Bank i Kredyt 53(3), 2022, 295-324

BANK I KREDYT
BANK & CREDIT

Internet banking, age, gender, and performance: Which connections in Italy?

Elisa Di Febo*, Eliana Angelini#

Submitted: 6 February 2020. Accepted: 12 May 2022.

Abstract

Internet banking has influenced community banking by changing the relationship between banks and their customers in the last few years. Therefore, it is crucial to understand how its use has impacted the performance and the branches. The innovation of the research lies in considering the percentage of Internet banking users and the demographic information: the age and gender of the users. The dataset includes 216 banks with 1296 observations from 2011 to 2016. The methodology used is a fixed-effect model. The results highlight that Internet banking harms the performance of Italian banks. However, the variable demographic of the age of users of Internet banking is attractive: only the group of users between 65–74 years old has a significant and negative impact on Italian branches. On the other hand, the gender of Internet banking users does not influence the reduction of the banks' branches. This information could help the management develop marketing and communication policies for the target groups.

Keywords: internet banking, branches, age, gender, performance

JEL: C23, G21, O33

* Department of Economic Studies, University "G. d'Annunzio" of Chieti; e-mail: elisa.difebo@unich.it; corresponding author.
# e-mail: eliana.angelini@unich.it.

1. Introduction

The word "Internet banking" indicates the capacity of the banks to use the Internet as a different channel for banking services and transactions, and it is a way to reach their customers directly. Internet banking allows the user to conduct financial transactions via the Internet. It is also defined as online banking or web banking. It requires a computer or other device, an Internet connection, and clients need to register for their bank's Internet banking service. Consumers are not required to physically visit a bank branch to complete most of their basic banking transactions.

How the firms perform is one of the determinants of a country's long-term potential growth. The technological progress of banks is influenced by the strategies adopted by the managers, among other things. Internet banking has become an essential alternative to traditional banks. Perhaps the most probable way Internet banking can influence community banking is by changing the relationship between banks and their customers. These implications potentially affect the banks' business mixes, funding resources, employees, and risk-return profiles. The gap in productivity between Europe and the United States is increased, mainly because of how slowly information and communication technology and digital technologies have spread within the European economies. Italy has accumulated a considerable delay in this field. The European Commission has elaborated an index that shows the digitalisation level of the European countries: the Digital Economy and Society Index – DESI. Five main dimensions compose this index: connectivity (25%), human capital (25%), use of the Internet (15%), integration of digital technology (20%), and digital public services (15%). It tracks the digital performance of Italy, which ranks 24th. On this basis, it is evident that there is a link between financial innovation and a firm's performance; and all participants need to understand how Internet banking affects the performance of banks. Internet banking has become a significant alternative distribution channel for the banking sector. It is crucial to know how its use impacted the performance represented by Net Interest Margin (NIM). The next step is to check whether Internet banking has contributed to the definition of the drastic reduction policy of the branches. The innovative part of the study is the inclusion of the demographic variables regarding Internet banking users. This choice was made to best characterise the use of Internet banking. Regarding the demographic variables such as age and gender, their inclusion derives from reading various articles on the relevance of gender (Calcagnini, Giombini, Lenti 2015; Chamboko et al. 2020). It is evident that banks generally do not adequately account for gender differences overall and, just as importantly, for generational differences among women in the way they market their services. Considering all these aspects, it seems natural to think that these variables may have influenced the banks' branch networks. Italy's choice derives from analyzing the Italian banks' various industrial plans, which indicate a push to invest in digitalisation strategy. The focus of digitalisation continues and remains to improve efficiency to simplify the relationship with the increasingly demanding and less loyal customers. In Italy, more than 13 million millennials are, as digital natives, the principal savers and investors of the future. They coexist with digital technologies that are a prerequisite for using financial services. The reference points are web companies, social networks, and models of the sharing economy, because they live in digitised and mobile-user experiences. For most of these, the relationship with the bank becomes sporadic for many standardised services. Moreover, Italy stands out among the countries where consumers use digital banking solutions more frequently, with 59% using them at least once every two weeks. Furthermore, in line with European data, 60% of Italians choose mobile banking apps, while 30% rely exclusively on online banks (data by European Digital Banking 2019, Mastercard).

Hence, the hypotheses of the paper are several:

H1: The percentage of Internet banking users is one of the determinants of the Net Interest Margin (NIM).

The study focuses on the impact of Internet banking on the performance of Italian banks. The choice of this dependent variable is based on the literature review. Many authors analyse the financial performance of banks through the net interest margin (Demirgüç-Kunt, Huizinga 1999; Gavurova et al. 2017; Khan, Tahir, Umer 2015; Nasserinia, Ariff, Fan-Fah 2017; Nouaili, Abaoub, Ochi 2015). The use of Internet banking is crucial in this analysis because the authors want to verify empirically if the performance of Italian banks has impacted this variable. After all, the literature is not unique. Therefore, it is crucial for bankers, bank supervisors, and policymakers to understand how Internet banking affects banks' performance (Sullivan 2000).

H2: The adoption of Internet banking has favoured reducing the high number of bank branches.

The predicted relation is negative, and this can be deduced from the trend in the number of Italian branches, which has decreased by 8,203 units in seven years (Figure 5). Di Febo and Angelini (2019) study this relationship and show how it is negative.

H3: The age of Internet banking users has influenced the reduction of many bank branches.

Many authors have analysed the relationship between age and the use of Internet banking. Among the most cited are those of Polatoglu and Ekin (2001), Rice and Katz (2003), Akinci, Aksoy and Atilgan (2004), Kim et al. (2005), Chang (2003), Flavián, Guinalíu and Torres (2006), Hernandez and Mazzon (2007), McKeown et al. (2007), Goldfarb and Prince (2008), Hanafizadeh, Keating and Khedmatgozar (2014), Kolodinsky et al. (2004). Besides, the Internet is used to access a bank's website to make inquiries and perform operations (transfers, etc.) and carries a specific risk. As Gan et al. (2006) show, older consumers are more risk-averse and prefer a personal banking relationship to a non-personal one. To validate our research, we decided to "characterize" the consumer of Internet banking and analyse if the user's demographic characteristics could, in some way, influence the closure of the banking branches.

H4: The gender of Internet banking users has influenced the closure of a large number of bank branches.

The hypothesis is based on observing the data and the literature (Calcagnini, Giombini, Lenti 2015; Chamboko et al. 2020; Deloitte 2019). On average, there are almost ten percentage points between the use of Internet banking by men and women. It means that they have different methods and purposes in their use, which could affect the branches. Age and gender are two fundamental aspects, for example, that can be used for "gender marketing". Doxa's research (Doxa 2018) on sustainable finance has shown that almost half of women autonomously make financial decisions for their families in Italy. This demonstrates the importance of gender in investment decisions and consequently on the relative use of Internet banking. Other variables, such as the level of education or income level, were not considered because they have already been carefully analysed in the literature. For example, according to Sullivan (2000), there is a higher demand for Internet banking among clients with a higher level of education compared to the rest of the clients. Similarly, the study carried out by Akinci, Aksoy and Atilgan (2004) concluded that the segment of "highly educated" customers deserves special attention from banks since it is a low-cost segment and very profitable. It will be less expensive for the bank to migrate this segment to Internet banking than with a lower educational level, since it is a part of the population accustomed to using the Internet. As evidenced in other studies, the variables are fundamental (Dianat et al. 2019; Zagalaz Jiménez, Aguiar Díaz 2019). The results show that age and gender are characteristics identifying the customers. Also, the level of education or personal income is more significant.

The work is structured as follows. After the introduction, section two presents a brief literature review. Then, the third section switches to two other subparagraphs: first on the performance and second on the banks' branches. Each of them is dedicated to presenting the dataset, methodology, and results. Finally, the conclusion is presented at the end.

