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THE DIGITALIZATION'S EFFECT IN DIFFERENT BUSINESS MODELS ON THE ITALIAN BANKS

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Abstract - This article analyses the effects of digitalization on the Italian banks also considering business models. The dataset is composed by commercial, cooperative and saving banks for the period running from 2011 to 2016. The goals are to study the impacts that the use of the internet banking and the business model have had on the reduction of the branches. The methodology used is those of the instrumental variables. The results show that business models have an opposite influence on the bank's branches. While "commercial banks" have a negative relationship, the "cooperative banks" have a positive connection, so they have shown that they are able to bring banking and financial services to places whose small size or the insufficient presence of production units did not justify the cost of a branch for the other banks. Instead, the use of internet banking is always statistically significant with a positive relationship with the number of branches. This means that consumers are using the internet banking only to conduct daily operations and they go in branches for all operations as investments or trading.

Index Terms - Digitalization, Internet Banking, Business Model, Italy

I. INTRODUCTION

Internet banking have become an important alternative to the traditional banks. Perhaps the most probable way that internet banking can influence community banking is by influencing the nature of the relation between banks and their customers. These implications have potential effect on the banks' business mixes, funding resource, employees and on the risk-return profiles. In recent years are continuing adaptation policies of European banks to the new economic, technological and regulatory framework. In all countries, albeit to varying degrees, physical networks are emptying of customers, both for a contraction in the demand for financial services, either because it is increasing the use of traditional banking services in digital mode. In countries with the highest penetration of online banking are already evident phenomena of substitutions between physical networks and computer networks. At the same time as the increase in the use of internet banking, there was a sharp reduction of the branches. In this contest, the business model theme is becoming increasingly important in the banking sector. The reasons are both regulatory and strategic (change in competitive environment). The aim of the article is to study any connections by internet banking and reduction of branches; all this in reference to the business model of the banks.

II. BUSINESS MODEL LITERATURE

The interest in banking business models has assumed on renewed emphasis after the recent financial crises and in the light of the competitive environment. The return to an adequate profitability will depend on bank's capacity to seize the opportunities offered by technological progress. The scope of this paragraph is not to effect the complete and close examination, but to highlight the main methodologies. The approach followed by the banking studies is largely common in the database used (balance sheet items and indicators), in input and output variables, in the statistical techniques used (main cluster analysis) and in the results obtained. One of first works mentioned [1]studies the strategic groups in banking (the term business model is not used yet) with a cluster analysis based on the balance sheet items. The scope of the authors is to try the existence of different strategic groups. The conclusion is that the banking business models exist and produce significant difference in performance. A working paper of the European Central Bank [2]evaluates the effect of the crisis on the banking business model. The authors show that the crisis has hit those banks that in previous years were characterized by high credit growth, lower dependence on customer deposits, greater company size and lower levels of capitalization. The papers of Ayadi et al. [3]-[4]-[5]-[6] have assumed an important guiding role for subsequent contributions, consolidating in a decisive way the financial data-driven approach. The authors speak of "business model analysis" and their goal is to analyse the performance levels of the different business models of the banking sector. Reference [7] analyses the impact of business model on the riskiness of banks in 15 EU countries between 2002 and 2010. The peculiarity of the work is the extension of the sample to smaller and unlisted banks. The choice is justified by the composition of the European banking system. The results shown that the effect of stability and profitability change according to the business models. Greater diversification of sources of income strengthens stability in the case of retail banks (cooperative and saving banks) and penalizes it in the case of investment banks. Contrary effects are instead found in the hypothesis of a greater

