JEL Classification: G02, G21
Keywords: local banks, cooperative banks, depositor discipline, halo effect, logotype

The Halo Effect in Banking: Evidence from Local Markets*

Łukasz KOZŁOWSKI - Department of Banking, Insurance and Risk, Kozminski University, Poland, (lkozlowski@kozminski.edu.pl)

Abstract

This study investigates depositors' reactions to the performance of small local banks in Poland. I provide evidence that clients respond to their bank's profitability, but at the same time their predisposition toward their bank improves with positive information about the performance of other local banks that use a similar logotype. Additionally, depositors of a relatively poor local bank tend to switch to its neighboring peers, and these depositors eventually prefer banks that only appear dissimilar to their troubled bank. In general, the research outcomes allow for the conjecture that the observed phenomena resemble the halo effect, in which knowledge with little analytical value for depositors' decisions nevertheless affects them. The findings have managerial and policy implications. They prove that a bank's apparent similarity to profitable neighboring peer institutions can be utilized to stimulate its clients' trust, and apparent similarity or dissimilarity of deposit institutions can play a significant role while understanding the mechanism of bank runs.

1. Introduction

Depositors' perception of banks' characteristics has been extensively discussed in the literature on market discipline, especially with regard to the market monitoring hypothesis. As per Bliss and Flannery (2000), market monitoring is a discipline in which market participants accurately understand changes in a bank's condition and promptly (a) incorporate their assessment while pricing the bank's securities and products or (b) adjust the volume of funds available to the bank. In this context, there are almost hundreds of works related to developed or emerging markets indicating that a bank's ability to attract deposits is influenced by its fundamentals and risk measures. For example, Demirgüç-Kunt and Huizinga (2004), Goldberg and Hudgins (2002), Imai (2006), Karas et al. (2013), Maechler and McDill (2006), Martinez Peria and Schmukler (2001), and Park and Peristiani (1998) are only the most seminal studies that prove that clients avoid risky banks and punish them by withdrawing deposits or demanding higher deposit interest rates. In turn, more profitable, highly capitalized banks with less risky asset portfolios benefit from relatively easier access to debt financing.

While the literature focuses on determinants of a bank's deposit interest rates (often proxied with interest costs; e.g., Baer and Brewer, 1986; Keeley, 1990; Demirgüç-Kunt and Huizinga, 2004), deposit structure (insured versus uninsured deposits; e.g., Billett et al., 1998; Jordan, 2000; Maechler and McDill, 2006), and

* The author acknowledges the financial support of the National Science Center, Poland (NCN) for Project no. 2014/15/D/HS4/00830.

The author thanks two anonymous referees for their helpful suggestions and comments.

deposit growth rates (e.g., Demirgüç-Kunt and Huizinga, 2004; Park and Peristiani, 1998; Shimizu, 2009), it rarely touches upon the mechanisms of potential misperceptions, simplifications, or indirect inferences in depositors' evaluations of a bank's abilities to meet its obligations. In this context, Shimizu (2009) provides a notable example and shows that depositors of Japanese *Shinkin* (cooperative) banks apparently withdraw funds after observing a fall in the stock prices of neighboring regional banks. Additionally, Hasan et al. (2013) show that depositors' actions are influenced by the rumors spread by the media concerning parent companies of commercial banks from Central European countries. To a certain extent, examples of depositors' behavior based on their common belief are the *too-big-to-fail* and *too-big-to-be-saved* phenomena (e.g., Berger and Turk-Ariss, 2010; Bertay et al., 2013; Demirgüç-Kunt and Huizinga, 2004; Oliveira et al., 2014).

In this study, by using data on 363 small local cooperative banks in Poland from the period 2007–2014, I investigate the extent to which depositors' decisions are based, on the one hand, on a given bank's fundamentals and, on the other hand, on the performance of financially independent, peer banks operating in the same vicinity, especially if the neighboring peers use a similar logotype as that of the given bank. In this way, I refer to the halo effect, i.e., the phenomenon that knowledge with little analytical value for depositors' decisions nevertheless affects them (Leuthesser et al., 1995; Nisbett and Wilson, 1977; Thorndike, 1920). In order to verify my research hypotheses, I estimate panel regression models and explore determinants of a bank's access to deposits, incorporating regressors that describe the performance of the bank's apparently similar and dissimilar peers in the same neighborhood. In this study, I define a bank's neighborhood as a commune or an area within 2.5 km or 5 km radius from the given bank. The research outcomes prove that clients respond to their banks' profitability, but at the same time their predisposition toward their bank improves with positive information about the performance of neighboring peer banks that use a similar logotype. Moreover, depositors of a relatively poor local bank tend to switch to its neighboring peer, and these depositors eventually prefer banks that only appear dissimilar to their troubled bank.

To the best of my knowledge, this is the first study to investigate the halo effect in banking, here in the context of depositors' behavior. Additionally, the findings have important managerial and policy implications. They prove that a bank's apparent similarity to profitable neighboring peer institutions can be utilized to stimulate its clients' trust, and apparent similarity or dissimilarity of deposit institutions can play a significant role within the mechanism of bank runs.

Section 2 provides an institutional background and formulates the hypotheses. Section 3 outlines the data and the methodology. Section 4 presents the results of baseline estimations and robustness checks and discusses the findings. Section 5 concludes the study.

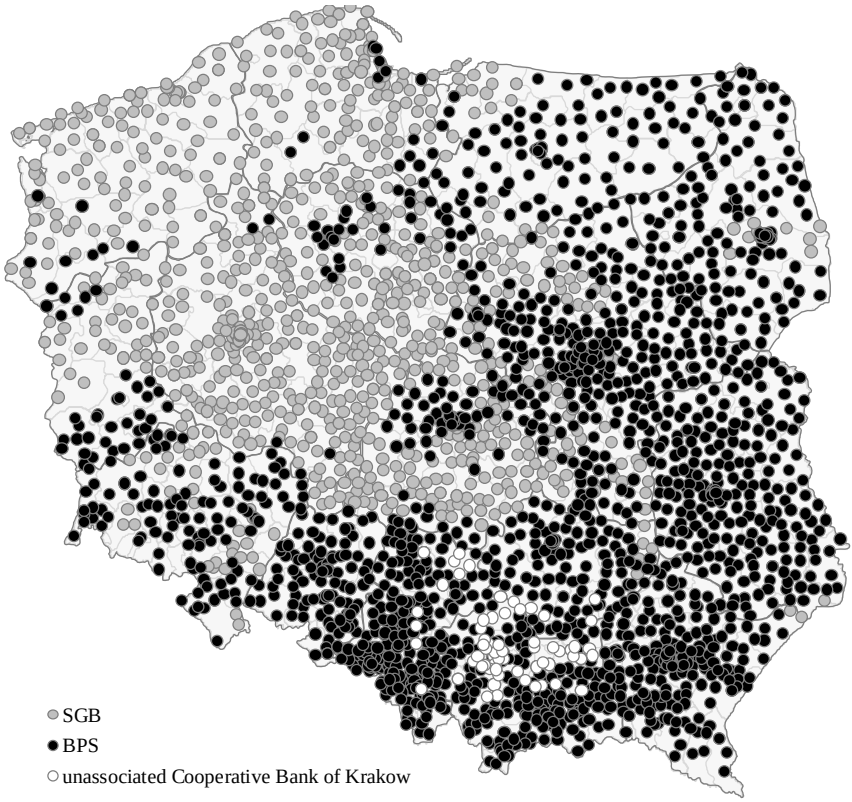
2. Background and Research Hypotheses

2.1 Institutional Background

The study concentrates on cooperative banks in Poland belonging to the larger of the two cooperative bank associations (BPS), which at the end of 2014 affiliated 360 banks, i.e., almost two-thirds of the 565 Polish cooperative banks. Institutions

from the second association (SGB) are not included in the analysis as their affiliating bank was unwilling to deliver financial statements of the association members. Nevertheless, taking into account the research goals (related to depositors' misinterpretation of neighboring banks' performance), it should be noted that the members of different associations rarely interact in local markets because they are generally domiciled in different parts of Poland (see Figure 1).

Figure 1 Locations of the Cooperative Bank Branches Belonging to the Two Associations: SGB and BPS



Although the analyzed banks belong to the same association, they were only loosely linked organizationally and financially in the analyzed time span. This inference can be attributed to at least the following three reasons. First, banks within the same association do not consolidate their financial statements nor guarantee their obligations.[1] Thus, they are not expected to be directly affected by financial difficulties of peer institutions from the same association. Second, the role of the affiliating bank, i.e., the association's head, is generally limited to clearing activities,

[1] The situation changed in late 2015, as the introduction of the capital requirements regulation and Directive CRR/CRD IV pushed cooperative banks to build stronger ties within an association.

reporting to the Polish regulatory and supervisory authorities on behalf of the association members, and supporting the associated cooperative banks in offering more complex products to their clients. Third, the areas of operation of individual cooperative banks often overlap, thereby pushing them to compete in their local markets. Table 1 shows that, in 2014, a cooperative bank did not face competition from any other neighboring peer institution in only 10% of the counties in Poland. At the commune level (*gmina* in Polish), the smallest administrative unit, this percentage rose to about 70%. Nevertheless, banks from different neighboring communes regularly interact and compete for the same clients, especially if their branches are located on the opposite sides of the same commune border.

