056***	
	[0.020]	
Fifth wealth dummy	-0.018	
	[0.022]	
Third wealth dummy*Single account	-0.061***	
	[0.019]	
Fourth wealth dummy*Single account	-0.026	
	[0.042]	
Fifth wealth dummy*Single account	0.088	
	[0.098]	
Second income dummy	-0.016	
	[0.018]	
Third income dummy	-0.021	
	[0.022]	
Fourth income dummy	-0.013	
	[0.019]	
Fifth income dummy	-0.032	
	[0.021]	
Sixth income dummy	-0.020	
	[0.032]	

Appendix 6 (continued)

Age	-0.034*	
	[0.017]	
Male	0.000	
	[0.011]	
University	0.011	
	[0.011]	
Swiss nationality	0.022	
	[0.016]	
Risk aversion	0.026***	
	[0.010]	
Time preference	0.017	
	[0.010]	
Distance UBS km	0.001*	
	[0.001]	
Distance Credit Suisse km	0.000	
	[0.001]	
Distance non-distressed bank km	-0.007**	
	[0.003]	
Banks / ZIP code	-0.002	
	[0.003]	
Household Fixed Effects	NO	YES
Regional Fixed Effects	YES	NO
Observations	2,093	822
Households	1,231	315
Mean of dependent variable	0.050	0.111
R-squared	0.159	0.264
Clustered standard errors	YES	YES
Method	OLS	OLS

Appendix 7. Bank-client relationships and deposit withdrawals (differential effect)

This table displays the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* The sample displayed in Panel A includes the full sample of all deposit accounts. The sample displayed in Panel B includes only deposit accounts with distressed banks (UBS or Credit Suisse). Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with Single account*)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Panel A. Full sample

Dependent variable	Withdrew deposits	Withdrew deposits
Sample (deposit accounts)	All deposit accounts	All deposit accounts
	(1)	(2)
Strong distress (UBS)	0.267***	0.241***
	[0.024]	[0.022]
Strong distress (UBS)*Single account	-0.219***	
	[0.031]	
Strong distress (UBS)*Credit linkage		-0.145***
		[0.037]
Single account	-0.021***	
	[0.008]	
Credit linkage		0.003
		[0.008]
Household Controls	YES	YES
Bank Controls	YES	YES
Bank Competition Controls	YES	YES
Household Fixed Effects	NO	NO
Regional Fixed Effects	YES	YES
Observations	2,093	2,093
Households	1,231	1,231
Mean of dependent variable	0.050	0.050
R-squared	0.191	0.169
Clustered standard errors	YES	YES
Method	OLS	OLS

Panel B. Deposit relationships with distressed banks

Dependent variable	Withdrew deposits	Withdrew deposits
Sample (deposit accounts)	Deposit accounts with distressed banks	
	(1)	(2)
Strong distress (UBS)	0.212***	0.216***
	[0.036]	[0.024]
Strong distress (UBS)*Single account	-0.135**	
	[0.054]	
Strong distress (UBS)*Credit linkage		-0.169**
		[0.077]
Single account	-0.103**	
	[0.047]	
Credit linkage		0.029
		[0.062]
Household Controls	YES	YES
Bank Controls	YES	YES
Bank Competition Controls	YES	YES
Household Fixed Effects	NO	NO
Regional Fixed Effects	YES	YES
Observations	467	467
Households	467	467
Mean of dependent variable	0.176	0.176
R-squared	0.197	0.177
Clustered standard errors	YES	YES
Method	OLS	OLS

Appendix 8. Bank distress and deposit withdrawals (Logit)

This table shows the marginal effects of estimates (at the mean of all explanatory variables) of a logit model estimated using Maximum Likelihood (ML) where the dependent variable is *Withdrew deposits.* Columns 1-4 report the results for the full sample of all deposit relationships with distressed or non-distressed banks. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits			
Sample (deposit accounts)	All deposit accounts			
	(1)	(2)	(3)	(4)
Strong distress (UBS)	0.053***	0.060***	0.057***	0.055***
	[0.007]	[0.009]	[0.009]	[0.010]
Weak distress (Credit Suisse)	0.023***	0.031***	0.031***	0.030***
	[0.007]	[0.010]	[0.009]	[0.010]
Household Controls	YES	YES	YES	YES
Bank Controls	NO	YES	YES	YES
Bank Competition Controls	NO	NO	YES	YES
Household Fixed Effects	NO	NO	NO	NO
Regional Fixed Effects	NO	NO	NO	YES
Observations	2,093	2,093	2,093	1,952
Households	1,231	1,231	1,185	1,140
Mean of dependent variable	0.050	0.050	0.050	0.053
Pseudo R-squared	0.271	0.274	0.285	0.310
Clustered standard errors	YES	YES	YES	YES
Method	ML	ML	ML	ML

Appendix 9. Bank-client relationships and deposit withdrawals (Logit)