diversification of the fundraising, obtained by increasing the weight of non-deposit funding. Reference [8]identifies three business models (retailed-funded commercial bank, wholesale-funded commercial bank and a capital markets-oriented bank) using balance sheet characteristics of 222 international banks and a data-driven. The results shown that institutions engaging mainly in commercial banking activities have lower costs and stable profits respect to capital markets-oriented banks. Reference [9] examines the effects of bank business models on performance and risk for a sample of 505 banks from 30 European countries over the period from 1998 to 2013. The methodology used is factorial analysis that leads to the distinction of two principal business model strategies: retail and diversification. The study confirms the relevance of the business model how determinant of the performance: the retail model is associated with higher profitability and stability, instead the diversification model is more profitable but not more susceptible to distress. Reference [10]compares the structures of the balance sheet and income statement of eight different types of bank, and analyses their profitability from 2006 to 2013. Two clusters represent specialized banks: the "network banks" and "public and development banks". The first cluster offers services or operates as hub of a network of cooperative banks; intermediaries for public interest purposes represent the second cluster. The other six clusters derive from the possible combinations of three factors: size, the ratio between loans to customers and total assets, above or below the median (lending or diversified banks) and finally the exposure to foreign countries, above or below 50% of total loans "international or domestic banks". The profitability of lending-oriented banks was better than diversified banks until 2010, and later it declined more sharply than that of the other banks. Reference [11] analyses heterogeneity among the various business models by introducing a portfolio logic. The sample includes only systemically important banks in 65 countries over the period of 2000 – 2012. Four different business models are identified: diversified, specialized, trading and investment. The results show the diversity of individual risk and systemic risk because the first is linked to the asset structure while the second is primarily related to the funding structure. The authors conclude that the individual risk is not a good predictor of systemic; therefore, in order to govern the latter, the traditional micro prudential supervisory measures are not sufficient. Reference [12]distinguishes banks on the business models by trying with various combinations of balance sheet characteristics as input in cluster analysis. The authors identify a retail-funded and a wholesale-funded commercial banking model that are robust to the choice of inputs; on the contrary trading banking model are less robust. The results show the banks that switched into the retail-funded model saw their ROE improve relative to non-switchers. By contrast, the banks that have passed into the wholesale-funded model have deteriorated their relative performance by five-percentage point on average. Reference [13]identifies four different business models: wholesale funded, traditional commercial, complex commercial and securities holding. The methodology used is based on a statistical clustering algorithm applied to a very large dataset on banks in the euro area. The authors find the risk and performance indicators of each clusters follow distinct statistical distributions. Reference [14]investigates the impact of business models on bank performance during the period 2007-2008 among 156 banks from Central and Eastern European countries. The outcome shows that banks with higher capitalization have a better performance and present a lower probability of default. Another trend of the literature follows different research perspectives from that of financial data-driven. Reference [15] adopts a purely logical and descriptive approach and do not resort to statistical-quantitative analysis. The authors distinguish between commercial banks, investment banks, non-banks (for example, insurance companies), diversified banks, functionally or geographically. Reference [16] adopts a logical descriptive approach and considers five core components for the analysis: the range of business undertaken; the banks' ultimate business scope; balance sheet management; the way the core business is conducted (e.g. use of securitization or credit risk-shifting instruments, etc.); the management of regulation. The author finds that all these components have also changed radically in the pre-crisis period and they will change again in the future. The concept of business models is related to the activities undertaken and the way in which the core business is carried out. The report of EBA [17]provides a global overview of the potential implications for business models resulting of the implementation of the regulatory measures, for example Basel III leverage ratio, liquidity coverage ratio etc.Reference [18]criticizes the dominant approach of the literature on business and provide a new way of rethinking the business models of the banks by using qualitative research on intangibles. Reference [19]affirms that the business models are under scrutiny. The authors have identified three potential scenarios for the banking: bank's domination; banking reinvented and banking ecosystem. These banks will have to choose between five business models:

- Trusted advisor: if the business model of the bank will focus on exploiting economies of scope and gaining a high share of their client's wealth;
- Product leader: If the bank develops innovative products, for which it is able to command premium prices;
- Transaction champion: if the bank will focus on exploiting economies of scale through partnering with other intermediaries (bank and no-bank);

- Managed solutions: if the bank will focus on building economies of scale through providing specific banking to other providers;
- Universal bank.