Table 1 Presence of Cooperative Banks in Counties and Communes in Poland in 2014

Panel A. Counties		
Number of cooperative banks with branches in a county	*Number of counties*	*% of all counties*
0	6	1.6%
1	37	9.7%
2	72	18.9%
3	100	26.3%
4	77	20.3%
5	36	9.5%
6	22	5.8%
>6	30	7.9%
Panel B. Communes		
Number of cooperative banks with branches in a commune	*Number of communes*	*% of all communes*
0	292	11.8%
1	1730	69.8%
2	357	14.4%
>2	100	4.0%

In some countries, cooperative banks are non-profit organizations that have a specific governance structure and that restrict their depositor base using certain criteria, such as professional affiliation or proximity. However, cooperative banks in other countries function like regular banks. In this context, in the case of Poland, it is worth noting that cooperative banks resemble small commercial banks, and all types of banks in Poland face similar institutional features, including the deposit insurance rules, which do not differ across institutions and counties. As a result, depositors move freely from one bank to another, and cooperative banks have to compete in order to draw clients, which could be a challenge since these institutions obtain funding primarily from retail deposits (i.e., household deposits constitute almost 80% of cooperative banks' liabilities).

2.2 Theoretical Background and Hypotheses

The existence of depositor discipline in both developed and developing markets is well documented (refer to, e.g., Demirgüç-Kunt and Huizinga, 2004; Martinez Peria and Schmukler, 2001; Park, 1995; Park and Peristiani, 1998; Levy-Yeyati et al., 2010). Although deposit insurance schemes naturally reduce depositors' motivation to monitor the risk of bank insolvency, the deposit guarantees usually do not fully disengage the depositor discipline mechanism. First, some depositors are unaware of the deposit insurance system or its details (Bowyer et al., 1986; Goedde-Menke et al., 2014; Inakura et al., 2005, Steiger et al., 2001), while others lack trust on the system, especially after the global financial crisis. Second, depositors' unwillingness to deposit in riskier banks may be related to perceptions about certain indirect costs, such as waiting for deposit redemption (Park and Peristiani, 1998). Third, depositor discipline works not only in the case of large commercial banks, whose deposits come in a relatively large proportion from financial institutions, and medium or large companies, but also for small local institutions, including cooperative banks (Murata and Hori, 2006; Shimizu, 2009; Tsuru, 2003), savings banks (Choi and Sohn, 2014), or non-bank financial institutions (Hess and Feng, 2006). Although these institutions' depositors are mostly households or micro-companies, i.e., relatively financially unsophisticated depositors, they are usually sensitive to their banks' risk and respond to it by withdrawing deposits or demanding higher interest rates. These observations are in line with the outcomes of other studies that distinguished between households and other depositors of commercial banks (Karas et al., 2013; Yan et al., 2014) while investigating the mechanism of depositor discipline. The aforementioned observations lead to the preliminary hypothesis H1, which refers to depositor discipline at small cooperative banks in Poland.

H1: Depositors of small local banks respond to banks' fundamentals, i.e., they prefer less risky banks while placing their deposits.

It is hard to expect that a majority of cooperative banks' depositors read sophisticated financial documents, including the banks' financial statements. In small local communities, in which the banks usually operate, the information about a bank's standing is often disseminated through informal channels, i.e., word of mouth or local media outlets, and it is provided directly to potential depositors by banks' employees. In such information dissemination scenario, the information becomes relatively easy to access, but it can simultaneously undergo significant distortions at different stages of dissemination. Although it cannot be excluded that a part of depositors processes the information directly from their original sources (i.e. financial documents, including disclosures required by Basel II), some peculiarities and distortions in the market discipline mechanism can exist. While similarity to a prosperous, neighboring local bank can improve the reputation of a given bank, similarity to an exceptionally poor neighboring bank can induce the opposite effect. There are at least two possible explanations for such an assumption. According to the first one, a significant share of local banks' depositors fails to distinguish between different cooperative banks, especially if the banks belong to the same association, use the same logotypes (the association's logotype), or have a similar name, i.e., use a pattern, such as *Cooperative Bank of X*. In such a scenario, depositors can

misinterpret positive or negative signals about any cooperative bank operating in a given neighborhood and treat them as signals concerning another bank. The expectation confirmation theory, which originates in the context of individuals' beliefs about different issues, gives a second alternative explanation of the potential phenomenon (Edwards and Smith, 1996; Oliver, 1977, 1980). From the perspective of financially unsophisticated depositors, information about an exceptionally good performance of a local bank and an average or poor performance of another quite similar local bank would lead to cognitive dissonance. In order to reduce this dissonance, depositors tend to interpret any inconsistent information in a way that harmonizes such information with their general belief about the performance of *visually comparable* cooperative banks in the same neighborhood. As a result, exceptionally good or bad performance of some local banks in the neighborhood, respectively, increases or decreases trust in other similar banks operating in the same area. The aforementioned deliberations lead to hypotheses H2 and H3.

H2: Depositors' predisposition toward a local bank improves if other local banks with the same logotype as the given bank operate in the same neighborhood and generate good results.

H3: Depositors' predisposition toward a local bank deteriorates if other local banks with the same logotype as the given bank operate in the same neighborhood and generate poor results.

3. Data and Method

3.1 Dataset

In order to verify the hypotheses, I collect four datasets. The first one, the annual financial statements of 363 cooperative banks from the larger of the two cooperative bank associations in Poland, covers the period from 2007–2014. I use this dataset to describe the banks' financial profiles in different time periods. Panel A of Table 2 gives definitions of the variables constructed using the first dataset. The second dataset is composed of detailed addresses of the banks' branches. They allowed me to geocode branch locations and calculate distances between competing branches or assign them to distinct administrative units, i.e., communes (*gmina*) and counties (*powiat*). The third dataset contains information on logotypes of individual banks. To be precise, I verify whether each bank uses its own logotype or the association's logotype. According to the survey, 278 banks (76.6%) use the association's logotype, and 69 (19.0%) have designed their own logotype[2]. It should be noted that the decision to adopt the association's logotype does not mean stronger financial connections with other members of the association or the association's head. The fourth and last dataset is provided by the Polish Central Statistical Office (GUS) and consists of information on different areas of Poland. The scope of the GUS's information at the commune level is limited. Therefore, I use county-level data to characterize a cooperative bank's area of operation as the local characteristics can improve or deteriorate the performance of the banks located in an area and impact its ability to attract deposits. Some of the banks operate in more than one

[2] In this regard, I am unable to find appropriate information for 16 institutions (4.4%) and thus cannot classify them.

county; therefore, I calculate a few average statistics for each bank in each year, while I use the number of bank branches in individual counties as weights. Panel B of Table 2 gives details of the respective variables' definitions.

Combining the first three datasets mentioned above, I construct variables that describe positive or negative signals about the condition of each cooperative bank's neighboring peers. The signal-related variables (as I call them in this study) are based on neighbors' profitability ratios because profit is an easy measure to communicate and is also usually understood by financially unsophisticated depositors. Thus, information about a bank's profit can flow relatively easily through informal communication channels, especially in small local environments where cooperative banks usually operate. As a result, the information can be misinterpreted or inappropriately associated with a different peer institution, particularly if the peer institution appears to be similar to the bank to which that information relates. It is worth stressing that, in this research, I do not imply that the financially unsophisticated clients of a bank monitor exact profitability measures of a bank or its local peers. To be precise, I assume that catchwords like *exceptional profit* or *exceptional loss* can flow through indirect channels from inside a bank or its more sophisticated stakeholders to ordinary clients.