2. Literature review

The literature on the performance of banks is divided into different approaches: one where the authors used the internal factors (bank-specific variables), another that used the external factors (economic environment in which the banks operate), and one that mixed internal and external factors. The main papers are shown below. Goddard, Liu and Molyneux (2011) studied bank profit persistence in 65 countries from 1997 to 2007, using the Generalised Methods of Moments (GMM). Factors that influence profit persistence are the GDP growth rate per capita (negatively) and the size of legal entry barriers (positively). Lee and Kim (2013) showed a new measure of bank performance based on the Malmquist index approach. It balanced the limitations of existing financial ratios such as ROA and ROE. The results show that foreign international banks (as a type of property) have beneficial effects on banking performance, while the management control of the government has unfavourable effects on bank performance. Distinguin, Roulet and Tarazi (2013) examined the relationship between bank regulatory capital and bank liquidity measured from on-balance sheet positions for European and US publicly traded commercial banks, using a simultaneous equations framework. Many studies used micro and macroeconomic variables. Through a mixed logit model on the database of 1,384 European commercial banks between 1993 and 2001. The results highlight the importance of country--level characteristics and firm-level features. Ayadi et al. (2010) examined the key developments and performance focusing on savings banks in Europe. Dietrich and Wanzenried (2011, 2014) analysed the profitability of commercial banks in Switzerland (in the paper of 2011) and across 118 countries (paper 2014) using the GMM estimator technique. Nassreddine, Fatma and Anis (2013) investigated the determinants of bank performance in Tunisian banking. The authors show that variables such as size, control and credit quality are important factors that influence the performance of banks. Nouaili, Abaoub and Ochi (2015) studied the internal and external determinants of bank performance in Tunisia. This study shows that bank performance is positively related to capitalisation, privatisation and quotation. While bank size, concentration index, and efficiency are related to performance indicators. Khan, Tahir and Umer (2015) analysed the determinants of the performance of banks in emerging economies through econometric panel techniques from 2008 to 2014. The results show that the macroeconomic variables like inflation and GDP are significant positively on Return on Assets and negatively on Net Interest Margins. While the microeconomic variable such as the reserve ratio hurts both profitability and Net Interest Margin. Chipeta and Muthinja's (2018) paper regarded the relationship between financial innovation (mobile banking, agency banking, Internet banking and automated teller machines) and the financial performance of 42 commercial banks in Kenia. The research shows that financial innovations impact positively the performance of banks. Onofrei, Firtescu and Terinte (2018) analysed the impact of the corporate governance characteristics on bank performance in Romania and Bulgaria. The authors used an OLS regression on panel data. The paper shows the good practices of corporate management to higher bank performance. Antoun, Coskun

and Georgievski (2018) examined the bank-specific, industry-specific, and macroeconomic variables of the financial performance of banks in Central and Eastern European Countries. The analysis is based on constructing the financial performance index with CAMEL ratios, using unbalanced panel data covering 2009–2014. The results suggest that size influences negatively the asset quality, earnings, capital adequacy and liquidity. The business mix and inflation positively influence the asset quality and earnings, and the bank concentration and the annual real GDP growth are positively linked with capital adequacy and liquidity. Another aspect of the literature of the banks' performance that is most interesting concerns the choice of use of the Internet or mobile bank and the relationships with the performance. Egland et al. (1998) was the first important study that estimated US banks offering Internet banking services. The authors analysed the structure and performance characteristics of these banks. The results show no difference in efficiency, profitability or credit quality by banks offering Internet banking services and that do not offer such services. Furst, Lang and Nolle (2000a, 2000b, 2001, 2002) affirmed that banks of all sizes providing Internet banking are generally more profitable and rely less heavily on traditional banking activities than non-Internet banks. Sullivan (2000) finds no systematic evidence that banks are either harmed or helped by offering the Internet channel. Moreover, the results show as *de novo* click and mortar banks perform significantly worse than *de novo* brick and mortar banks. Tan and Teo (2000) affirm that the intention to adopt Internet banking depends on the perceptions of advantage compatibility, trialability, and risk toward using the Internet. Hernando and Nieto (2007) develop a quantitative analysis of the impact of the Internet on the financial performance of Spanish banks, using a sample of 72 commercial banks. DeYoung, Lang and Noll (2007) find that Internet adoption improved community bank profitability through increased revenues from deposit charges. Sathye (2005) analyses the impact of Internet banking on major credit unions' performance and risk profile in Australia. He shows that Internet banking doesn't significantly impact performance and risk profile. Malhotra and Singh (2009) show no significant association between banks' adoption of Internet banking and their performance. Internet banking has a negative statistical significance on the profitability of the private sector's new banks. Di Febo and Angelini (2019) study the impact of Internet banking on European banking performance concerning the business model. A very interesting work (Zagalaz Jiménez, Aguiar Díaz 2019) studies the determinants of Internet or mobile banking use in Spain, considering education level, gender, level of income, and others. It shows a positive relationship between a higher educational level, gender, level of income, being self-employed, greater use of ATMs, greater frequency in banking operations, and Internet banking use.

3. Methodological aspects

The dataset is composed of 216 Italian banks for the period running from 2011 to 2016.

The Digital Economy and Society Index (DESI) tracks the digital performance of Italy and ranks it 24th (Figure 1). In detail, also the percentage of the people that used the Internet for online banking is lower (45.63%) compared to the European average (63.68%) (Figure 2). Analysing the characteristics of consumers, most of them belong to the 20–24 age group (Figure 3), and men use Internet banking more than the women (Figure 4).

The data were provided, respectively, from BankFocus (Bureau Van Dijk) for all balance data, from Eurostat Statistics for other variables, in particular, the percentage of individuals, gender, and age who

use Internet banking, real GDP growth rate volume, and the inflation rate. The banks were selected through several criteria provided by BankFocus: commercial banks, cooperative banks and savings banks. The result was a sample of 383 banks. Subsequently, all the missing values were cleared up to the dataset under analysis. The final dataset includes 216 banks with 1,296 observations. Table 1 defines the variables that measure performance and those of the firm-level and some macro determinants. Table 3 contains the descriptive statistics of the variables used in the analysis. This table, together with Figure 6, shows how the economic condition of Italy is not thriving. The proxy "Business Cycle" represents the real GDP growth rate and highlights how the percentages are low (minimum value -2.8%, maximum value 1%). The methodology used is a fixed-effect model (Assfaw 2019; Demirgüç-Kunt, Huizinga 1999; Raharjo et al. 2014) with panel data analysis for 2011–2016. Panel data have been chosen because they have several advantages over cross-sectional or time-series data (Hsiao 2007). First, they have a more accurate inference of model parameters. Usually, they contain more degrees of freedom and more sample variability than cross-sectional data. Second, panel data have a greater capacity for capturing the complexity of human behaviour than single cross-section data. In the end, the panel data simplify computational and statical inference. Panel data involve at least two dimensions, a time series and a cross-sectional dimension.

3.1. Performance and Internet banking

To answer the research objectives related to the determinant factor in the Italian banking performance, the methodology used is the equation model of the panel data as follows:

$$NIM_{i,t} = \beta_0 + \beta_1 T1R_{i,t} + \beta_2 LLRIL_{i,t} + \beta_3 LogTA_{i,t} + +\beta_4 CTIR_{i,t} + \beta_5 BC_t + \beta_6 INF_t + \beta_7 \%IB_t + \varepsilon_{i,t} \quad (1)$$

where:

$NIM_{i,t}$ – Net Interest Margin of bank *i* at time *t*,
$T1R_{i,t}$ – Tier 1 Ratio of the bank *i* at time *t*,
$LLRIL_{i,t}$ – loan loss reserve impaired loans of the bank *i* at time *t*,
$LogTA_{i,t}$ – logarithm of the total asset of the bank *i* at time *t*,
$CTIR_{i,t}$ – cost to income ratio of the bank *i* at time *t*,
BC_t – real GDP growth rate of Italy at time *t*,
INF_t – average inflation rate of Italy at time *t*,
$\%IB_t$ – percentage of persons who use Internet banking at the time *t* in Italy,
β_0 – constitutes the bank-specific fixed effects constant term in the regression model,
$\beta_1 - \beta_9$ – parameters to be estimated,
$\varepsilon_{i,t}$ – random variable.
All data are annual, so *t* = 2011,…, 2016.

The explanation of the variables of the analysis is as follows:

- Net Interest Margin (NIM) is the dependent of the first regression. It is the cost of financial intermediation and it measures the difference between interest income and interest expenses relative to the amount of interest-earning assets.

- Tier 1 Ratio (T1R) measures a bank's capital adequacy to cover all potential inherent risk in the bank's earning assets, mostly in loans. It is a bank's core Tier 1 Capital ratio tits total Risk--Weighted Assets.
- Loan Loss Impaired Reserve Loans (LLIRL) is a reserve for losses expressed as a percentage of total loans. It is a proxy of the bank's risk.
- Logarithm of Total Asset (LogTA). In most studies on banking, the bank's total assets are used as a proxy. This study uses log total assets (LogTA) to proxy the size.
- Cost to Income Ratio (CTIR) represents the ratio between total operating expenses and total operating income. A lower rate means that the bank is more efficient.
- Business Cycle (BC) is the real GDP growth rate.
- Inflation (INF) is a process of rising prices in general.
- The percentage of the persons who use Internet banking (%IB) is the percentage of persons in Italy who use Internet banking for payments and others.

Before starting the analysis, the study tests the correlation between firm-specific and macroeconomic variables, as presented in Table 2. It shows that there are no high correlation values between variables (all coefficients are inferior to 70%), which does not make us think of a multicollinearity problem. Then, to define the appropriate panel data models to use, the Chown-test, Lagrange Multiplier test and Hausman test are done. The Chown-test assumes the error terms in the regression will be normally distributed with the same variance. That test is for the null hypothesis that all coefficients for fixed effects are zero, i.e. a trial between Fixed Effect versus pooled OLS. The null hypothesis is rejected; thus, the fixed effect is significant; otherwise, go for the pooled OLS. The Lagrange Multiplier test compares the pooled OLS with the Random Effect Model, while the Hausman test compares the Fixed Effect Model with the Random Effect Model. The results (see Table 4) of the Chow and Hausman tests show that the best model used is the Fixed Effect Model. Table 4 shows the results of the analysis of the determinant factors NIM of Italian banks. From the results, it is possible to affirm that internal and external factors impact the NIM. The balance variables, such as LogTA and CTIR, statistically affect the net interest margin of the Italian banks significantly.