The work of Efma[20]focuses on the new banking business models and how the new technologies are driving the developments in the industry. The proposed work is based on this theme, that is to say how much digitalization has influenced the performances and strategies adopted by Italian banks.

III. DATASET AND METHODOLOGY

The sample data is composed of the 216 Italian banks for the period running from 2011 to 2016. The banks are selected through tree different business models: commercial banks, cooperative banks and saving banks. The commercial banks are characterized by activity in retail banking (individuals, SMEs), wholesale banking (large corporate) and private banking (not belonging to groups of saving banks, cooperative banks). The cooperative banks are characterized by a cooperative ownership structure and are mainly active in retail banking (individuals, SMEs); whereas, the saving banks usually belonging to a group of saving banks. The data used in the analysis were provided respectively: from BankFocus for all balance data, the number of bank branches and the number of employees; from Eurostat for ratio of individuals who use internet banking and for real GDP growth rate volume. The table I shows three particular cases.The first is the period of negative economic situation with a GDP growth rate of negative (minimum value -2.8%).The second is the growth of 9% of the people who use internet banking;and the last but not the least is the presence in the country of an online-only bank, justified by the number of zero employees.

If the banks are divided for business models have these characteristic (Table II): the commercial banks are those with the higher number of employees and branches for the all period. It is evident how the trend is decreasing; in fact, branches have decreased from 556 in 2011 to 400 in 2016. The same behavior the saving banks had. As far as the cooperative banks are concerned, they have instead maintained almost constant distribution throughout the territory. The methodology used for two models presented below is the instrumental variables, which corrects the endogeneity problem involving instruments that are correlated with the endogenous regressors but uncorrelated with the error term; that is a method to generate only exogenous variation in the independent variables. Then the two stage least squares procedure has been applied. This type of regression can control for threats to internal validity, like: confounding variables, measurement error, spuriousness, simultaneity and reverse causality. In essence, this method is used when the variables are related in some way; if there is some type of correlation going on between variables (e.g. bidirectional correlation), then you can't use the more common methods like OLS, because one requirement of those methods is that variables are not correlated.

IV. THE EFFECT OF THE DIGITALIZATION

In this section the connection between the digitalization and the reduction of number of branches are analysed on base of the business model. The variable dependent (y_1) is logarithm of the number of branches, while the endogenous regressor(y_2) is the logarithm of number of employees. The exogenous variables (x_1) are the percentage of the person who use internet, the economic situation in terms of real GDP growth rate volume, one of the capital requirements so Tier1 ratio, the logarithm of the deposits, the net interest margin and the business models "commercialbanks", "cooperativebanks"and "savingbanks". Instruments (x_2) are the logarithm of the asset and the managerial efficiency. The model is replicated for each business model (commercial, cooperative and saving bank) to analyze whether this factor influences and how the number of branches of Italian banks.

The single equation is:

OLS regression:

$$y_1 = y_2\beta_1 + x_1\beta_2 + u$$

2SLS, first-stage regression:

$$y_2 = y_1\gamma_1 + x_1\gamma_2 + e$$

2SLS, second-stage equation:

$$y_1 = \widehat{y_2'\beta_1} + x_1'\beta_2 + u$$

While the systems of equations is:

$$y_1 = y_2'\beta_1 + z_1'\gamma_1 + u_1$$
$$y_2 = y_1'\beta_2 + z_2'\gamma_2 + u_2$$

In details the variables used are:

$\text{lognbranches}_{i,t}$ is the total number of bank branches in existence at the balance sheet date.

$\text{lognemployees}_{i,t}$ is the annual average number of employees of the bank.

" $\text{percentuseinternet}_i$ " is the percentage of individuals who use internet banking for each years.

"$\text{businesscycle}_{i,t}$" is the real GDP growth rate.

"$\text{tier1ratio}_{i,t}$" is the comparison between a banking firm's core equity capital and its total risk-weighted assets.