In the most general sense, each of the signal-related variables reflects a share of a given bank's branches that operate in a vicinity of a good or bad peer bank, respectively. Thus, a good or bad peer is expected to send some signals that can finally affect a given bank's depositors. I construct the signal-related variables describing the performance of a bank's peers in three stages. In the first stage, I build proxy variables distinguishing between *exceptionally profitable, just profitable, exceptionally unprofitable,* and *just unprofitable* banks in the sample comprising all cooperative banks in each year. I imply that the designed proxies correspond with depositors' perception of these aforementioned banks, based on informal and imprecise clues. As the same value of profitability ratio has different meanings in different macroeconomic contexts, and objective profitability thresholds (distinguishing profitable from unprofitable banks) are difficult to set, I identify each local bank's return on assets (PROFIT) in this variable's distribution among all cooperative banks in a given year. Thus, I assign a cooperative bank to a group of *exceptionally profitable banks* if its PROFIT belongs to the last decile of the PROFIT distribution in a given year, and to a group of *just profitable banks* if it belongs to the one-third of the most profitable cooperative banks in a given year.[3] In an exactly corresponding manner, I distinguish between *exceptionally unprofitable banks* (from the first decile) and *just unprofitable banks* (belonging to the one-third of the least profitable banks in a given year). In the second stage, based on the aforementioned classification, I construct binary variables that inform whether a branch of a given cooperative bank from the sample operates in the vicinity of *exceptionally profitable*, *just profitable*, *exceptionally unprofitable,* or *just unprofitable* peer bank branches. As a cooperative bank can have several branches, in the third stage, the binary signals describing peers of a bank's individual branches are finally averaged over all branches of the bank. Subsequently, I utilize these signal-related variables to test

[3] Thus, *exceptionally profitable* banks are a subgroup of *just profitable* banks.

whether information about local peer banks determines depositors' attitude toward their own cooperative bank.

From the perspective of financially unsophisticated depositors, information about a peer bank's high or low profitability can seem useful in case of the peer bank's apparent similarity to the cooperative bank that holds the depositors' savings. Thus, I construct 12 signal-related variables; these variables describe separate sets of signals coming from the performance of all peer banks operating within a given cooperative bank's vicinity, neighboring peer banks using the same logotype, and neighboring peer banks using a different logotype. To be precise, the first two positive signal-related variables (PEER.PROFIT.EXC.HIGH and PEER.PROFIT.HIGH) indicate whether a given cooperative bank competed in its local market with a peer bank that was *exceptionally profitable* or *just profitable*, respectively (i.e., belonged to one-tenth or one-third of the banks with the best profitability ratios in a given year, respectively). Conversely, the first two negative signal-related variables (PEER.PROFIT.EXC.LOW and PEER.PROFIT.LOW) show whether one of a bank's local neighbors recorded the lowest profitability (i.e., were classified within one-tenth or one-third of banks with the worst profitability ratios in a given year, respectively). The remaining eight signal-related variables (LOGO.PROFIT.EXC.HIGH, LOGO.PROFIT.HIGH, LOGO.PROFIT.EXC.LOW, LOGO.PROFIT.LOW, OTHR.PROFIT.EXC.HIGH, OTHR.PROFIT.HIGH, OTHR.PROFIT.EXC.LOW, and OTHR.PROFIT.LOW) additionally inform whether the abovementioned signals were generated by banks with the same logotype as a given bank (indicated by the substring of characters LOGO) or by those with a different logotype (indicated by the substring OTHR).

The signal-related variables are proxies for informal clues that are produced in the vicinity of a given bank and related to its peer banks. To prove that my results are not driven by the choice of the definition of a bank's neighborhood, I replicate the signal-related variables' construction in three ways, i.e., I use different definitions of a bank's local market. Thus, during the estimation of different panel models, I introduce signal-related variables reflecting information about the performance of peer banks located (a) in the same commune, (b) within a 2.5 km radius, or (c) within a 5 km radius from a bank's branches. According to these three different approaches, the areas of the analyzed individual local markets of distinct branches equal, on average, 126 km^2 (the average commune area in Poland), 20 km^2, and 79 km^2, respectively. The following areas can be considered for the sake of comparison: while the area of the capital city of Warsaw equals 517 km^2, the areas of some capital cities of Polish provinces (*voivodships*) are less than 100 km^2; on the other hand, the area of 20 km^2 is representative of a small city with a population of approximately 30,000 to 40,000. Panel C of Table 2 presents detailed definitions of all the variables describing the performance of local neighbors, while Tables 3 and 4 present the descriptive statistics for all variables that are sourced from all four datasets and employed in the research.

Table 2 Definitions of Variables

Panel A. Banks' financial characteristics	
Variable	*Definition*
DEP.GR	Yearly growth rate of deposits in constant prices
INT.COST	Inflation-adjusted interest expenses on average deposits
BANK.SIZE	Bank's total assets to total assets of the biggest local bank in a given year
OVERHEADS	Overheads to operating income
EQUITY	Equity to total assets
PROFIT	Return on average assets
IMPAIR	Yearly net loan loss provisions to average loans
Panel B. Local environment's characteristics	
Variable	*Definition*
POP.DENS	County-level population density (in thousands/km^2)*
UNEMPL	County-level unemployment rate*
COMM.BANKS	Share of commercial bank branches with nation-wide presence in a given bank's vicinity**
Panel C. Information on the condition of neighboring local banks***	
Variable	*Definition*
PEER.PROFIT.EXC.HIGH, LOGO.PROFIT.EXC.HIG, OTHR.PROFIT.EXC.HIGH	Three variables identifying the local presence of an *exceptionally profitable* peer bank, i.e., each of those variables is calculated as a share of a given bank's branches located near a local peer bank that uses any, the same, or a different logotype, respectively, and belongs to 10% of the most profitable cooperative banks (based on PROFIT) in a given year
PEER.PROFIT.HIGH, LOGO.PROFIT.HIGH, OTHR.PROFIT.HIGH	Three variables identifying the local presence of a *just profitable* peer bank, i.e., each of those variables is calculated as a share of a given bank's branches located near a local peer bank that uses any, the same, or a different logotype, respectively, and belongs to 33% of the most profitable cooperative banks (based on PROFIT) in a given year
PEER.PROFIT.EXC.LOW, LOGO.PROFIT.EXC.LOW, OTHR.PROFIT.EXC.LOW	Three variables identifying the local presence of an *exceptionally unprofitable* peer bank, i.e., each of those variables is calculated as the share of a given bank's branches located near a local peer bank that uses any, the same, or a different logotype, respectively, and belongs to 10% of the least profitable cooperative banks (based on PROFIT) in a given year
PEER.PROFIT.LOW, LOGO.PROFIT.LOW, OTHR.PROFIT.LOW	Three variables identifying the local presence of a *just unprofitable* peer bank, i.e., each of those variables is calculated as the share of a given bank's branches located near a local peer bank that uses any, the same, or a different logotype, respectively, and belongs to 33% of the least profitable cooperative banks (based on PROFIT) in a given year

Notes: * Values were averaged over counties in which a bank operates, with the number of that bank's branches in individual counties used as weights.

** The vicinity was defined in the following three ways: considering all bank branches from the same commune, within a 2.5-km radius, and within a 5-km radius, respectively. In each of these three cases, the presence of commercial bank branches around each branch of a given cooperative bank was measured, and, subsequently, a final value for a given cooperative bank was averaged over values obtained for its individual branches.

*** The variables were constructed in the following three ways: considering neighboring banks from the same commune, within a 2.5-km radius, and within a 5-km radius.

Table 3 Descriptive Statistics of the Sample

Panel A. Characteristics of the local environment

Variable	*Mean*	*Std. dev.*	*Min*	*25th centile*	*50th centile*	*75th centile*	*Max*
POP.DENS	0.2759	0.3971	0.0158	0.0673	0.1193	0.2760	2.9476
UNEMPL	0.1470	0.0446	0.0390	0.1141	0.1418	0.1755	0.3238
COMM.BANKS*	0.3457	0.2265	0.0000	0.1900	0.3400	0.5000	0.9606

Panel B. Banks' financial characteristics

Variable	*Mean*	*Std. dev.*	*Min*	*25th centile*	*50th centile*	*75th centile*	*Max*
DEP.GR	0.0748	0.0897	-0.4468	0.0167	0.0766	0.1348	0.2992
INT.COST	0.0021	0.0169	-0.0364	-0.0113	0.0010	0.0165	0.0489
BANK.SIZE	0.0608	0.0803	0.0023	0.0214	0.0368	0.0671	1.0000
OVERHEADS	0.6624	0.0976	0.3599	0.5988	0.6671	0.7280	1.3102
EQUITY	0.1320	0.0477	0.0085	0.0973	0.1231	0.1544	0.4147
PROFIT	0.0113	0.0063	-0.0549	0.0079	0.0108	0.0147	0.0352
IMPAIR	0.0024	0.0059	-0.0098	-0.0001	0.0007	0.0031	0.0829

Notes: The total number of observations equals 1,963.
* Within a given local bank's commune.