This table shows the marginal effects of estimates (at the mean of all explanatory variables) of a logit model estimated using Maximum Likelihood (ML) where the dependent variables is *Withdrew deposits.* All columns show the results for the subsample of deposit relationships with the strongly-distressed bank (UBS). In all columns, other deposit relationships are excluded. Household control variables are the *Wealth* dummy variables (without interactions with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits		
Sample (deposit accounts)	Deposit accounts with strongly-distressed bank (UBS)		
	(1)	(2)	(3)
Single account	-0.360***	-0.353***	-0.357***
	[0.076]	[0.074]	[0.073]
Credit linkage	-0.120***	-0.110***	-0.114***
	[0.040]	[0.038]	[0.042]
Household Controls	YES	YES	YES
Bank Controls	NO	NO	NO
Bank Competition Controls	NO	YES	YES
Household Fixed Effects	NO	NO	NO
Regional Fixed Effects	NO	NO	YES
Observations	321	321	302
Households	321	321	302
Mean of dependent variable	0.231	0.231	0.242
Pseudo R-squared	0.168	0.177	0.203
Clustered standard errors	YES	YES	YES
Method	ML	ML	ML

Appendix 10. Bank distress and asset withdrawals

This table displays the estimates of a linear probability model where the dependent variables are *Withdrew non-deposits, Withdrew assets, Withdrew assets (less 50%), Withdrew assets (at least 50%), Bank relationship ceased.* The sample in column 1 includes all bank relationships characterised by having at least one securities or retirement account. The sample displayed in columns 2-5 includes bank relationships with any account type. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew non-deposits	Withdrew assets	Withdrew assets (less 50%)	Withdrew assets (at least 50%)	Bank relationship ceased
Sample (bank relationships)	Relationships with Securities or Retirement accounts	All bank relationships	All bank relationships	All bank relationships	All bank relationships
	(1)	(2)	(3)	(4)	(5)
Strong distress (UBS)	0.161***	0.248***	0.082***	0.166***	0.113***
	[0.032]	[0.022]	[0.015]	[0.017]	[0.019]
Weak distress (Credit Suisse)	0.036	0.056**	0.041**	0.015	0.013
	[0.027]	[0.024]	[0.016]	[0.016]	[0.011]
Household Controls	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES
Bank Competition Controls	YES	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES	YES
Observations	940	2,208	2,208	2,208	2,210
Households	690	1,231	1,231	1,231	1,231
Mean of dependent variable	0.043	0.055	0.019	0.036	0.024
R-squared	0.100	0.156	0.057	0.116	0.082
Clustered standard errors	YES	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS	OLS

Appendix 11. Bank-client relationships and asset withdrawals

This table displays the estimates of a linear probability model where the dependent variables are *Withdrew non-deposits, Withdrew assets, Withdrew assets (less 50%), Withdrew assets (at least 50%), Bank relationship ceased.* The sample in column 1 includes all bank relationships with the strongly-distressed bank characterised by having at least one securities or pension savings account. The sample displayed in columns 2-5 includes bank relationships with the strongly-distressed bank of any account type. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and Income dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew non-deposits	Withdrew assets	Withdrew assets (less 50%)	Withdrew assets (at least 50%)	Bank relationship ceased
Sample (deposit accounts)	Securities or pension savings accounts with strongly distressed bank	All bank relationships (all accounts) with strongly-distressed bank	All bank relationships (all accounts) with strongly-distressed bank	All bank relationships (all accounts) with strongly-distressed bank	All bank relationships (all accounts) with strongly-distressed bank
	(1)	(2)	(3)	(4)	(5)
Single account	-0.132	-0.255***	-0.037	-0.218***	-0.172***
	[0.090]	[0.043]	[0.029]	[0.039]	[0.037]
Credit linkage	-0.053	-0.067	0.009	-0.076	-0.136***
	[0.089]	[0.052]	[0.034]	[0.046]	[0.032]
Household Controls	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES
Bank Competition Controls	YES	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES	YES
Observations	159	341	341	341	342
Households	159	341	341	341	342
Mean of dependent variable	0.151	0.243	0.073	0.170	0.114
R-squared	0.201	0.174	0.103	0.142	0.178
Clustered standard errors	YES	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS	OLS

Appendix 12. Bank-client relationships and deposit withdrawals (alternative proxies)

This table displays the estimates of a linear probability model where the dependent variables is *Withdrew deposits.* All columns show the results for the subsample of deposit relationships with the strongly-distressed bank (UBS). In all columns, other deposit relationships are excluded. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and Income dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits	Withdrew deposits	Withdrew deposits	Withdrew deposits
Sample (deposit accounts)	Deposit accounts with strongly-distressed bank	Deposit accounts with strongly-distressed bank	Deposit accounts with strongly-distressed bank	Deposit accounts with strongly-distressed bank
	(1)	(2)	(3)	(4)
Single account	-0.270***			
	[0.045]			
Credit linkage		-0.134***		
		[0.047]		
Retirement account			-0.085	
			[0.059]	
Securities account				-0.136**
				[0.061]
Household Controls	YES	YES	YES	YES
Bank Controls	NO	NO	NO	NO
Bank Competition Controls	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES
Observations	321	321	321	321
Households	321	321	321	321
Mean of dependent variable	0.231	0.231	0.231	0.231
R-squared	0.175	0.144	0.135	0.146
Clustered standard errors	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Appendix 13. Bank distress, deposit withdrawals and deposit insurance