$\text{logvolumedeposit}_{i,t}$ is the annual total deposits for each bank and for each year.

" $\text{netinterestmargin}_{i,t}$ " is the measure of the difference between interest income and interest expenses relative to the amount of interest -earning assets.

"commercialbank_i" is the dummy variable. It is one if the bank is a commercial bank otherwise is zero.

(1)

"$cooperativebank_i$" is the dummy variable. It is one if the bank is a cooperative bank otherwise is zero.

(2)

"$savingbank_i$" is the dummy variable. It is one if the bank is a saving bank otherwise is zero.

(3)

"$logtotasset_{i,t}$" is the logarithm of the total asset how proxy of the single size bank.

"$managerialefficiency_{i,t}$" represents the efficiency of company's operations. A lower ratio means that the bank is more efficient.

The results show how the business models influence the number of the branches (Table III; TableVI and Table IX); only one of the business model is not significant statistically, that is the savings bank. In the first model (1) it is interesting to note how the external variable "businesscycle" is not statistically significant. It can be said that in Italy the reduction over time of the branches (from 556 to 400 on mean) did not depend on the economic crisis but on other variables. Another variable very interesting is the percentage the people who use internet banking. It is statistically significant at 1% with a positive relation to number of branches. It was expected a negative relationship, instead it is the exact opposite; this could significance that the Italian consumers use internet banking for the normal daily use (payments and online purchases) and preference to go on the branches for the investment activities. Also the number of employees, the volume of the deposits and the net interest margin have a positive relationship with the number of branches; this means that the normal carrying out of the activities is provided mainly in the branch, therefore with direct contact between employees and customers. The "tier1ratio" is highly significant with a negative relation to the number of branches. This means that a stronger prudential regulation can reduce the operativeness of the banks also to level of the branches. In addition, the "commercialbanks" is significant at 1% and has a negative relationship with dependent variable. This result is consistent with the strategic lines of the commercial banks that in recent years have been progressively reducing branches in the area. These results are tested to prove the endogeneity of regressors and the instruments validity. The Durbin-Wu-Hausman test compares OLS and 2SLS model coefficients. The null hypothesis that the regressors are exogenous is rejected. Therefore, the logarithm of the number of employees is an endogenous regressor and it is necessary to use instrumental variables approach (Table IV). The test for overidentifying restriction shows all instruments are valid (Table IV); and the test for weak instruments looks at the F statistic for joint significance of instruments (Table V). The result is 183.541, which is larger than the rule of thumb of 10. Therefore, the instruments are not weak.

Also in the second model with the variable "cooperativebanks" (2) the situation of economic instability, characterizing the period, does not affect the strategic decision to reduce the number of branches; and all variables have the same behavior of the first model (Table VI). What is different is the relationship between the business model and number of the branches: it is positive. This means that due to the nature of the same specialization cooperative banks tend to have a strong presence of the territory. This is confirmed by the descriptive statistics (Table I), in fact, their number on average remained virtually unchanged during the analysis period. In addition, these results are tested to prove endogeneity of regressors and the instruments validity. The Durbin-Wu-Hausman test compares OLS and 2SLS model coefficients. The null hypothesis that the regressors are exogenous is rejected (Table VII). Moreover, the test for overidentifying restriction shows all instruments are valid (Table VII); and the test for weak instruments looks at the F statistic for joint significance of instruments (Table VIII). The result is 261.655, which is larger than the rule of thumb of 10. Therefore, the instruments are not weak. Regarding the model with the business model "savingbanks", the result is very different from the previous ones; that is it is not statistically significant (Table IX). What needs tobe emphasized is that even in this case, the "percentuseinternet" variable is always statistically significant at 1% with a positive relationship with the number of branches. This result supports the evidence emerging from an online survey that involved a sample of over 4240 respondents in March 2018, in which Italian customers prefer to go to the branch for investment activities (Fig. 1) and use internet banking to carry out daily operations.