Table 4 Positive and Negative Signals Describing the Performance of Peer Banks Operating in the Neighborhood

Panel A. Signals about banks within the same commune					
Variable	*Mean*	*Std. dev.*	*75th centile*	*95th centile*	*Max*
PEER.PROFIT.EXC.HIGH	0.0261	0.1099	0	0.1667	1
LOGO.PROFIT.EXC.HIGH	0.0184	0.0961	0	0.0769	1
OTHR.PROFIT.EXC.HIGH	0.0080	0.0570	0	0	1
PEER.PROFIT.HIGH	0.0798	0.1819	0	0.5000	1
LOGO.PROFIT.HIGH	0.0563	0.1604	0	0.4286	1
OTHR.PROFIT.HIGH	0.0309	0.1076	0	0.2500	1
PEER.PROFIT.EXC.LOW	0.0791	0.1856	0	0.5417	1
LOGO.PROFIT.EXC.LOW	0.0381	0.1248	0	0.2500	1
OTHR.PROFIT.EXC.LOW	0.0453	0.1464	0	0.3846	1
PEER.PROFIT.LOW	0.1615	0.2525	0.2500	0.7273	1
LOGO.PROFIT.LOW	0.0917	0.1939	0.0909	0.5556	1
OTHR.PROFIT.LOW	0.0930	0.2012	0.0278	0.6000	1
Panel B. Signals about banks within a 2.5 km radius					
Variable	*Mean*	*Std. dev.*	*75th centile*	*95th centile*	*Max*
PEER.PROFIT.EXC.HIGH	0.0204	0.0963	0	0.1247	1
LOGO.PROFIT.EXC.HIGH	0.0149	0.0856	0	0	1
OTHR.PROFIT.EXC.HIGH	0.0057	0.0463	0	0	1
PEER.PROFIT.HIGH	0.0660	0.1613	0	0.5000	1
LOGO.PROFIT.HIGH	0.0462	0.1402	0	0.3548	1
OTHR.PROFIT.HIGH	0.0237	0.0924	0	0.1667	1
PEER.PROFIT.EXC.LOW	0.0575	0.1482	0	0.4000	1
LOGO.PROFIT.EXC.LOW	0.0245	0.0929	0	0.1667	0.8181
OTHR.PROFIT.EXC.LOW	0.0339	0.1202	0	0.2844	1
PEER.PROFIT.LOW	0.1290	0.2135	0.2000	0.6000	1
LOGO.PROFIT.LOW	0.0674	0.1567	0	0.4494	1
OTHR.PROFIT.LOW	0.0740	0.1687	0	0.5000	1
Panel C. Signals about banks within a 5 km radius					
Variable	*Mean*	*Std. dev.*	*75th centile*	*95th centile*	*Max*
PEER.PROFIT.EXC.HIGH	0.0243	0.1058	0	0.1667	1
LOGO.PROFIT.EXC.HIGH	0.0176	0.0930	0	0.0415	1
OTHR.PROFIT.EXC.HIGH	0.0070	0.0539	0	0	1
PEER.PROFIT.HIGH	0.0803	0.1768	0.0417	0.5000	1
LOGO.PROFIT.HIGH	0.0575	0.1562	0	0.4329	1
OTHR.PROFIT.HIGH	0.0289	0.1037	0	0.2304	1
PEER.PROFIT.EXC.LOW	0.0874	0.1946	0	0.5451	1
LOGO.PROFIT.EXC.LOW	0.0428	0.1381	0	0.3333	1
OTHR.PROFIT.EXC.LOW	0.0479	0.1500	0	0.4000	1
PEER.PROFIT.LOW	0.1798	0.2682	0.3333	0.7692	1
LOGO.PROFIT.LOW	0.1030	0.2087	0.1111	0.6000	1
OTHR.PROFIT.LOW	0.1034	0.2176	0.0667	0.6493	1

Notes: Minimum values as well as the 5th, 25th, and 50th centiles remain unreported as they are all equal to zero. The total number of observations equals 1,963.

3.2 Method

Private individuals and farmers provide approximately 80% of cooperative banks' deposits in Poland, and in case of the smaller banks, this ratio can surge up to 85% (PFSA, 2014). At the same time, households and micro-companies, which are the major clients of the institutions, seem relatively weakly predisposed to an accurate assessment of banks' financial standing, owing to their limited financial awareness (in relation to depositors from the group of medium- and large-sized companies). This further intensifies the information asymmetry between a Polish cooperative bank and its depositors. Following the theoretical deliberations of Stiglitz and Weiss (1981), it can be argued that, under asymmetric information, such clients would discipline a potentially risky bank by withdrawing deposits rather than by

demanding higher interest rates from the bank. Besides, deposit withdrawals tend to be the first response even when both the aforementioned depositor discipline channels are employed. This finding can be attributed to the fact that, in most cases, a cooperative bank's deposits are not individually negotiated contracts; in other words, clients are solely price recipients, and a bank is unlikely to increase deposit interest rates unless it is faced with a dwindling depositor base. Taking this into account, I empirically investigate the factors influencing a bank's deposit growth rates. To be precise, to verify H1, I regress deposit growth rates against different control variables describing a bank and its area of operation as well as against a group of bank fundamentals reflecting its risk (i.e., depositor discipline variables). In line with H1, I expect that a higher bank risk coincides with worse access to deposits. Furthermore, to test H2 and H3, I add variables describing a superior or inferior performance of a bank's nearest neighbors from the same cooperative bank association or even banks with the same logotype. Thus, I investigate whether a bank's depositors mechanically respond to signals coming from different institutions that appear similar to their banks. This behavior would resemble the halo effect.

In this research, I estimate random-effects panel regression models by using the generalized least squares (GLS) procedure. I prefer this method over the fixed-effects models as some of the explanatory variables (describing the banks' area of operation) remain relatively stable over time for each cooperative bank. Thus, adding bank fixed-effects generates multicollinearity problems as the linear combination of fixed effects is highly correlated with any of the variables that reflect a bank's area of operation. Nevertheless, I also verify the robustness of the results with two different estimators (refer to Section 4.3 for details). Equations (1) and (2) illustrate the general construction of the random-effects panel models. They test hypotheses H1 and both H2-H3, respectively.

$$DEP.GR_{i,t} = f\left(AREA_{i,t}; FIN_{i,t-1}; DEP.DISC_{i,t-1}; year\ dummies\right) \tag{1}$$

$$DEP.GR_{i,t} = f\left(AREA_{i,t}; FIN_{i,t-1};\ SIGNAL_{i,t}; DEP.DISC_{i,t-1}; year\ dummies\right) \tag{2}$$

where $DEP.GR_{i,t}$ denotes inflation-adjusted deposit growth rate[4] for bank *i* in year *t*, while the set of independent variables includes AREA (different characteristics of a bank's area of operation), FIN (control variables related to a bank's financial characteristics), DEP.DISC (bank fundamentals used to test the existence of

[4] I use total deposits, as information on different deposit categories is unavailable (e.g., insured vs. uninsured deposits). Nevertheless, it should be noted that the Polish Financial Supervision Authority's data proves that household deposits constitute almost 90% of all deposits in the cooperative banking sector. Apparently, these depositors are mostly insured, but their presumably poor deposit insurance awareness (Bowyer et al., 1986; Goedde-Menke et al., 2014; Inakura et al., 2005, Steiger et al., 2001) and the indirect costs connected with bank insolvencies (waiting for deposit redemption; refer to Park and Peristiani, 1998) do not preclude market discipline. Many studies provide evidence on market discipline by insured or partly insured depositors (e.g., Hori et al., 2009; Martinez Peria and Schmukler, 2001; Önder and Özyildirim, 2008; Park and Peristiani, 1998), but some researchers prove that the sensitivity of depositors to bank fundamentals may reduce substantially if the deposit insurance is in force (e.g., Demirgüç-Kunt and Huizinga, 2004; Karas et. al., 2013; Yan et. al. 2014).

depositor discipline), and SIGNAL (signal-related variables providing information about the *good* or *bad* performance of peer banks located in the same neighborhood). I describe the area of operation using POP.DENS, UNEMPL, and COMM.BANKS. The first variable distinguishes rural from mostly urban regions, the second variable provides information about the economic situation within a given area, and the third variable describes the presence of commercial banks within the given bank's vicinity.