The logarithm of total assets (LogTA) has a negative effect of -0.3450421 on the NIM, and this means that each increase of one unit LogTA will be followed by a decrease in NIM of 0.3. In other words, the growth of bank assets would decrease the bank's interest margin. This result is in line with the study of Ahmad, Shaharuddin and Tin (2012) and Bennaceur and Goaied (2008). For banks that become very large, the effect of size could be harmful due to inefficient or bureaucratic factors, or other reasons lowering interest margins.

The Cost to Income Ratio (CTIR), used as a proxy of the bank's efficiency, has a negative relationship with the NIM. Low CTIR reflects the bank's ability to manage its total cost relative to income. The banks with higher operating expenses are expected to have higher net interest margins and lower profitability. Also, this result is coherent with the literature: Athanasoglou, Brissimis and Delis (2008) found that operating expenses are negatively and strongly linked to profitability. The CTIR variable has an estimated low coefficient of -0.00052508 in the NIM equation. The result suggests that the banks do not transfer their operating expenses to the customers, perhaps due to the regulatory limit or because the bank's strategy allows their good customers more favourable rates.

Between external factors used in this study, the inflation (INF) and the percentage of persons who use Internet banking (%IB) contribute significantly to the interest margin of Italian banks.

INF has a positive effect on interest margin with a high coefficient of 0.1436426. This result is coherent with the literature (Revell 1979; Molyneux, Thornton 1992; Demirgüç-Kunt, Huizinga 1999; Staikouras, Wood 2004; Athanasoglou, Brissimis, Delis 2008). A significant indirect influence on the banks resides in the impact of inflation on their customers. Thus it causes the consequent change in the behaviour of demand for financial services. A rise in inflation could cause cash flow difficulties for borrowers and reduce the debtor's ability to meet its obligations to the bank. Furthermore, inflation is one of the main ways through which it is possible to influence the margin of banks through interest rates; in other words, the banks will raise lending rates to increase interest margin.

Internet banking (%IB) can seem strange because it results in a statistically significant negative relationship. However, unlike in Europe, Internet banking has a positive relationship (Di Febo, Angelini 2019). This result is very significant, and the behaviour of Italian customers justifies it. Italian customers use Internet banking to make simple payments or recharge prepaid cards and not for investment operations that influence the interest margin (KPMG 2017). As highlighted in Table 5, the trend of Internet banking for almost all the services is declining, while the branches are increasing. This is proof that the Italian customer still prefers human contact at the branch. The European Central Bank and Banca d'Italia confirm Italians' preference for their cash. Italians pay 86% of revenues in cash against only 14% with other solutions such as ATMs, credit cards, wire transfers, RID, and checks. This result is also coherent with the literature. The results of diverse authors (Delgado, Hernando, Nieto 2004; Deyoung 2001; DeYoung 2002, 2003; DeYoung, Lang, Noll 2007; Giordani, Floros 2013) confirm the negative impact on the profitability of private sector banks.

A robustness analysis was implemented, and the evidence was produced in the Appendix (Table 10).

$$NIM_{i,t} = \beta_0 + \beta_1 L.NIM_{i,t} + \beta_2 T1R_{i,t} + \beta_3 LLRIL_{i,t} + \beta_4 LogTA_{i,t} + + \beta_5 CTIR_{i,t} + \beta_6 BC_t + \beta_7 INF_t + \beta_8 \%IB_t + \varepsilon_{i,t} \quad (1a)$$

The regression (1) is extended, including the lagged NIM (L.NIM) as the explanatory variable (1a). This model uses a dynamic distributed lag model to estimate the relationship between net interest margin and micro- and macro-economic variables. This is because the lagged values of the dependent variable are included among the explanatory variables. The two-step system GMM is implemented (Roodman 2009). The Table shows that the results of the fixed effect regression (1) are consistent. The lagged variable is significant but at 1% with a positive relationship. The CTIR, BC, INF and %IB are statistically significant. The CTIR has a negative relationship with NIM, which means that the rise of the ratio leads to a worsening of efficiency and, consequently, lowering NIM. The BC maintains the significance and the positive relationship, as well as the INF. Also, the percentage of persons who use Internet banking (%IB) results in having a worsened effect on the NIM.

3.2. Branches, Internet banking, age and gender

Currently, the Italian banking sector is characterised at the end of 2018 by 25,404 branches. Of these, 50% belonged to major banks, and the remaining were divided approximately between large, medium--sized, small, and minor banks (Figure 7). The criteria of the division of banks are the following (Banca d'Italia 2019):

– major banks: average total assets greater than EUR 60 bn,
– large banks: average total assets ranging from EUR 26 bn to EUR 60 bn,
– medium-sized banks: average total assets ranging from EUR 9 bn to EUR 60 bn,
– small banks: average total assets ranging from EUR 1.3 bn to EUR 9 bn,
– minor banks: average total assets less than EUR 1.3 bn.

The number of branches has been drastically reduced (Figure 5) to 8,803 units from 2011 to 2016. The objective of the analysis is to know if Internet banking has influenced this reduction, also considering the age and gender of the users. The scope is significant because it can help understand the behaviour of consumers and develop targeted strategies.

There are three different panel data regressions: the first considers the percentage of persons who use Internet banking; the second regression takes into consideration the age of the users of Internet banking, and the third, considers the gender of the users of Internet banking (Zagalaz Jiménez, Aguiar Díaz 2019).

The three regressions are:

$$LogNB_{i,t} = \beta_0 + \beta_1 T1R_{i,t} + \beta_2 BC_{i,t} + \beta_3 LogTA_{i,t} + \beta_4 CTIR_{i,t} + \beta_5 ROAE_{i,t} + \beta_6 \%IB_t + \varepsilon_{i,t} \quad (2)$$

$$LogNB_{i,t} = \beta_0 + \beta_1 T1R_{i,t} + \beta_2 BC_{i,t} + \beta_3 LogTA_{i,t} + \beta_4 CTIR_{i,t} + \beta_5 ROAE_{i,t} + \beta_6 \%IB2024_t + \beta_7 \%IB2564_t + \beta_8 \%IB6574_t + \varepsilon_{i,t} \quad (3)$$

$$LogNB_{i,t} = \beta_0 + \beta_1 T1R_{i,t} + \beta_2 BC_{i,t} + \beta_3 LogTA_{i,t} + \beta_4 CTIR_{i,t} + \beta_5 ROAE_{i,t} + \beta_6 \%MEN_t + \beta_7 \%WOMEN_t + \varepsilon_{i,t} \quad (4)$$

In detail, the variables are:
– T1R is the acronym of the Tier 1 Ratio (already used previously);
– BC is the acronym of the Business Cycle (already used previously);
– LogTA is the acronym of the logarithm of the total asset (already used previously);
– CTIR is the acronym of the Cost to Income Ratio (already used previously);
– ROAE is the acronym of the Return on Average Equity; it is an adjustment version of ROE; it is calculated by dividing net income by average shareholders equity (summation of the equity value at the beginning and closing of a year, divided by two);
– %IB is the acronym of the percentage of persons who use Internet banking in Italy; Eurostat downloads these data;
– %IB2024, %IB2564 and %IB6474 represent the percentage of people, divided by a range of ages 20–24, 25–64, 64–74, who use Internet banking;
– %MEN and %WOMEN represent the percentage of men and women who use Internet banking.

The first step tested the correlation between the independent variables to avoid multicollinearity (Table 6). The results confirm that there is no problem.

Also, in this case, to determine the panel data models to use, some tests are done: the Chown-test (Fixed Effect versus pooled OLS), Lagrange Multiplier test (pooled OLS versus Random Effect Model) and the Hausman test (Fixed Effect versus Random Effect). These tests are conducted for all three models.

In model (2), the results show that the Fixed Effect Model is the best (Table 7). The variables that have impacted the branches are the Tier 1 Ratio, the Business Cycle, the proxy of the size, the Cost to Income Ratio, and Internet banking. The negative relationship that links the branches and the ratio of Tier 1 (T1R) is comprehensive because a strong prudential regulation can limit the operativity of the banks; thus, a branch bank reduction is justifiable. The Cost to Income Ratio (CTIR) is the variable used to proxy efficiency. Its results are coherent and highly significant: if the ratio increases, the efficiency decrease, and in this case, an expansion of the inefficiency is linked with a rise in the branches. Results also confirm the hypothesis that Internet banking has influenced the drastic reduction of the branches. The variable of the percentage of persons who use Internet banking has negatively impacted the number of branches. Table 5 shows the most attractive phenomenon: the customer prefers the web for informative operations (like monitoring, checking the balance, and the bank transaction list) and issuing simple transaction orders. To make investments or loans and receive advice on this type of transaction, customers continue to choose the branch as their preferred channel. The Tier 1 Ratio and the logarithm of the total asset (T1R and LTA) align with the works of the literature. Commonly, the effects of the strong prudential regulation of the European Union influence the bank operativity negatively. In the same way, the proxy of the size is closely related to the number of branches.