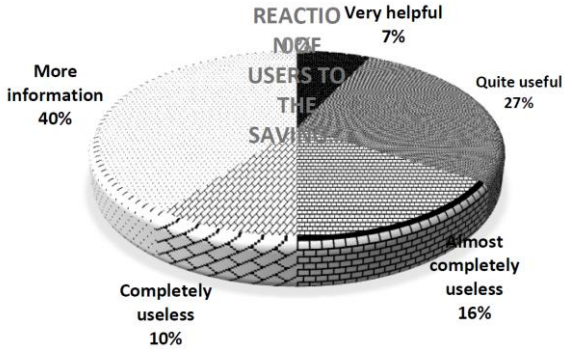

Figure 1 Reaction of users to the saving management proposal through an online service

V. CONCLUSIONS

This articlehighlights the importance of the human relationship in a branch, which still remains the point of reference for the most complex operations. If in fact it is true that the simplest operations such as information and some transactions such as transfers and bank transfers have almost totally migrated to homebanking and apps, it is true that most online account holders continue to go to the branch for investments and financing. Customers continue to seek quality advice that only the human relationship

with a professional can offer.The relationship of trust towards one's consultant is more central than ever for the client anduses technological innovation to be increasingly efficient. Innovation that must be used to support the consulting activity and not as a mere substitute.

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TABLE

Table I Descriptive statistics of the variables for the period running from 2011-2016

Variable	Obs	Mean	Std. Dev.	Min.	Max.
LOG. NET INTEREST INCOME	1296	4.160471	0.709436	2.84	7.19
LOG. TOT. OPERATING EXPENSES	1296	9.644946	1.692179	6.78	16.72
% OF PEOPLE WHO USE INTERNET BANKING	1296	24.33333	3.497379	20	29
GDP GROWTH RATE	1296	-0.3166667	1.43282	-2.8	1
TIER 1 RATIO	1296	17.81758	9.295672	1.63	142.06
LOG VOLUME DEPOSITS	1296	12.85819	1.700656	9.14	19.93
NET INTEREST MARGIN	1296	2.136303	0.622736	.326	6.645
NUMBER BRANCHES	1296	131.1151	726.2566	1	9496
LOG. NUMBER BRANCHES	1296	2.685795	1.612235	0	9.16
NUMBER EMPLOYEES	1296	1721.373	11877.11	0	163915
LOG. NUMBER EMPLOYEES	1296	3.752068	2.457354		12.01
COMMERCIAL BANKS	1296			0	1

COOPERATIVE BANKS	1296			0	1
SAVINGS BANKS	1296			0	1

Table II: Characteristic Italian banks divided for business models

	Mean					
	COMMERCIAL BANKS		COOPERATIVE BANKS		SAVING BANKS	
YEAR	Branches	Employees	Branches	Employees	Branches	Employees
2016	400	6765	41	361	117	1037
2015	429	6499	41	360	120	1049
2014	459	7007	43	374	124	1045
2013	493	7434	41	355	126	1061
2012	537	7765	41	364	131	1088
2011	556	7919	41	362	131	1079

Table III: Estimation of system of equation of the y_1 = lognbranches for commercial banks (1)

OLS regression			Number of obs = 1296
			R-squared = 0.8244
			Adj R-squared= 0.8234
lognbranches	Coef.	Std. Err.	t*
Lognemployees	0.2508819	0.0181272	13.84***
percentuseinternet	0.0092079	0.007358	1.25
Businesscycle	0.0137275	0.016821	0.82
Tier1ratio	-0.0126103	0.0023098	-5.46***
Commercialbank	-0.6414494	0.0553262	-11.59***
Logvolumedeposit	0.5788272	0.0261155	22.16***
netinterestmargin	0.453726	0.0356842	12.72***
_cons	-6.540772	0.3637867	-17.98***
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%			