While the composition of bank control variables is based on conventions in existing literature on depositor discipline, I simultaneously consider correlations between potential regressors before employing them in the final model. First, I introduce a bank's interest costs (INT.COST), expecting that a moral hazard will result in a positive sign for the coefficient of INT.COST. Second, I control for the scale of operations (BANK.SIZE) and the specificity of cost management (OVERHEADS). I expect to observe a higher deposit growth from larger banks because they may seem more reliable for unsophisticated depositors, even if the *too-big-to-fail* doctrine may not apply to small cooperative banks. Furthermore, the lack of strict control over non-interest costs (i.e., high OVERHEADS) is considered a bad management trait, and thus should be negatively correlated with the dependent variable; however, it can also be argued that high overheads emerge from high marketing expenses and better customer service, which positively impact deposit growths. As far as the DEP.DISC group is concerned, I use three baseline bank-specific variables to test for the existence of depositor discipline (in Equation 1) and to control for this phenomenon (in Equation 2). If depositors monitor a bank risk, then high profitability (PROFIT) and a solid capital base (EQUITY) would lead to an increase in deposit growth rates. Conversely, elevated impairment provisions (IMPAIR) would negatively affect the dependent variable because they are related to an increase in bad loans. Nevertheless, considering the specificity of cooperative banks' depositors, it can be argued that the depositors can merely react to profitability ratios (if they react to any indicators of a bank), while more sophisticated measures of a bank's risk would be irrelevant for them. Finally, to test H2 and H3, in Equation 2, I use different variables that provide information about the performance of other cooperative banks in the same neighborhood, defined as the same communes or areas within a 2.5 km or 5 km radius from a given bank's branches, respectively (the SIGNAL variables). I expect to observe positive and negative coefficients for *good* or *bad* evidence of the nearest neighbors' performance, respectively.[5]

The analysis period covers the change in the deposit insurance scheme in Poland; at the beginning of 2011, the fully guaranteed amount of households' deposits was raised from €50,000 to €100,000. Thus, while testing H1, in order to shed more light on the analyzed phenomenon, I distinguish the following three subperiods: 2007–2014 (all years), 2007–2010, and 2011–2014. Additionally, in the specification based on the whole analysis period, I introduce the interaction terms of

[5] It should be noted that estimated coefficients for the SIGNAL variables have a straightforward meaning. For example, a coefficient related to the presence of *good* peers in the vicinity represents an increase in a bank's deposit growth rate which is expected if the share of the bank's branches neighboring a *good* peer institution grows from 0% to 100%. Naturally, the coefficient has the most direct meaning when it is related to a one-branch bank as it then indicates what happens when that branch faces a *good* peer in its neighborhood.

the DEP.DISC variables with a binary variable (GUAR.HIGH) coding years 2011–2014. It allowed me to check whether my conclusions related to depositor discipline are general or are specific to only some deposit insurance regimes.

4. Empirical Results

4.1 Depositors' Reactions to the Fundamentals of Their Local Banks

In Table 5, I investigate the question whether the fundamentals of small local cooperative banks affect their deposit growth. The coefficients for most of the control variables are statistically significant. First, estimation results for the controls related to a bank's area of operation suggest that the cooperative banks have easier access to deposits in environments with a higher unemployment rate (UNEMPL) and with a less pronounced presence of commercial banks (COMM.BANKS). The former outcome may seem unexpected, but it must be noted that relatively poor and less developed areas are typical bastions of cooperative banks that designed their business models to serve clients from those areas. The coefficients for the third variable reflecting the local environment (POPUL.DENS) are statistically insignificant in all specifications. Second, with regard to bank-level controls, quite unsurprisingly, deposit interest rates, proxied by INT.COST, seem to be the most important determinants of deposit growth. In all specifications, the corresponding coefficient is positive and strongly significant at levels below 1%. Additionally, better access to deposits is a trait of larger banks (BANK.SIZE), while the specificity of cost management (OVERHEADS) does not influence the dependent variable in a statistically significant way. The latter result may suggest that high overheads are not necessarily an effect of bad management but of higher expenses on marketing and improving customer service.

The results for the test of the validity of H1 are partially mixed. First, cooperative banks' clients generally do not react to the bank's bad loans (IMPAIR) but are very responsive to their profitability (PROFIT), regardless of the level of deposit insurance (PROFIT × GUAR.HIGH). In all four specifications, coefficients for the PROFIT variable are positive and statistically significant. Conversely, depositors' sensitivity to a bank's capital equity levels (EQUITY) is in line with the depositor discipline hypothesis only in one specification, which covers the subperiod of relatively weaker deposit guarantees. The difference in results obtained for EQUITY and PROFIT can be explained by the presence of two types of depositors. The first type, which is potentially less common but more financially sophisticated and aware of the specificity of current insurance schemes, reacts to a bank's equity level, i.e., a ratio that corresponds more directly to the risk of a bank's insolvency. The second type, comprising potentially less financially sophisticated depositors, who are more common, are more rumor-prone and less aware of deposit insurance. Hence, this type of depositors reacts mechanically to a bank's profitability ratios as they are easier to communicate to and be understood by the common people. It should be noted that estimation outcomes for the PROFIT variable have relatively high stability; this observation is also in line with expectations related to depositors of small local banks. As the results strongly suggest that depositors react to their bank's profitability, I will also concentrate on peer banks' profitability clues while

investigating depositors' reactions to the financial situation of the peer banks operating in the given bank's vicinity.

Table 5 Depositor Discipline at Cooperative Banks

	(1)	*(2)*	*(3)*	*(4)*
Estimation period	*2007-2014*	*2007-2010*	*2011-2014*	*2007-2014*
Explanatory/dependent variable	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**
$POP.DENS_t$	0.0079	0.0050	0.0083	0.0074
	(0.0055)	(0.0010)	(0.0066)	(0.0055)
$UNEMPL_t$	0.0978**	0.0465	0.125**	0.0988**
	(0.0482)	(0.0943)	(0.0528)	(0.0477)
$COMM.BANKS_t$	-0.0251**	0.0105	-0.0388***	-0.0262**
	(0.0103)	(0.0216)	(0.0111)	(0.0102)
$INT.COST_{t-1}$	2.251***	2.039***	2.275***	2.253***
	(0.375)	(0.660)	(0.436)	(0.371)
$BANK.SIZE_{t-1}$	0.0496**	0.137***	0.0101	0.0498**
	(0.0203)	(0.0387)	(0.0222)	(0.0203)
$OVERHEADS_{t-1}$	-0.0216	-0.0127	-0.0139	-0.0165
	(0.0399)	(0.0745)	(0.0465)	(0.0385)
$EQUITY_{t-1}$	0.0041	0.208**	-0.0940	0.0697
	(0.0628)	(0.0961)	(0.0728)	(0.0914)
$PROFIT_{t-1}$	2.082***	2.505*	2.144**	2.277**
	(0.765)	(1.357)	(0.894)	(0.961)
$IMPAIR_{t-1}$	-0.0377	-0.779	0.384	-0.438
	(0.584)	(0.829)	(0.698)	(0.812)
$EQUITY_{t-1} \times GUAR.HIGH_t$				-0.117
				(0.110)
$PROFIT_{t-1} \times GUAR.HIGH_t$				-0.125
				(1.000)
$IMPAIR_{t-1} \times GUAR.HIGH_t$				0.601
				(0.976)
Constant	0.0294	-0.0231	0.0907**	0.0145
	(0.0357)	(0.0639)	(0.0428)	(0.0343)
Observations	1,963	557	1,406	1,963
Banks	363	314	363	363
R-squared	0.183	0.150	0.207	0.185

Notes: The table presents random-effects estimates. For brevity, coefficients for year dummies are not reported. GUAR.HIGH denotes a binary variable that codes years 2011-2014, when deposit guarantees were set higher. The models do not include GUAR.HIGH outside the interaction terms as the effect is already reflected in year dummies. Cluster-robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.2 Depositors' Reactions to the Performance of other Local Banks in the Same Neighborhood

In this section, I investigate the relationship between deposit growth at a given bank and information about the performance of other banks from the same association operating in the same neighborhood (commune) or within a radius of 2.5

km or 5 km from the bank's branch. In further deliberations, I do not present nor comment on the estimated coefficients and standard errors for the bank- and area-specific control variables as they are in line with the baseline specification 1 from Table 5.

Table 6 Depositors' Reaction to the Superior Performance of Other Local Banks Operating in the Same Neighborhood

Panel A. Banks within the same commune				
	(1)	*(2)*	*(3)*	*(4)*
Explanatory/dependent variable	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**
PEER.PROFIT.EXC.HIGH$_t$	0.0534**			
	(0.0251)			
LOGO.PROFIT.EXC.HIGH$_t$		0.0726***		
		(0.0211)		
OTHR.PROFIT.EXC.HIGH$_t$		0.0095		
		(0.0677)		
PEER.PROFIT.HIGH$_t$			0.0330**	
			(0.0142)	
LOGO.PROFIT.HIGH$_t$				0.0424***
				(0.0141)
OTHR.PROFIT.HIGH$_t$				0.0177
				(0.0265)
R-squared	0.188	0.190	0.188	0.190
Panel B. Banks within a 2.5 km radius				
	(5)	*(6)*	*(7)*	*(8)*
Explanatory/dependent variable	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**
PEER.PROFIT.EXC.HIGH$_t$	0.0481			
	(0.0308)			
LOGO.PROFIT.EXC.HIGH$_t$		0.0665***		
		(0.0232)		
OTHR.PROFIT.EXC.HIGH$_t$		-0.0030		
		(0.0949)		
PEER.PROFIT.HIGH$_t$			0.0396***	
			(0.0152)	
LOGO.PROFIT.HIGH$_t$				0.0495***
				(0.0139)
OTHR.PROFIT.HIGH$_t$				0.0206
				(0.0328)
R-squared	0.186	0.187	0.188	0.190
Panel C. Banks within a 5 km radius				
	(9)	*(10)*	*(11)*	*(12)*
Explanatory/dependent variable	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**
PEER.PROFIT.EXC.HIGH$_t$	0.0500*			
	(0.0262)			
LOGO.PROFIT.EXC.HIGH$_t$		0.0690***		
		(0.0221)		
OTHR.PROFIT.EXC.HIGH$_t$		0.0056		
		(0.0738)		
PEER.PROFIT.HIGH$_t$			0.0328**	
			(0.0135)	
LOGO.PROFIT.HIGH$_t$				0.0409***
				(0.0124)
OTHR.PROFIT.HIGH$_t$				0.0195
				(0.0280)
R-squared	0.189	0.191	0.190	0.191