Model (3) considers the age of Internet banking customers, with results appropriate to the Fixed Effect Model (Table 8). However, the result is more interesting because only the users of Internet banking in the age range of 65–74 are highly significant, and negatively to the number of branches. This evidence can be explained in two ways: Internet banking users use it for complex operations like loans or investments, and the volume of the activities is considerable. On the other hand, the non-significant variables of the age ranges 20–24 and 25–64 demonstrate that these consumers used Internet banking for simple operations like displaying account movements or monitoring the account. These affirmations are supported by Figure 3; despite the high utilisation percentages of the two groups, they do not appear to influence the number of the branches.

Model (4) tries to respond to the question whether the gender of Internet banking users impacts the branches. Also, in this last model, the three variables representing the strong prudential regulation, size, and efficiency are highly significant. At the same time, the gender of users of Internet banking does not influence the number of branches present in the territory. However, the data are in line with other existing papers (Lera-Lòpez, Billon, Gil 2011; Zagalaz Jiménez, Aguiar Díaz 2019), where the percentage of male users are higher than those of women (Figure 4).

4. Conclusions

The objective of this study is twofold: to individuate the determinants of the Net Interest Margin (NIM) with particular regard to the use of Internet banking; and to verify if the adoption of Internet banking, considering the demographic information of users, has influenced the closure of a large number of Italian bank branches. The choice was made to characterise the aspect of Internet banking

best. The methodology used is the Fixed Effect Model and several tests are done: the Chown-test (Fixed versus OLS), Lagrange Multiplier test (OLS versus Random Effect Model), and the Hausman test (Fixed Effect versus Random Effect). Moreover, the two-step system GMM for the robustness check was also implemented. For the part relating to the performance, it can be concluded that both internal and external factors influenced the Net Interest Margin of the Italian banks. The balanced variables, such as size and efficiency, are statistically significant. For the Italian banks that become too large, size could be harmful due to inefficiency, bureaucracy, or other reasons, so it will lower interest margin. The negative significance of the Cost to Income Ratio with the Net Interest Income suggests that the strategic policy of the Italian banks is to allow their good customers more favourable rates. This result is the explanation of the choice not to transfer operating expenses to the customers.

Instead, regarding the phenomenon of the declining number of Italian bank branches, it can be said that the use of Internet banking influenced this reduction negatively. Moreover, it is interesting to see how the age of Internet banking users is essential. The 65 to 74 year old age group is the only statistically significant result. This evidence is justifiable because these people carry out more complex operations online, such as investments or loan requests, which impact the bank's operations. The non-significance of the other two groups is also immediately explained by the evolutionary cultural dynamics: the younger ones are abandoning the use of Internet banking to switch to mobile banking (KPMG 2017). On the other hand, the social variable on the user's gender did not impact the reduction of the branches. However, it is possible to say that users will never leave the branches as they are too tied to direct contact with financial advisors. Given the particular effect that Internet banking has on the Italian banks, the management could develop marketing and communication policies for the target groups. It is essential to consider in the long term planification projects with a high innovative impact to improve the Italian banking sector's performance. Based on the above analysis, the authors' main takeaway is that the relationship between gender (and age) and banking patterns are real and more complex than the generic stereotypes and cliches. Banks need to beef up their research and spend more time taking a deeper dive into analysing these patterns to understand why the discrepancies exist. They can then use that knowledge to better market to and serve these different segments. A deeper understanding of these disparities in behavioural patterns will allow them to do their customers better, regardless of gender or age.

References

Ahmad R., Shaharuddin S.S., Tin L.M. (2012), Determinants of bank profits and net interest margins in East Asia and Latin America, *SSRN Electronic Journal*, https://doi.org/10.2139/ssrn.1912319.

Akinci S., Aksoy Ş., Atilgan E. (2004), Adoption of Internet banking among sophisticated consumer segments in an advanced developing country, *International Journal of Bank Marketing*, 22(3), 212–232.

Antoun R., Coskun A., Georgievski B. (2018), Determinants of financial performance of banks in Central and Eastern Europe, *Business and Economic Horizons*, 14(3), 513–529.

Assfaw A.M. (2019), Firm-specific and macroeconomic determinants of banks liquidity: empirical investigation from Ethiopian private commercial banks, *Journal of Accounting, Finance and Auditing Studies*, 5(2), 123–145.

Athanasoglou P.P., Brissimis S.N., Delis M.D. (2008), Bank-specific, industry-specific and macroeconomic determinants of bank profitability, *Journal of International Financial Markets, Institutions and Money*, 18(2), 121–136.

Ayadi R., Llewellyn D.T., Arbak E., De Groen W.P. (2010), *Investigating Diversity in the Banking Sector in Europe: Key Developments, Performance and Role of the Cooperative Banks*, Centre for European Policy Studies.

Banca d'Italia (2019), *Banks and Financial Institutions_Metodi e Fonti: Note Metodologiche*, *Statistic Series*, https://doi.org/10.4324/9780429429088-8.

Bennaceur S., Goaied M. (2008), The determinants of commercial bank interest margin and profitability: evidence from Tunisia, *Frontiers in Finance and Economics*, 5(1), 106–130.

Calcagnini G., Giombini G., Lenti E. (2015), Gender differences in bank loan access: an empirical analysis, *Italian Economic Journal*, 1(2), 193–217.

Chamboko R., Giné X., Cull R., Heitmann S., Reitzug F., Van Der Westhuizen M. (2020), The role of gender in agent banking evidence from the Democratic Republic of Congo, *World Development*, 146, 105551.

Chang T. (2003), *Dynamics of banking technology adoption: an application to Internet banking*, https://doi.org/10.22004/AG.ECON.269477.

Chipeta C., Muthinja M.M. (2018), Financial innovations and bank performance in Kenya: evidence from branchless banking models, *South African Journal of Economic and Management Sciences*, 21(1), 1–11.

Delgado J., Hernando I., Nieto M.J. (2004), *Do European primarily Internet banks show scale and experience efficiencies?,* Documentos de Trabajo, 0412, http://www.bde.es, accessed 15 January 2021.

Deloitte (2019), Are there gender differences in banking behavior?, *QuickLook Blog Deloitte US*, https://www2.deloitte.com/us/en/pages/financial-services/articles/gender-differences-banking-behavior.html, accessed 7 January 2021.

Demirgüç-Kunt A., Huizinga H. (1999), Determinats of commercial bank interest margins and profitability: some international evidence, *The World Bank Economic Review*, 13(2), 379–408.

Deyoung R. (2001), The financial performance of pure play Internet banks, *Economic Perspectives*, 25, 60–78.

DeYoung R. (2002), Learning-by-doing, scale efficiencies, and financial performance at Internet-only banks, *Banking & Financial Institutions*, https://doi.org/10.2139/ssrn.282721.

DeYoung R. (2003), The performance of Internet-based business models: evidence from the banking industry, *Banking & Financial Institutions*, https://doi.org/10.2139/ssrn.376821.

DeYoung R., Lang W.W., Nolle D.L. (2007), How the Internet affects output and performance at community banks, *Journal of Banking and Finance*, 31(4), 1033–1060.

Dianat I., Adeli P., Asgari Jafarabadi M., Karimi M.A. (2019), User-centred web design, usability and user satisfaction: the case of online banking websites in Iran, *Applied Ergonomics*, 81, 102892.

Dietrich A., Wanzenried G. (2011), Determinants of bank profitability before and during the crisis: evidence from Switzerland, *Journal of International Financial Markets, Institutions and Money*, 21(3), 307–327.

Dietrich A., Wanzenried G. (2014), The determinants of commercial banking profitability in low-, middle-, and high-income countries, *Quarterly Review of Economics and Finance*, 54(3), 337–354.

Distinguin I., Roulet C., Tarazi A. (2013), Bank regulatory capital and liquidity: evidence from US and European publicly traded banks, *Journal of Banking and Finance*, 37(9), 3295–3317.

Doxa (2018), *Donne e Finanza Sostenibile*, Forum per la finanza sostenibile, https://finanzasostenibile.it/eventi/donne-e-finanza-sostenibile-lo-scenario-italiano/.

Egland K.L., Furst K., Nolle D.E., Robertson D.D. (1998), *Banking over the Internet*, 1 December, https://papers.ssrn.com/abstract=1988194, accessed 14 January 2021.

Di Febo E., Angelini E. (2019), Digitalization and business model: the case of European banks, *IUP Journal of Bank Management*, 18(3), 7–31.

Flavián C., Guinalíu M., Torres E. (2006), How bricks-and-mortar attributes affect online banking adoption, *International Journal of Bank Marketing*, 24(6), 406–423.

Furst K., Lang W.W., Nolle D.E. (2001), Internet banking in the U.S.: landscape, prospects, and industry implications, *Journal of Financial Transformation*, 2, 45–52.

Furst K., Lang W.W., Nolle D.E. (2000a), Who offers Internet banking ?, *Quarterly Journal*, 19(2), 27–46.