First-stage regression			Number of obs = 1296
			R-squared = 0.8562
			Adj R-squared= 0.8553
Lognemployees	Coef.	Std. Err.	t*
percentuseinternet	-0.0322674	0.0101225	-3.19***
businesscycle	0.0304869	0.0232056	1.31
Tier1ratio	0.0017942	0.0032077	.56
commercialbanks	1.052818	0.0710936	14.81***
logvolumedeposit	0.0752492	0.0678429	1.11
netinterestmargin	0.0407375	0.0498406	0.82
Logtotasset	2.689334	0.1524581	17.64
managerialefficiency	0.2224309	0.6388665	0.35
_cons	-12.55654	.4155844	-30.21***
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%			

Instrumental variables (2SLS) regression Over-identified case (1 endogenous variable, 2 instruments)			Number of obs = 1296
			R-squared = .7916
lognbranches	Coef.	Std. Err.	z*
Lognemployees	0.5318937	0.044612	11.92***
percentuseinternet	0.020642	0.0081547	2.53***
Businesscycle	0.0062991	0.0182971	0.34
Tier1ratio	-0.0115132	0.0025131	-4.58***
Commercialbank	-0.9646811	0.0756981	-12.74***
Logvolumedeposit	0.2348905	0.0566141	4.15***
netinterestmargin	0.3969383	0.0395863	10.03***
_cons	-3.290201	0.6087009	-5.41***
Instrumented: lognemployees			
Instruments: percentuseinternetbusinesscycle tier1ratio			

commercialbankslogvolumedepositnetinterestmarginlogtotassetmanagerialefficiency
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%

Table IV: Results of the quality test of the y_1 = lognbranches for commercial banks

Test of endogeneity	Ho: variables are exogenous
Durbin (score) chi2 (1) = 57.9772	(p=0.0000)
Wu-Hausman F (1, 1287) = 60.2708	(p=0.0000)

Test of overidentifying restriction	
Hansen's J chi2 (1) = 1.49496	(p=0.2214)

Table V: Weak instrument tests of y_1 = lognbranches for commercial banks

Weak instrument tests	
Robust F (2, 1287)	183.541

Table VI: Estimation of system of equation of the y_1 = lognbranches for cooperative banks (2)

OLS regression			Number of obs = 1296
			R-squared = 0.8133
			Adj R-squared= 0.8123
lognbranches	Coef.	Std. Err.	t*
Lognemployees	0.2425311	0.0200118	12.12***
percentuseinternet	0.0100109	0.0075878	1.32
Businesscycle	.0141959	0.0173447	0.82
Tier1ratio	-0.0158522	0.0023536	-6.74***
cooperativebank	0.3936181	0.0557535	7.06***
Logvolumedeposit	0.5786068	0.0274237	21.10***
netinterestmargin	0.452167	0.0368178	12.28***
_cons	- 6.874584	0.3737601	- 18.39***
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%			

First-stage regression			Number of obs = 1296
			R-squared = 0.8713
			Adj R-squared= 0.8705
Lognemployees	Coef.	Std. Err.	t*
percentuseinternet	-0.0314266	0.0095746	- 3.28***
businesscycle	0.0284715	0.021952	1.30
Tier1ratio	0.0038362	0.0030022	1.28
cooperativebanks	-1.23382	0.0619769	- 19.91***
logvolumedeposit	0.1484748	0.064216	2.31**
netinterestmargin	0.05711	0.0471514	1.21
Logtotasset	2.398377	0.1456792	16.46***
managerialefficiency	0.1269247	0.6040753	0.21
_cons	- 10.77523	0.4133417	- 26.07
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%			

Instrumental variables (2SLS) regression Over-identified case (1 endogenous variable, 2 instruments)			Number of obs = 1296
			R-squared = .7692
lognbranches	Coef.	Std. Err.	z*
Lognemployees	0.5917551	0.0531833	11.13***
percentuseinternet	0.0233971	0.0086129	2.72***
Businesscycle	0.0056191	0.0192635	0.29
Tier1ratio	-0.0153775	0.0026098	- 5.89***
cooperativebanks	0.8815592	0.0915464	9.63***
Logvolumedeposit	0.1730694	0.0638336	2.71***
netinterestmargin	0.3822059	0.0419461	9.11***
_cons	- 3.514783	0.6228254	- 5.64***
Instrumented: lognemployees			