Notes: The table presents random-effects estimates. In all specifications, estimations are based on 1,963 observations from 363 banks. For brevity, coefficients for a constant term, year dummies, and all control variables (POP.DENS, UNEMPL, COMM.BANKS, INT.COST, BANK.SIZE, OVERHEADS, EQUITY, PROFIT, and IMPAIR) are not reported. All control variables, except POP.DENS, UNEMPL, and COMM.BANKS, are lagged by one period. Cluster-robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6 presents estimation results for the impact of positive performance of other local banks (*exceptionally profitable* or *just profitable* neighboring peers). The outcomes strongly indicate that, after controlling for an institution's specificity and area of its operations, a cooperative bank has better access to deposits if its branches are located near local banks having exceptional or at least fair profitability. The effect of profitable neighbors is economically and statistically significant even in the case of weaker signals, i.e., when they are exerted by neighbors belonging to one-third of the most profitable banks in a given year. The specification 3 in Table 6 suggests that the additional annual increase in deposits due to the presence of profitable neighbors equals 3.33% (almost half of the average deposit growth rate in the sample) when all branches of a given bank are located in the same commune as that of the branch of a peer bank that belongs to one-third of the most profitable banks in a given year. The impact rises to 5.34% (71% of the sample mean of the deposit growth rate) if one of the neighbors of each branch within a commune belongs to one-tenth of the most profitable local banks. It should be noted that the significance of the effect does not depend on the definition of the local market. Further investigations (specifications 2, 4, 6, 8, 10, and 12) lead us to conclude that the effect is dependent on the visual similarity of a bank to its neighbors. In other words, the effect is exerted only by neighbors using the same logotype as a given bank. In all the six cases, the respective coefficients for LOGO.PROFIT.EXT.HIGH and LOGO.PROFIT.HIGH are positive and statistically significant at levels below 1%. The economic significance of the estimation results is higher than in the previous case; for example, a bank can expect a 6.65% increase in deposits if all its branches are located within a 2.5 km radius from another cooperative bank belonging to one-tenth of the most profitable banks (specification 6). On the other hand, the respective coefficients indicating the presence of *just profitable* banks with a different logotype (OTH.PROFIT.EXT.HIGH or OTH.PROFIT.HIGH) are always statistically insignificant. The estimation results are generally in line with H2, and this allows for the conjecture that the observed phenomenon resembles the halo effect, in which the banks are judged by depositors not only on their fundamentals but also on the performance of other institutions that seem similar at first sight.

Table 7 presents the estimation results corresponding to the impact of poor performance of neighboring peer banks. The outcomes do not allow for a positive verification of H3 as they indicate that the presence of not only a *just unprofitable* neighbor but even an *exceptionally unprofitable* peer bank in a given cooperative bank's vicinity generally does not influence the bank's deposit base, i.e., almost all estimated coefficients for the signal-related variables are statistically insignificant. Specification (6) constitutes one notable exception to this regularity, i.e., the coefficient for the variable OTHR.PROFIT.EXT.LOW is positive and statistically significant at the 10% level. It indicates that the presence of a *just unprofitable* peer institution with a different logotype in a given cooperative bank's vicinity stimulates the bank's deposit growth. It corroborates findings denoting depositor's inclination to base judgements on apparent similarity or dissimilarity of banks. In other words, the results suggest that depositors of a relatively poor cooperative bank tend to switch to its local peer, and these depositors eventually prefer banks that appear dissimilar to their troubled bank at first sight.

Table 7 Depositors' Reaction to the Inferior Performance of Other Local Banks Operating in the Same Neighborhood

Panel A. Peer banks within the same commune				
	(1)	*(2)*	*(3)*	*(4)*
Explanatory/dependent variable	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**
$PEER.PROFIT.EXC.LOW_t$	0.0016			
	(0.0112)			
$LOGO.PROFIT.EXC.LOW_t$		-0.0191		
		(0.0159)		
$OTHR.PROFIT.EXC.LOW_t$		0.0200		
		(0.0141)		
$PEER.PROFIT.LOW_t$			0.0054	
			(0.0080)	
$LOGO.PROFIT.LOW_t$				-0.0026
				(0.0106)
$OTHR.PROFIT.LOW_t$				0.0028
				(0.0101)
R-squared	0.184	0.185	0.184	0.184
Panel B. Peer banks within a 2.5 km radius				
	(5)	*(6)*	*(7)*	*(8)*
Explanatory/dependent variable	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**
$PEER.PROFIT.EXC.LOW_t$	0.0159			
	(0.0129)			
$LOGO.PROFIT.EXC.LOW_t$		-0.0156		
		(0.0213)		
$OTHR.PROFIT.EXC.LOW_t$		0.0318**		
		(0.0148)		
$PEER.PROFIT.LOW_t$			0.0118	
			(0.0090)	
$LOGO.PROFIT.LOW_t$				-0.0043
				(0.0129)
$OTHR.PROFIT.LOW_t$				0.0126
				(0.0109)
R-squared	0.184	0.185	0.184	0.184
Panel C. Peer banks within a 5 km radius				
	(9)	*(10)*	*(11)*	*(12)*
Explanatory/dependent variable	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**
$PEER.PROFIT.EXC.LOW_t$	0.0030			
	(0.0103)			
$LOGO.PROFIT.EXC.LOW_t$		-0.0116		
		(0.0145)		
$OTHR.PROFIT.EXC.LOW_t$		0.0171		
		(0.0121)		
$PEER.PROFIT.LOW_t$			0.0020	
			(0.0072)	
$LOGO.PROFIT.LOW_t$				-0.0063
				(0.0091)
$OTHR.PROFIT.LOW_t$				0.0032
				(0.0086)
R-squared	0.186	0.187	0.186	0.186

Notes: The table presents random-effects estimates. In all specifications, estimations are based on 1,963 observations from 363 banks. For brevity, coefficients for a constant term, year dummies, and all control variables (POP.DENS, UNEMPL, COMM.BANKS, INT.COST, BANK.SIZE, OVERHEADS, EQUITY, PROFIT, and IMPAIR) are not reported. All control variables, except POP.DENS, UNEMPL, and COMM.BANKS, are lagged by one period. Cluster-robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.3 Robustness Checks

I verify the robustness of the results in four ways. First, although the models control for the specificity of a bank's area of operation, it can be still argued that a reported deposit growth at a given bank is not a reaction to its neighboring peer's

good performance, but the superior performance of both banks can be attributed to their operating environments that promote an increase in the deposit base and profitability. Therefore, I introduce additional explanatory variables into the models. They aim to control for the deposit growth rates at neighboring banks in the same manner as that of their profitability. The constructed variables indicate whether the given cooperative bank operates in the vicinity of a peer bank with an *exceptionally high deposit growth* or a *just high deposit growth*. Similarly, as in the case of the signal-related variables, I assign a peer bank to a group of institutions with an *exceptionally high deposit growth* and a *just high deposit growth* if its DEP.GR in a given year belongs to one-tenth or one-third of the highest deposit growth rates among all cooperative banks, respectively. The presence of peer banks with low deposit growth rates in the neighborhood is controlled for in an exactly corresponding manner and denotes distinguishing peer banks with an *exceptionally low deposit growth* and a *just low deposit growth*. Since I distinguish between high deposit growth rates of neighboring peers with the same logotype as that of a given cooperative bank and a different logotype from the given cooperative bank, I construct eight control variables for each definition of the bank's neighborhood (LOGO.DEPO.EXT.HIGH, OTHR.DEPO.EXT.HIGH, LOGO.DEPO.HIGH, and OTHR.DEPO.HIGH for the presence of peers with high deposit growth rates in the vicinity of the given bank, and LOGO.DEPO.EXT.LOW, OTHR.DEPO.EXT.LOW, LOGO.DEPO.LOW, and OTHR.DEPO.LOW for the presence of peers with low deposit growth rates). The variables are introduced into the models simultaneously with their corresponding signal-related regressors, which reflect the presence of profitable or unprofitable peers in a given bank's neighborhood.[6]

Table 8 presents results of the first robustness check. As expected, deposit growth at a given bank follows the paths of its local peers. In other words, the presence of other cooperative banks with high deposit growth rates corresponds with an increase in the deposit base at a given bank, while the presence of peers with low deposit growth rates coexists with a limited deposit growth at the given bank. It is worth stressing that findings related to signals about peer banks' profitability still hold and corroborate the identified halo effect. In other words, a high profitability of peer banks with the same logotype stimulates deposit growth rates at a neighboring cooperative bank. Additionally, specifications (7) and (9)–(12) support the previous findings that depositors of a relatively poor cooperative bank tend to switch to its local peer, and these depositors eventually prefer banks that appear dissimilar to their troubled bank at first sight.