Furst K., Lang W.W., Nolle D.E. (2000b), *Internet Banking: Developments and Prospects*, United States Office of the Comptroller of the Currency.

Furst K., Lang W.W., Nolle D.E. (2002), Internet banking, *Journal of Financial Services Research*, 22(1), 95–117.

Gavurova B., Belas J., Kocisova K., Kliestik T. (2017), Comparison of selected methods for performance evaluation of Czech and Slovak commercial banks, *Journal of Business Economics and Management*, 18(5), 852–876.

Giordani G., Floros C. (2013), How the internet affects the financial performance of Greek banks, *International Journal of Financial Services Management*, 6(2), 170–177.

Goddard J., Liu H., Molyneux P., Wilson J.O.S. (2011), The persistence of bank profit, *Journal of Banking and Finance*, 35(11), 2881–2890.

Hanafizadeh P., Keating B.W., Khedmatgozar H.R. (2014), A systematic review of Internet banking adoption, *Telematics and Informatics*, 31(3), 492–510.

Hernando I., Nieto M.J. (2007), Is the Internet delivery channel changing banks' performance? The case of Spanish banks, *Journal of Banking and Finance*, 31(4), 1083–1099.

Hsiao C. (2007), Panel data analysis-advantages and challenges, *Sociedat de Estadistica e Investigation Operativa -Test*, 16(1), 1–22.

Khan I., Tahir M., Umer N. (2015), Determinants of commercial banks' performance: evidence from emerging economies, *Accounting*, 1, 17–28.

Kim B.M., Widdows R., Yilmazer T. (2005), The determinants of consumers' adoption of Internet banking, in: *Proceedings of the Consumer Behavior and Payment Choice 2005 Conference*.

KPMG (2017), *Digital banking. Le Sfide per Il Sistema Bancario Tra Esigenze Dei Consumatori, Rivoluzione Digitale e Nuovi Competitor*, https://assets.kpmg/content/dam/kpmg/it/pdf/2017/03/KPMGDigitalBanking2017.pdf.

Lee J.Y., Kim D. (2013), Bank performance and its determinants in Korea, *Japan and the World Economy*, 27, 83–94.

Lera-Löpez F., Billon M., Gil M. (2011), Determinants of internet use in Spain, *Economics of Innovation and New Technology*, 20(2), 127–152.

Malhotra P., Singh B. (2009), The impact of Internet banking on bank performance and risk: the Indian experience, *Eurasian Journal of Business and Economics*, 2(4), 43–62.

Molyneux P., Thornton J. (1992), Determinants of European bank profitability: a note, *Journal of Banking & Finance*, 16(6), 1173–1178.

Nasserinia A., Ariff M., Fan-Fah C. (2017), Relationship between participation bank performance and its determinants, *Pertanika Journal of Social Sciences & Humanities*, 25(2), 993–1018.

Nassreddine G., Fatma S., Anis J. (2013), Determinants of banks performance: viewing test by cognitive mapping technique, *International Review of Management and Business Research*, 2(1), 20–36.

Nouaili M., Abaoub E., Ochi A. (2015), The determinants of banking performance in front of financial changes: case of trade banks in Tunisia, *International Journal of Economics and Financial Issues*, 5(2), 410–417.

Onofrei M., Firtescu B.-N., Terinte P.-A. (2018), Corporate governance influence on banking performance. An analysis on Romania and Bulgaria, *Scientific Annals of Economics and Business*, 65(3), 317–332.

Polatoglu V.N., Ekin S. (2001), An empirical investigation of the Turkish consumers' acceptance of Internet banking services, *International Journal of Bank Marketing*, 19(4), 156–165.

Raharjo P.G., Hakim D.B., Manurung A.H., Maulana T.N.A. (2014), The determinant of commercial banks' interest margin in Indonesia: an analysis of fixed effect panel regression, *International Journal of Economics and Financial Issues*, 4(2), 295–308.

Revell J. (1979), Inflation & financial institutions, *Financial Times*, https://www.worldcat.org/title/inflation-financial-institutions/oclc/6310151, accessed 29 November 2019.

Rice R.E., Katz J.E. (2003), Comparing internet and mobile phone usage: digital divides of usage, adoption, and dropouts, *Telecommunications Policy*, 27(8–9), 597–623.

Roodman D. (2009), How to do xtabond2: an introduction to difference and system GMM in Stata, *Stata Journal*, 9(1), 86–136.

Sathye M. (2005), The impact of internet banking on performance and risk profile: evidence from Australian credit unions, *Journal of Banking Regulation*, 6(2), 163–174.

Staikouras C.K., Wood G.E. (2004), The determinants of European bank profitability, *International Business & Economics Research Journal*, 3(6), 57–68.

Sullivan R.J. (2000), How has the adoption of Internet banking affected performance and risk in banks?, *Financial Industry Perspectives*, 12(1), 1–16.

Tan M., Teo T.S.H. (2000), Factors influencing the adoption of Internet banking, *Journal of the Association for Information Systems*, 1(1), 1–44.

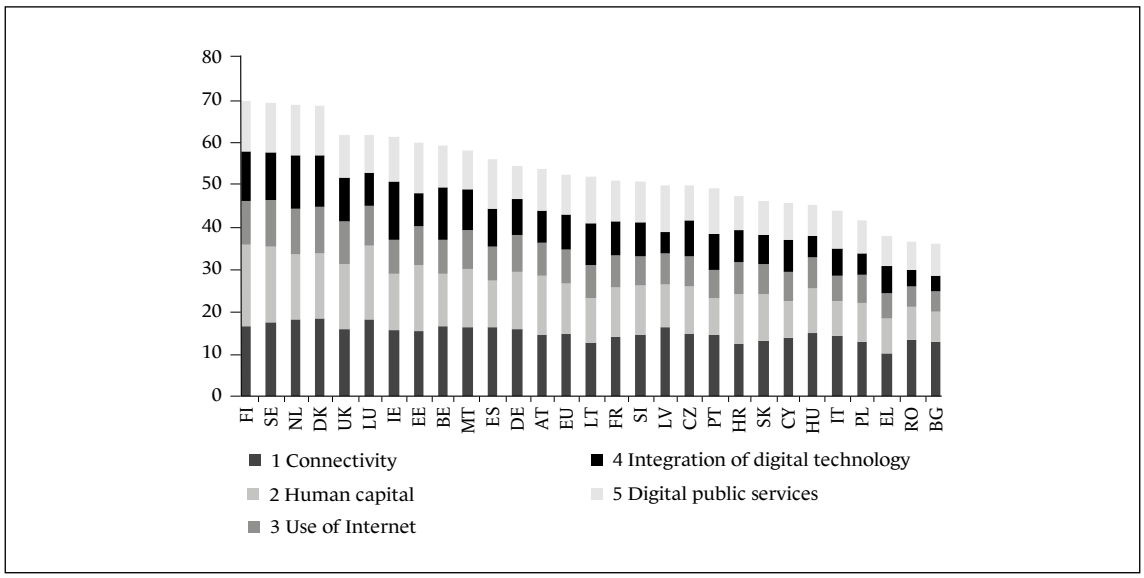
Zagalaz Jiménez J.R., Aguiar Díaz I. (2019), Educational level and Internet banking, *Journal of Behavioral and Experimental Finance*, 22, 31–40.

Acknowledgements

The authors are grateful to two anonymous referees for their important suggestions and helpful comments.