Instruments: percentuseinternetbusinesscycle tier1ratio cooperativebankslogvolumedepositnetinterestmarginlogtotassetmanagerialefficiency
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%

Table VII: Results of the quality test of the y_1 = lognbranches for cooperative banks

Test of endogeneity	Ho: variables are exogenous
Durbin (score) chi2 (1) = 64.2859	(p=0.0000)
Wu-Hausman F (1, 1287) = 67.1714	(p=0.0000)

Test of overidentifying restriction	
Hansen's J chi2 (1) = 0.886351	(p=0.3465)

Table VIII: Weak instrument tests of y_1 = lognbranches for cooperative banks

Weak instrument tests	
Robust F (2, 1287)	216.655

Table IX: Estimation of system of equation of the of y_1 = lognbranches for savings banks (3)

OLS regression			Number of obs = 1296
			R-squared = .8103
			Adj R-squared= .8093
lognbranches	Coef.	Std. Err.	t*
Lognemployees	0.1482214	0.0179906	8.24***
percentuseinternet	0.008373	0.0076491	1.09
Businesscycle	0.0154746	0.0174821	0.89
Tier1ratio	-0.0158991	0.0023783	- 6.69***
savingsbank	0.4149266	0.0773459	5.36***
Logvolumedeposit	0.6447863	0.0270571	23.83***
netinterestmargin	0.4684848	0.0370925	12.63***
_cons	- 7.11017	0.37874	- 18.77***
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%			

First-stage regression			Number of obs = 1296
			R-squared = .8387
			Adj R-squared= .8377
Lognemployees	Coef.	Std. Err.	t*
percentuseinternet	-0.0374392	0.010712	-3.50***
businesscycle	0.0301864	0.0245718	1.23
Tier1ratio	0.0126996	0.0033539	3.79***
savingsbanks	0.8005967	0.1065038	7.52***
logvolumedeposit	0.1462306	0.0721257	2.03**
netinterestmargin	0.0549552	0.0527937	1.04
Logtotasset	2.695459	0.1625103	16.59***
managerialefficiency	0.8840379	0.6748651	1.31
_cons	-13.48331	0.4332969	-31.12***
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%			

Instrumental variables (2SLS) regression Over-identified case (1 endogenous variable, 2 instruments)			Number of obs = 1296
			R-squared =
lognbranches	Coef.	Std. Err.	z*
Lognemployees	0.4701785	0.0476724	9.86***
percentuseinternet	0.0234287	0.0087577	2.68***
Businesscycle	0.0070237	0.0195078	0.36
Tier1ratio	-0.0187349	0.0026766	-7.00***
savingsbank	0.0785275	0.0972955	0.81
Logvolumedeposit	0.2265926	0.0637588	3.55***
netinterestmargin	0.3986226	0.0423728	9.41***
_cons	-3.08374	0.6860298	-4.50***

Instrumented: lognemployees		
Instruments: percentuseinternetbusinesscycle tier1ratio savingsbankslogvolumedepositnetinterestmarginlogtotassetmanagerialefficiency		
*represents significance at 10%, while ** represents significance at 5% and ***represents significance at 1%		

Table X: Results of the quality test of the y_1 = lognbranches for savings banks

Test of endogeneity	Ho: variables are exogenous
Durbin (score) chi2 (1) = 68.3985	(p=0.0000)
Wu-Hausman F (1, 1287) = 71.7081	(p=0.0000)

Test of overidentifying restriction	
Hansen's J chi2 (1) = 0 .019494	(p= 0.8890)

TableXI: Weak instrument tests of Weak instrument tests of y_1 = lognbranches for savings banks

Weak instrument tests	
Robust F (2, 1287)	199.417

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