[6] I do not construct control variables which measure an average deposit growth rate of neighboring peer banks because some cooperative banks do not face competition of any peer bank in their vicinity. It would then lead to missing values in the new variable and to a reduction in the sample size.

Table 8 Depositors' Reaction to the Performance of Other Local Banks Operating in the Same Neighborhood: Results After Controlling for the Deposit Growth of Peer Banks

Panel A. Depositor's reaction to superior performance of peer banks

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	Banks within the same commune		**Banks within a 2.5 km radius**		**Banks within a 5 km radius**	
Explanatory/dependent variable	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**	**$DEP.GR_t$**
$LOGO.PROFIT.EXC.HIGH_t$	0.0599***		0.0497*		0.0536**	
	(0.0233)		(0.0260)		(0.0244)	
$OTHR.PROFIT.EXC.HIGH_t$	-0.0029		-0.0221		-0.0099	
	(0.0664)		(0.0931)		(0.0720)	
$LOGO.DEPO.EXC.HIGH_t$	0.0342**		0.0477***		0.0425***	
	(0.0142)		(0.0167)		(0.0148)	
$OTHR.DEPO.EXC.HIGH_t$	0.0238*		0.0394***		0.0281**	
	(0.0134)		(0.0151)		(0.0124)	
$LOGO.PROFIT.HIGH_t$		0.0384**		0.0347**		0.0342**
		(0.0160)		(0.0151)		(0.0140)
$OTHR.PROFIT.HIGH_t$		0.0012		-0.0002		0.0053
		(0.0252)		(0.0305)		(0.0268)
$LOGO.DEPO.HIGH_t$		0.0039		0.0219		0.0101
		(0.0110)		(0.0136)		(0.0109)
$OTHR.DEPO.HIGH_t$		0.0296***		0.0368***		0.0286***
		(0.0114)		(0.0130)		(0.0106)
R-squared	0.193	0.193	0.192	0.194	0.195	0.195

Panel B. Depositor's reaction to inferior performance of peer banks

	(7)	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
	Banks within the same commune		**Banks within a 2.5 km radius**		**Banks within a 5 km radius**	
Explanatory/dependent variable	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**
LOGO.PROFIT.EXC.LOW$_t$	-0.0175		-0.0109		-0.0052	
	(0.0163)		(0.0211)		(0.0149)	
OTHR.PROFIT.EXC.LOW$_t$	0.0240*		0.0330**		0.0288**	
	(0.0141)		(0.0149)		(0.0119)	
LOGO.DEPO.EXC.LOW$_t$	-0.0258		-0.0421*		-0.0353**	
	(0.0174)		(0.0223)		(0.0152)	
OTHR.DEPO.EXC.LOW$_t$	-0.0851***		-0.102**		-0.0808***	
	(0.0309)		(0.0452)		(0.0228)	
LOGO.PROFIT.LOW$_t$		0.0057		0.0120		0.0116
		(0.0114)		(0.0137)		(0.0104)
OTHR.PROFIT.LOW$_t$		0.0145		0.0240**		0.0153*
		(0.0106)		(0.0112)		(0.0091)
LOGO.DEPO.LOW$_t$		-0.0225*		-0.0406**		-0.0415***
		(0.0123)		(0.0167)		(0.0131)
OTHR.DEPO.LOW$_t$		-0.0357**		-0.0427**		-0.0362***
		(0.0142)		(0.0178)		(0.0122)
R-squared	0.190	0.187	0.190	0.189	0.193	0.193

Notes: The table presents random-effects estimates. In all specifications, estimations are based on 1,963 observations from 363 banks. For brevity, coefficients for a constant term, year dummies, and all control variables (POP.DENS, UNEMPL, COMM.BANKS, INT.COST, BANK.SIZE, OVERHEADS, EQUITY, PROFIT, and IMPAIR) are not reported. All control variables, except POP.DENS, UNEMPL, and COMM.BANKS, are lagged by one period. Cluster-robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

As a second robustness check, I introduce binary variables to account for depositor reaction to extremely high or low profitability of their own bank (SELF.PROFIT.EXC.HIGH, SELF.PROFIT.HIGH, SELF.PROFIT.EXC.LOW, and SELF.PROFIT.LOW). Thus, I distinguish between *exceptionally profitable*, *just profitable*, *exceptionally unprofitable*, and *just unprofitable* banks in the same manner as that of the baseline signal-related variables describing a bank's local peers. Table 9 presents the estimation results. Panel A proves that strong signals about a given bank's profitability convey additional information to its clients and impact deposit growth beyond the linear channel induced by PROFIT. Furthermore, Panel B indicates that depositors react to high profitability of both their own bank and its peer with the same logotype; however, interestingly, the impact of profitable peers can even exceed the impact exerted by the right bank. On the other hand, specifications (6), (8), and (10) prove that depositors are relatively more reasonable while witnessing low profitability, that is, they reduce their deposits at their own bank in case of its low profitability but do not punish their bank for the low profitability of its local peers.

The third set of robustness checks concerns estimation techniques. In order to prove the stability of the results, I re-estimate the models using (a) the ordinary least squares (OLS) estimator with standard errors clustered at the bank level, and (b) the system generalized method of moments (GMM-SYS) estimator (Blundell and Bond, 1998) with an additional regressor constituted by the dependent variable lagged by one period. In fact, the second method also indirectly addresses the issue of potential bank fixed-effects as it controls for persistency in deposit growth. Additionally, the GMM estimation procedure addresses the potential endogeneity of the deposit price (proxied by INT.COST). This is because I treat INT.COST as only sequentially exogeneous and design suitably lagged instrumental variables for this variable. The robustness checks lead to almost identical results, and thus I do not present them for brevity. Nevertheless, they are available upon request from the author.

Finally, in the fourth robustness check I employ alternative signal-related variables which describe the good or bad performance of local peer banks. First, for each branch of an analyzed cooperative bank I calculate the number of respectively good or bad peers' branches in the neighborhood, and then I average it over all branches of the analyzed bank. As a second alternative, instead of basing the signal-related variables' definitions on neighboring peer banks' profitability ratios, I check whether peers' growths in PROFIT belong to one-tenth or one-third of the highest or lowest values among all cooperative banks in a given year. I adjust definitions in the described manner as it can be argued that, for some depositors, changes in profitability are more tangible measures of a bank's superior or inferior performance when compared to pure profitability ratios. As the adjustments do not alter research findings, I do not present them for brevity. Nevertheless, they are available upon request.

Table 9 Depositors' Reaction to Performance of Other Local Banks Operating in the Same Neighborhood: Impact of a Given Bank's Profitability vs. Peer banks' Profitability

Panel A. Reaction to extremes in a given bank's profitability

	(1)	*(2)*	*(3)*	*(4)*
Explanatory/dependent variable	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**
PROFIT$_{t-1}$	2.264***	1.764**	1.726**	1.788**
	(0.801)	(0.767)	(0.770)	(0.770)
SELF.PROFIT.EXC.HIGH$_{t-1}$	-0.0077			
	(0.0065)			
SELF.PROFIT.HIGH$_{t-1}$		0.0077*		
		(0.0041)		
SELF.PROFIT.EXC.LOW$_{t-1}$			-0.0084**	
			(0.0040)	
SELF.PROFIT.LOW$_{t-1}$				-0.0117
				(0.0072)
R-squared	0.184	0.185	0.185	0.185