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* All columns show results for the full sample of all deposit relationships with distressed or non-distressed banks. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits		Withdrew deposits	
Sample (deposit accounts)	All deposit accounts		All deposit accounts	
Subsample (households)	Low wealth (deposits)	High wealth (deposits)	Insured	Not insured
	(1)	(2)	(3)	(4)
Strong distress (UBS)	0.209***	0.273***	0.217***	0.272***
	[0.032]	[0.048]	[0.026]	[0.070]
Weak distress (Credit Suisse)	0.031	0.078*	0.038	0.106
	[0.024]	[0.046]	[0.027]	[0.064]
Household Controls	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES
Bank Competition Controls	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES
Observations	1,458	635	1,720	373
Households	923	308	1,014	217
Mean of dependent variable	0.040	0.071	0.047	0.064
R-squared	0.153	0.210	0.152	0.268
Clustered standard errors	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Appendix 14. Bank relationships, deposit withdrawals and deposit insurance

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* All columns show the results for the subsample of deposit relationships with the strongly-distressed bank (UBS). In all columns, other deposit relationships are excluded. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits		Withdrew deposits	
Sample (deposit accounts)	Deposit accounts with strongly-distressed bank		Deposit accounts with strongly-distressed bank	
Subsample (households)	Low wealth (deposits)	High wealth (deposits)	Insured	Not insured
	(1)	(2)	(3)	(4)
Single account	-0.252***	0.081	-0.258***	0.138
	[0.051]	[0.187]	[0.054]	[0.187]
Credit linkage	-0.145***	-0.100	-0.137**	-0.126
	[0.054]	[0.097]	[0.057]	[0.148]
Household Controls	YES	YES	YES	YES
Bank Controls	NO	NO	NO	NO
Bank Competition Controls	YES	YES	YES	YES
Household Fixed Effects	NO	NO	NO	NO
Regional Fixed Effects	YES	YES	YES	YES
Observations	214	107	252	69
Households	214	107	252	69
Mean of dependent variable	0.210	0.271	0.226	0.246
R-squared	0.249	0.317	0.198	0.504
Clustered standard errors	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Appendix 15. Bank distress and deposit withdrawals: Local presence of the distressed banks

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* Both columns report the results for the subsample of deposit relationships by households which are located in cantons with a high share of branches by the two distressed banks (UBS and Credit Suisse). Cantons with high shares are those where UBS and Credit Suisse together held more bank branches than in the median canton in 2006 (see Appendix 1 for details). Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account*) and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits	Withdrew deposits
Sample	Cantons where UBS and Credit Suisse have high branch share in 2006	Cantons where UBS and Credit Suisse have low branch share in 2006
	(1)	(2)
Strong distress (UBS)	0.218***	0.232***
	[0.027]	[0.043]
Weak distress (Credit Suisse)	0.065*	0.023
	[0.037]	[0.029]
Household Controls	YES	YES
Bank Controls	YES	YES
Bank Competition Controls	YES	YES
Household Fixed Effects	NO	NO
MS Region Fixed Effects	YES	YES
Observations	1,157	936
Households	664	567
Mean of dependent variable	0.059	0.038
R-squared	0.175	0.162
Clustered standard errors	YES	YES
Method	OLS	OLS

Appendix 16. Bank distress and deposit withdrawals (by securities account)

This table shows the estimates of a linear probability model where the dependent variable is *Withdrew deposits.* Columns 1-2 report the results for the full sample of all deposit relationships with distressed or non-distressed banks. Colum 1 reports the results for the subsample of households *with* securities accounts. Colum 2 reports the results for the subsample of households *without* securities accounts. Household control variables are the *Wealth* dummy variables (including interactions of wealth dummy variables indicating wealth of at least CHF 100,000 with *Single account)* and *Income* dummy variables, *Age, Male, University, Swiss nationality, Risk aversion, Time preference.* Bank-level control variables are *Too big to fail, State-owned* and *Tax dispute.* Bank competition control variables are *Distance UBS km, Distance Credit Suisse km, Distance non-distressed bank km* and *Banks / ZIP code.* Definitions of the variables are provided in Appendix 3. Regional Fixed Effects are on the cantonal level. Standard errors are clustered on the MS Region level and are reported in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10-level respectively.

Dependent variable	Withdrew deposits	Withdrew deposits
Sample (deposit accounts)	All deposit accounts	All deposit accounts
Subsample (securities account)	Without securities account	With securities account
	(1)	(2)
Strong distress (UBS)	0.264***	0.162***
	[0.031]	[0.050]
Weak distress (Credit Suisse)	0.042	0.083
	[0.026]	[0.056]
Household Controls	YES	YES
Bank Controls	YES	YES
Bank Competition Controls	YES	YES
Household Fixed Effects	NO	NO
Regional Fixed Effects	YES	YES
Observations	1,569	524
Households	1,027	413
Mean of dependent variable	0.048	0.053
R-squared	0.201	0.139
Clustered standard errors	YES	YES
Method	OLS	OLS