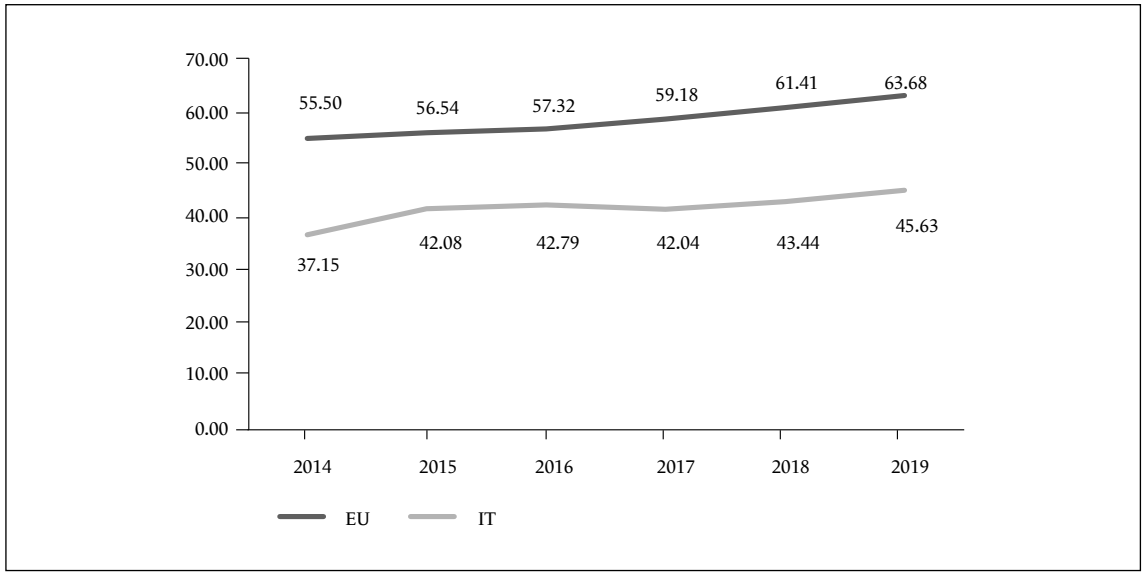
Appendix

Figure 1
The Digital Economy and Society Index 2019



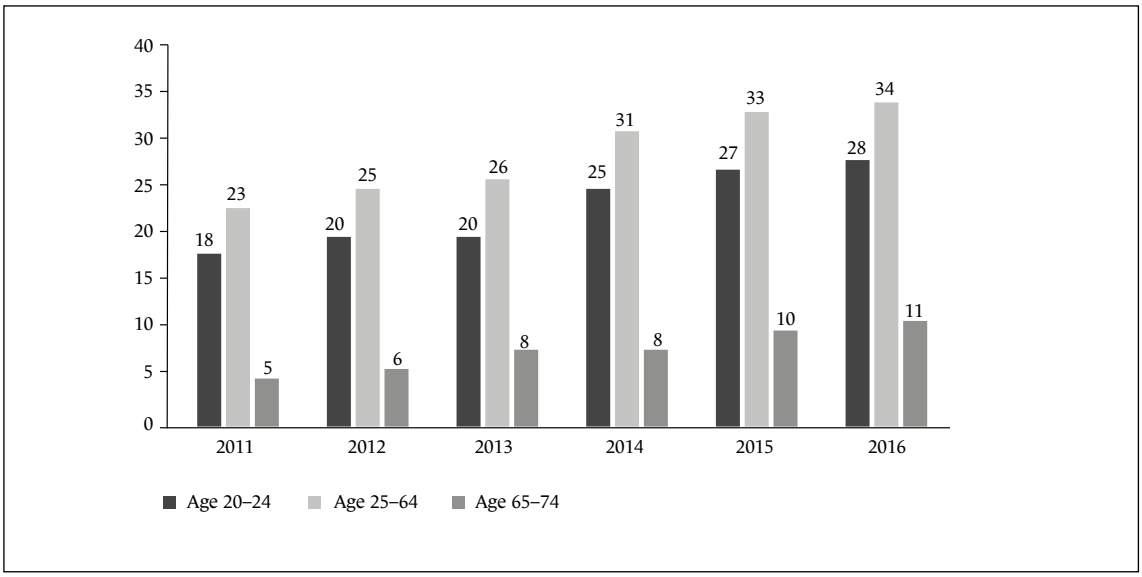
Source: elaboration of data by Eurostat.

Figure 2
Percentage of persons who use Internet banking (age 16–74)



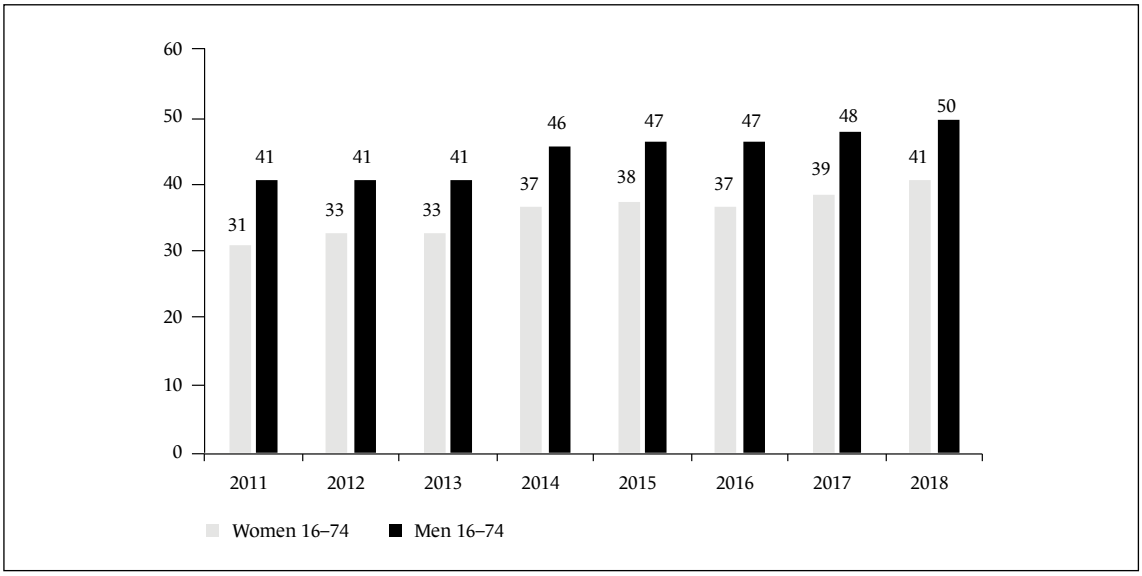
Source: elaboration of data by Eurostat.

Figure 3
Percentage of users of Internet banking by age



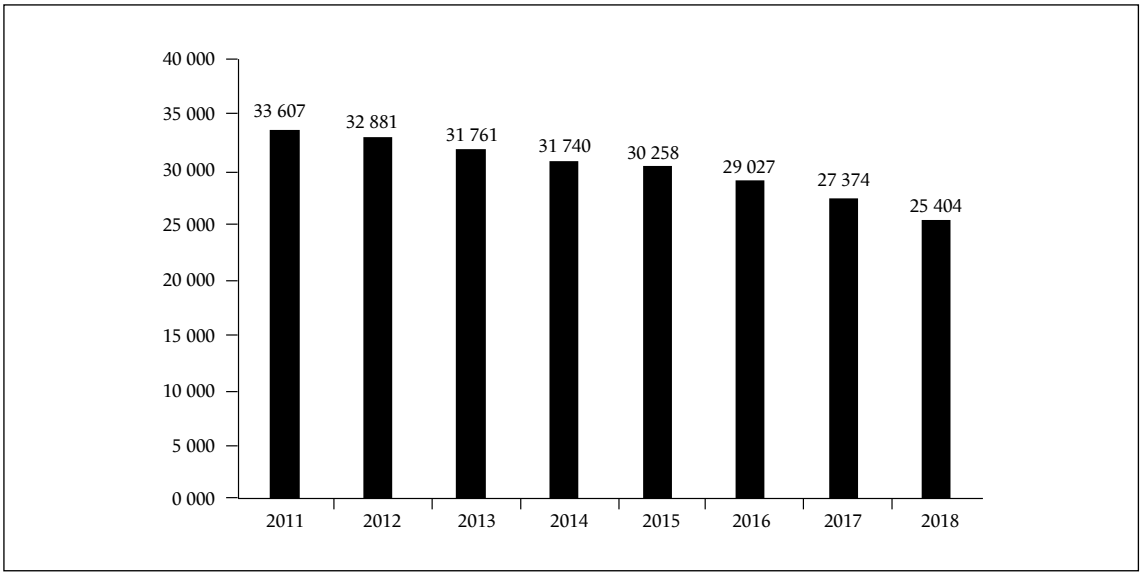
Source: elaboration of data by Eurostat.

Figure 4
Percentage of users of Internet banking by gender



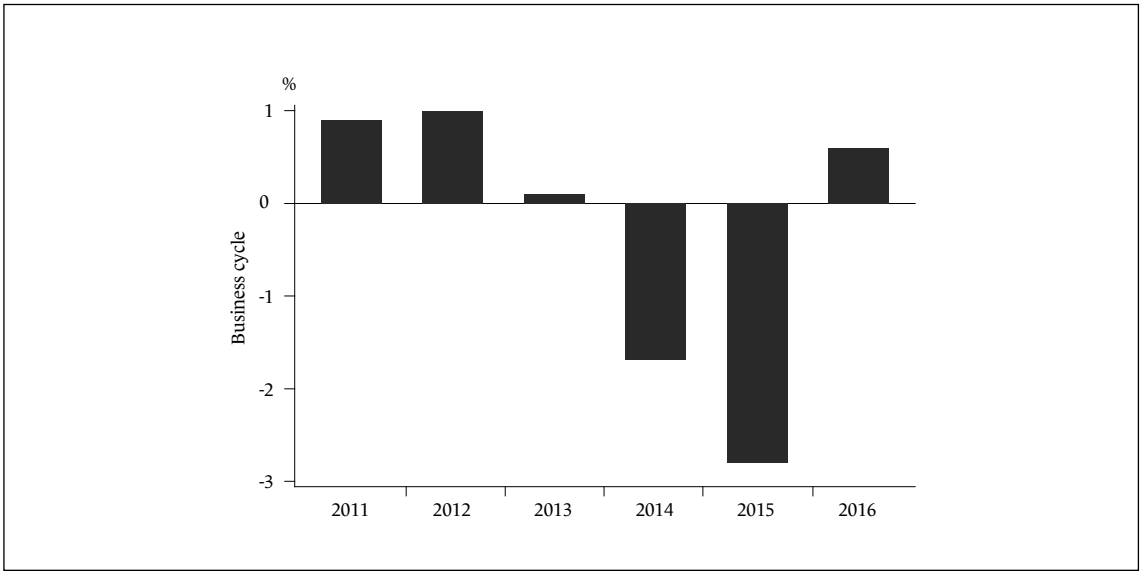
Source: elaboration of data by Stata.