Panel B. Reaction to extremes in a given bank's and peer banks' profitability

	(5)	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
	Peer banks within the same commune		**Peer banks within a 2.5km radius**		**Peer banks within a 5 km radius**	
Explanatory/dependent variable	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**	**DEP.GR$_t$**
SELF.PROFIT.HIGH$_{t-1}$	0.0137**		0.0139**		0.0132**	
	(0.0055)		(0.0055)		(0.0054)	
LOGO.PROFIT.HIGH$_{t-1}$	0.0454***		0.0462***		0.0377***	
	(0.0108)		(0.0125)		(0.0112)	
OTHR.PROFIT.HIGH$_{t-1}$	-0.0109		0.0005		0.0006	
	(0.0274)		(0.0336)		(0.0281)	
SELF.PROFIT.LOW$_{t-1}$		-0.0120**		-0.0122**		-0.0116**
		(0.0049)		(0.0049)		(0.0048)
LOGO.PROFIT.LOW$_{t-1}$		0.00811		0.0154		0.0032
		(0.0106)		(0.0120)		(0.0094)
OTHR.PROFIT.LOW$_{t-1}$		0.0122		0.0194		0.0025
		(0.0114)		(0.0128)		(0.0097)
R-squared	0.187	0.182	0.186	0.182	0.187	0.183

Notes: The table presents random-effects estimates. Estimations are based on 1,963 (Panel A) or 1,962 observations (Panel B) from 363 banks. For brevity, coefficients for a constant term, year dummies, and all control variables (POP.DENS, UNEMPL, COMM.BANKS, INT.COST, BANK.SIZE, OVERHEADS, EQUITY, and IMPAIR) are not reported. All control variables, except POP.DENS, UNEMPL, and COMM.BANKS, are lagged by one period. Cluster-robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5. Conclusions

In the study, I establish that depositors respond to the fundamentals of small cooperative banks. At the same time, positive information about the performance of other local banks operating in the same neighborhood, belonging to the same association, and using the same logotypes seems to improve depositors' perception about their banks' safety, despite the fact that those banks are distinct and loosely linked entities and do not consolidate their financial statements nor guarantee their obligations. Conversely, I do not find evidence that a local bank is punished by its depositors for the inferior performance of its local peers, which are only apparently similar. Finally, the research outcomes indicate that depositors of a relatively poor local bank tend to switch to its neighboring peer, and they eventually prefer a bank that, at first sight, appears dissimilar to their troubled bank. In summary, the study suggests that depositors can be lured by profitable peer banks, but their decisions become affected by knowledge with more analytical value when the probability of incurring loss becomes more tangible. Generally, the research outcomes allow for the conjecture that the halo effect can be observed in small local banking markets as knowledge with little analytical value impacts depositors' choices.

The findings have managerial and policy implications. First, the findings prove that being apparently similar to neighboring peer institutions works in favor of small local banks, i.e., a bank is more likely to take advantage of the visual similarity (offered by the logotype) to its better-performing neighbors than to be pulled down by poor achievers. In other words, it does not pay to be apparently distinct if a bank is surrounded by champions, and it is not very harmful to be similar if a bank is surrounded by peer banks that deliver inferior performance. Second, the estimation results can play a role while understanding the mechanism of bank runs. While they confirm the view that depositors' choices are not always rational, they also show that this phenomenon can be utilized to strengthen a population's confidence in the banking sector if relatively poor performing banks become apparently similar to the better ones.

REFERENCES

Baer H, Brewer E (1986): Uninsured Deposits as a Source of Market Discipline: A New Look. *Quarterly Journal of Business and Economics*, 24:3–20.

Berger A, Turk-Ariss R (2010): Do Depositors Discipline Banks? An International Perspective. *Wharton Financial Institutions Working Paper*, 11-25.

Bertay AC, Demirgüç-Kunt A, Huizinga H (2013): Do We Need Big Banks? Evidence on Performance, Strategy and Market discipline. *Journal of Financial Intermediation*, 22:532–558.

Billett MT, Garfinkel JA, O'Neal ES (1998): The Cost of Market Versus Regulatory Discipline in Banking. *Journal of Financial Economics*, 48:333–358. DOI: 10.1016/S0304-405X(98)00014-2.

Bliss RR, Flannery M (2000): Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring vs. Influencing. *Review of Finance*, 6:361–96. DOI:10.1023/A:1022021430852.

Blundell RW, Bond SR (1998): Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87:115–143.

Bowyer LE, Thompson AF, Srinivasan V (1986): The Ohio Banking Crisis: A Lesson in Consumer Finance. *Journal of Consumer Affairs*, 20:290–299.

Choi H, Sohn W (2014): Regulatory Forbearance and Depositor Market Discipline: Evidence from Savings Banks in Korea. *Contemporary Economic Policy*, 32:203–218.

Demirgüç-Kunt A, Huizinga H (2004): Market Discipline and Deposit Insurance. *Journal of Monetary Economics*, 51:375–399.

Edwards K, Smith EE (1996): A Disconfirmation Bias in the Evaluation of Arguments. *Journal of Personality and Social Psychology*, 71:5–24.

Goedde-Menke M, Langer T, Pfingsten A (2014): Impact of the Financial Crisis on Bank Run Risk – Danger of the Days After. *Journal of Banking and Finance*, 40:522-533.

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

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

Hess K, Feng G (2007): Is There Market Discipline for New Zealand Non-Bank Financial Institutions? *Journal of International Financial Markets, Institutions and Money*, 17:326–340.

Hori M, Ito Y, Murata K (2009): Do Depositors Respond Rationally to Bank Risks? Evidence from Japanese Banks During Crises. *Pacific Economic Review*, 14:581-592.

Imai M (2006): Market Discipline and Deposit Reform Insurance in Japan, *Journal of Banking and Finance*, 30:3433-52.

Inakura N, Shimizutani S, Paprzycki R (2005): Deposit Insurance and Depositor Discipline: Direct Evidence on Bank Switching Behavior in Japan. *Hi-Stat Discussion Paper*, 125.

Jordan JS (2000): Depositor Discipline at Failing Banks. *New England Economic Review*, March/April:15-28.

Karas A, Pyle W, Schoors K (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.

Keeley MC (1990): Deposit Insurance, Risk and Market Power in Banking. *American Economic Review*, 80:1183–1200.

Leuthesser L, Kohli CS, Harich KR (1995): Brand Equity: The Halo Effect Measure. *European Journal of Marketing*, 29:57–66.

Levy-Yeyati E, Martinez Peria MS, Schmukler SL (2010): Depositor Behavior Under Macroeconomic Risk: Evidence from Bank Runs in Emerging Economies. *Journal of Money, Credit and Banking*, 42:585-614.

Maechler AM, McDill KM (2006): Dynamic Depositor Discipline in US Banks. Journal of Banking and Finance, 30:1871–1898.

Martinez Peria MS, Schmukler SL (2001): Do Depositors Punish Banks for Bad Behavior? Market Discipline, Deposit Insurance, and Banking Crises. *Journal of Finance*, 56:1029–1051.

Murata K, Hori M (2006): Do Small Depositors Exit from Bad Banks? Evidence from Small Financial Institutions in Japan. *Japanese Economic Review*, 57:260–278.

Nisbett R, Wilson T (1977): The Halo Effect: Evidence for Unconscious Alteration of Judgments. *Journal of Personality and Social Psycholo*gy, 35:250–256.

Oliveira RF, Schiozer RF, Barros LAB (2014): Depositors' Perception of 'Too-Big-to-Fail'. *Review of Finance*, 19:191-227.

Oliver RL (1977): Effect of Expectation and Disconfirmation on Postexposure Product Evaluations – An Alternative Interpretation. *Journal of Applied Psychology*, 62:480-486.

Oliver RL (1980): A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal of Marketing Research*, 17:460-469.

Önder Z, Özyildirim S (2008): Market Reaction to Risky Banks: Did Generous Deposit Guarantee Change It? *World Development*, 36:1415–1435.

Park S (1995): Market Discipline by Depositors: Evidence from Reduced-Form Equations. *Quarterly Review of Economics and Finance*, 35:497–514.

Park S, Peristiani S (1998): Market Discipline by Thrift Depositors. *Journal of Money, Credit, and Banking*, 30:347–364.

PFSA (Polish Financial Supervision Authority) (2014): Informacja o Sytuacji Banków Spółdzielczych i Zrzeszających w III Kwartale 2014, available on-line at: http://www.knf.gov.pl.

Shimizu K (2009): Is the Information Produced in the Stock Market Useful for Depositors? *Finance Research Letters*, 6:34-39.

Steiger DM, Simon A, Montgomery R (2001): Household Survey on Deposit Insurance Awareness. Survey Report, available on-line at: http://www.fdic.gov/deposit/insurance/initiative/ household.

Stiglitz J, Weiss A (1981): Credit Rationing in Markets with Imperfect Information. *American Economic Review*, 71:393-410.

Thorndike EL (1920): A Constant Error on Psychological Rating. *Journal of Applied Psychology*, 4:25–29.

Tsuru K (2003): Depositors' Selection of Banks and the Deposit Insurance System in Japan: Empirical Evidence and Its Policy Implications. *RIETI Discussion Paper Series*, No. 03-E-24.

Yan X, Skully M, Avram K, Vu T (2014): Market Discipline and Deposit Guarantee: Evidence from Australian Banks. *International Review of Finance*, 14:431-457.