Figure 5
Number of bank branches from 2011 to 2018



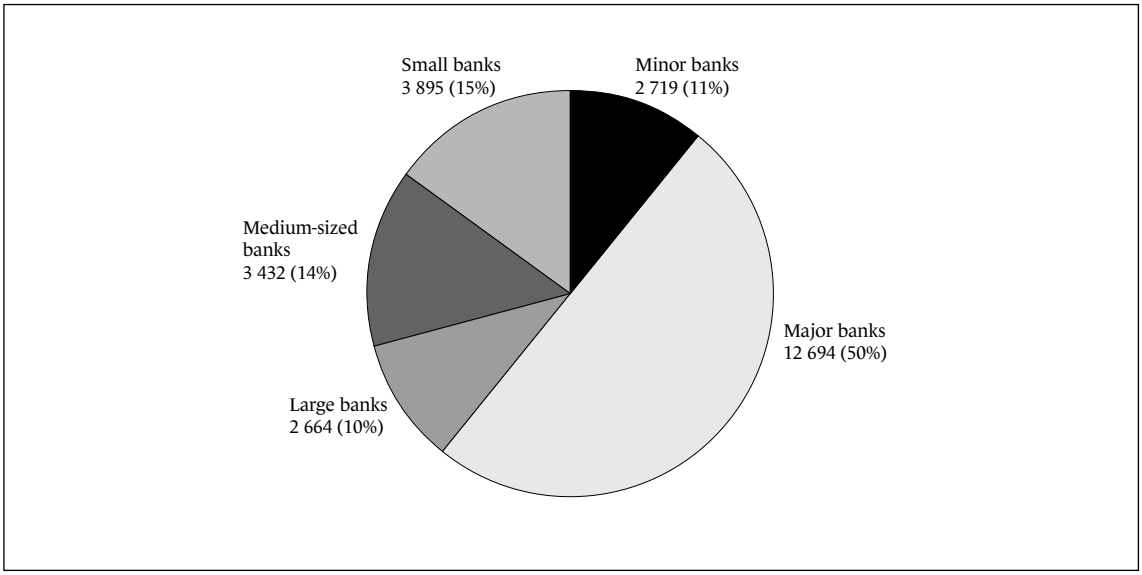
Source: elaboration of data by Banca d'Italia.

Figure 6
GDP growth rate of Italy



Source: elaboration of data by Eurostat.

Figure 7
Number of bank branches divided by size



Source: elaboration of data by Banca d'Italia.

Table 1
Research variables

Variable	Description
Net Interest Margin	It is the measure of the difference between interest income and interest expenses relative to the amount of interest-earning asset
Tier 1 Ratio	It is calculated as Tier 1 capital / risk-weighted assets
Cost to Income Ratio	It represents the efficiency of the company's operations. It is calculated as Total Operating Expenses over Total Operating Income
ROAE	It is return on average equity. Adjustment version of ROE. It is calculated by dividing net income by average shareholders equity (summation of the equity value at the beginning and the closing of a year, divided by two)
Loan Loss Reserve / Impaired Loans	It is a reserve for losses expressed as a percentage of total loans
Business Cycle	It is the growth rate of GDP
Log. Total Asset	It is the logarithm of the total assets. It includes total earning assets + cash and due from banks + foreclosed real estate + fixed assets + goodwill + other intangibles + current tax assets + deffered tax + discontinued operations + other assets
Inflation	It represents the inflation rate which is measured as consumer prices annual percentage
Percent persons who use IB	It represents the percentage of persons who use Internet banking
IB age 20–24	It represents the percentage of Internet banking users aged between 20 and 24
IB age 25–64	It represents the percentage of Internet banking users aged between 25 and 64
IB age 65–74	It represents the percentage of Internet banking users aged between 65 and 74
Men (age 16–74)	It represents the percentage of men who use Internet banking
Women (age 16–74)	It represents the percentage of women who use Internet banking
Log. Number Branches	It represents the logarithm of the number of bank branches

Table 2
Pearson's correlation between variables with the level of statistical significance (*)

	T1R	LLIRL	LogTA	CTIR	BC	INF
T1R	1.0000					
LLIRL	0.2262*	1.0000				
LogTA	-0.4276*	0.1576*	1.0000			
CTIR	0.2740*	0.1005*	-0.1571*	1.0000		
BC	0.0860*	0.1592*	0.0166	0.0801*	1.0000	
INF	-0.1039*	-0.2093*	-0.0499	0.0986*	-0.6047*	1.0000

Note: T1R – Tier 1 Ratio; LLIRL – Loan Loss Reserve / Impaired Loans; LogTA – Logarithm Total Assets; CTIR – Cost to Income Ratio; BC – Business Cycle; INF – Inflation.

Table 3
Statistic variables

Variable		Mean	Std. dev.	Min	Max	Observations
	overall	108.5	62.37723	1	216	N = 1296
ID	between		62.498	1	216	n = 216
	within		0	108.5	108.5	T = 6
	overall	3.5	1.708484	1	6	N = 1296
TIME	between		0	3.5	3.5	n = 216
	within		1.708484	1	6	T = 6
	overall	2.136303	0.622736	0.326	6.645	N = 1296
NIM	between		0.5206198	1.026167	6.278167	n = 216
	within		0.3432224	0.2213033	3.494303	T = 6
	overall	17.81758	9.295672	1.63	142.06	N = 1296
T1R	between		7.874977	7.221667	58.995	n = 216
	within		4.963234	-8.417424	123.7442	T = 6
	overall	46.35702	19.62278	0.11	226.96	N = 1296
LLRIL	between		16.06743	5.366667	130.4117	n = 216
	within		11.30875	-7.736313	156.0287	T = 6
	overall	5.879398	0.7453259	4.57	8.97	N = 1296
LogTA	between		0.7424023	4.598333	8.943334	n = 216
	within		0.0804829	5.241065	6.921065	T = 6
	overall	65.11428	18.48249	23.27	379.3	N = 1296
CTIR	between		14.28439	38.43667	193.985	n = 216
	within		11.76207	-0.1940494	297.0359	T = 6
	overall	-0.3166667	1.43282	-2.8	1	N = 1296
BC	between		0	-0.3166667	-0.3166667	n = 216
	within		1.43282	-2.8	1	T = 6
	overall	1.205	1.279396	-0.09	3.04	N = 1296
INF	between		0	1.205	1.205	n = 216
	within		1.279396	-0.09	3.04	T = 6
	overall	24.33333	3.497379	20	29	N = 1296
%IB	between		0	24.33333	24.33333	n = 216
	within		3.497379	20	29	T = 6

Note: T1R – Tier 1 Ratio; LLIRL – Loan Loss Reserve / Impaired Loans; LogTA – Logarithm Total Assets; CTIR – Cost to Income Ratio; BC – Business Cycle; INF – Inflation.

Table 4
Result of the regression model (1)

NIM	**Coef**	**Std. error**
T1R	0.0006392	(0.0015527)
LLRIL	-0.0001955	(0.0006854)
LogTA	-0.446428***	(0.1053869)
CTIR	-0.0052508***	(0.0006782)
BC	0.005391	(0.0065192)
INF	0.1436426***	(0.0149837)
%IB	-0.0190995***	(0.0056081)
_cons	5.393983***	(0.6304493)
F test that all u_i = 0: F(215, 1073) = 22.13		Prob > F = 0.0000
Hausman Test		Prob > chi2 = 0.0173
Breusch and Pagan Lagrangian Multiplier test		Prob > chibar2 = 0.0000

Notes:
Fixed-effects (within) regression
R-sq: within = 0.5610,
between = 0.1273,
overall = 0.2389;
NIM – Net Interest Margin; T1R – Tier 1 Ratio; LLIRL – Loan Loss Reserve / Impaired Loans; LogTA – Logarithm Total Assets; CTIR – Cost to Income Ratio; BC – Business Cycle; INF – Inflation; %IB – Percentage of persons who use Internet banking.

Table 5
Banks service used by web or branches (in %)

Service	Web	Mobile	Branche	Other
Display account movements	60 (–)	30 (+)	4 (+)	36
Monitoring required	63 (–)	22 (+)	7 (+)	30
Saving product subscription	48 (–)	11 (+)	32 (+)	20
Funding subscription	35 (–)	10	45 (+)	20
Execution of transaction operations	64 (–)	20 (+)	9 (+)	27
Personal financial manager	62 (–)	16 (+)	14 (+)	24
Advice on financing and/or investments	33 (+)	9 (–)	42 (+)	25
Trading of financial products	47 (–)	13 (+)	31 (+)	22

Source: elaboration of data by report of KPMG (2017) Digital Banking.

Table 6
Pearson's correlation

	T1R	LogTA	BC	CTIR	ROAE	%IB
T1R	1.0000					
LogTA	-0.4276*	1.0000				
BC	0.0860*	0.0166	1.0000			
CTIR	0.2740*	-0.1571*	0.0801*	1.0000		
ROAE	0.1010*	-0.1078*	-0.0526	-0.3543*	1.0000	
%IB	0.1137*	0.0497	0.6235*	-0.0647*	-0.0620*	1.0000

Note: T1R – Tier 1 Ratio; LogTA – Logarithm Total Assets; BC – Business Cycle; CTIR – Cost To Income Ratio; ROAE – Return on Average Equity; %IB – percentage of persons who used Internet banking.

Table 7
Results of the regression model (2)

LogNB	**Coef.**	**Std. error**	**P > |t|**
T1R	-0.0081088	0.0009704	0.000
BC	0.0103636	0.0040765	0.011
LogTA	1.592379	0.0663413	0.000
CTIR	0.0016156	0.0004408	0.000
ROAE	-0.000225	0.0007471	0.763
%IB	-0.0123362	0.0019084	0.000
_cons	-6.333221	0.382217	0.000
F test that all u_i = 0: F(215, 1074) = 112.74			Prob > F = 0.0000
Hausman Test			Prob > chi2 = 0.0000
Breusch and Pagan Lagrangian Multiplier test			Prob > chibar2 = 0.0000

Notes:
Fixed-effects (within) regression.
R-sq: within = 0.4175,
between = 0.8023,
overall = 0.7969.
LogNB – Logarithm Number of Branches; T1R – Tier 1 Ratio; BC – Business Cycle; LogTA – Logarithm Total Assets; CTIR – Cost to Income Ratio; ROAE – Return on Average Equity; %IB – percentage of persons who used Internet banking.

Table 8
Results of the regression model (3)

LogNB	**Coef.**	**Std. error**	**P > |t|**
T1R	-0.0081443	0.0009747	0.000
BC	0.0053962	0.0040186	0.180
LogTA	1.605031	0.0664375	0.000
CTIR	0.0017086	0.0004653	0.000
ROAE	-0.0003126	0.0007499	0.677
%IB2024	0.0107135	0.0183799	0.560
%IB2564	-0.011959	0.0190938	0.531
%IB6574	-0.0152875	0.0074248	0.040
_cons	-6.495882	0.3951674	0.000
F test that all u_i = 0: F(215, 1072) = 113.16			Prob > F = 0.0000
Hausman Test			Prob > chi2 = 0.0000
Breusch and Pagan Lagrangian Multiplier test			Prob > chibar2 = 0.0000

Notes:
Fixed-effects (within) regression
R-sq: within = 0.4213,
between = 0.8026,
overall = 0.7972.
LogNB – Logarithm Number of Branches; T1R – Tier 1 Ratio; BC – Business Cycle; LogTA – Logarithm Total Assets; CTIR – Cost to Income Ratio; ROAE – Return on Average Equity; %IB2024 – percentage of Internet banking users aged between 20 and 24; %IB2564 – percentage of Internet banking users aged between 25 and 64; %IB6574 – percentage of Internet banking users aged between 65 and 74.

Table 9
Results of the regressions model (4)

LogNB	**Coef.**	**Std. error**	**P > |t|**
T1R	-0.008408	0.0009838	0.000
BC	0.01483	0.0086043	0.085
LogTA	1.545325	0.0657918	0.000
CTIR	0.001602	0.0004629	0.001
ROAE	-0.0000412	0.0007531	0.956
%MEN	-0.0196737	0.0134161	0.143
%WOMEN	0.0054879	0.0122216	0.653
_cons	-5.678306	0.4006755	0.000
F test that all u_i = 0: F(215, 1073) = 111.36			Prob > F = 0.0000
Hausman Test			Prob > chi2 = 0.0000
Breusch and Pagan Lagrangian Multiplier test			Prob > chibar2 = 0.0000

Notes:
Fixed-effects (within) regression
R-sq: within – 0.4104
between – 0.8022
overall – 0.7966
LogNB – Logarithm Number of Branches; T1R – Tier 1 Ratio; BC – Business Cycle; LogTA – Logarithm Total Assets; CTIR – Cost to Income Ratio; ROAE – Return on Average Equity; %MEN – percentage of men who use Internet banking; %WOMEN – percentage of women who use Internet banking.

Table 10
Dynamic panel-data estimation, two-step system GMM

NIM	**Corrected**			
	Coef.	**Std. error**	**z**	**P > |z|**
L.NIM	0.1803692	0.0976973	1.85	0.065
T1R	0.1223078	0.045907	2.66	0.008
LLRIL	-0.0083357	0.0043477	-1.92	0.055
LogTA	0.3093305	0.2593091	1.19	0.233
CTIR	-0.0376665	0.0088054	-4.28	0.000
BC	0.076519	0.0203447	3.76	0.000
INF	0.2055522	0.0266277	7.72	0.000
%IB	-0.0781385	0.0261451	-2.99	0.003
_cons	2.217572	1.780824	1.25	0.213

N. group / N. instruments = 216/19

Arellano-Bond test for AR(2): p-value = 0.882

Hansen test: p-value = 0.699

Bankowość internetowa, wiek, płeć, efektywność: zależności w bankowości włoskiej

Streszczenie

W ostatnich latach bankowość internetowa wywarła znaczny wpływ na bankowość detaliczną i zmieniła relacje między bankami a ich klientami. Technologie internetowe wpływają na wyniki finansowe banku oraz modyfikują sieć dystrybucji usług bankowych. Dlatego istotnego znaczenia nabiera wiedza, czy – a jeśli tak, to w jaki sposób – korzystanie z internetu może wpływać na marżę odsetkową netto (Net Interest Margin – NIM) i czy internet wpływa na politykę ograniczania liczby oddziałów. Nowatorskim elementem badania jest uwzględnienie w analizie cyfryzacji usług bankowych zmiennych demograficznych, charakteryzujących użytkowników bankowości internetowej. Ich uwzględnienie znajduje potwierdzenie w lekturze artykułów podnoszących znaczenie płci w wyjaśnianiu wielu procesów ekonomicznych i społecznych (Calcagnini, Giombini, Lenti 2015; Chamboko i in. 2020). Równocześnie banki w swoich strategiach zazwyczaj nie uwzględniają w stopniu zadowalającym płci swoich klientów, a także, co istotne, różnic pokoleniowych. Biorąc to pod uwagę, można przypuszczać, że zmienne demograficzne mogą mieć wpływ zarówno na wynik finansowy, jak i na sieć oddziałów bankowych.

W związku z tym wysunięto kilka hipotez:

H1: odsetek użytkowników bankowości internetowej jest jedną z determinant NIM.

W opracowaniu skupiono się na wpływie bankowości internetowej na wyniki finansowe włoskich banków. Wielu autorów analizuje wyniki finansowe banków poprzez marżę odsetkową netto (Demirgüç-Kunt, Huizinga 1999; Gavurova i in. 2017; Khan, Tahir, Umer 2015; Nasserinia, Ariff, Fan Fah 2017; Nouaili, Abaoub, Ochi 2015). Korzystanie z bankowości internetowej jest kluczowe w tej analizie, ponieważ autorzy chcą sprawdzić empirycznie, czy wyniki włoskiego banku zależą od liczby uczestników obecnych w systemie bankowości internetowej.

H2: Przyjęcie bankowości internetowej sprzyjało redukcji liczby oddziałów bankowych.

Zależność między zakresem bankowości internetowej a liczbą oddziałów bankowych jest ujemna, co można wywnioskować z trendu liczby włoskich oddziałów. Liczba oddziałów w ciągu ostatnich siedmiu lat zmniejszyła się o 8203. Di Febo i Angelini (2019) badają tę zależność i pokazują, jak silna jest korelacja ujemna.

H3: Wiek użytkowników bankowości internetowej wpływa na zmniejszenie liczby oddziałów wielu banków.

Wielu autorów analizowało związek między wiekiem a skalą korzystania z usług bankowości internetowej: Polatoglu, Ekin (2001), Rice, Katz (2003), Akinci, Aksoy, Atilgan (2004), Kim i in. (2005), Chang (2003), Flavián, Guinalíu, Torres (2006), Hernandez, Mazzon (2007), McKeown i in. (2007), Goldfarb, Prince (2008), Hanafizadeh, Keating, Khedmatgozar (2014), Kolodinsky i in. (2004). Dlatego też, aby zweryfikować naszą hipotezę, postanowiliśmy „scharakteryzować" konsumenta bankowości internetowej i przeanalizować, czy cechy demograficzne użytkownika mogą w jakiś sposób wpłynąć na zamykanie oddziałów bankowych.

H4: Płeć użytkowników bankowości internetowej ma wpływ na zamykanie dużej liczby oddziałów bankowych.

Hipoteza ta opiera się na obserwacji danych i literatury (Calcagnini, Giombini, Lenti 2015; Chamboko i in. 2020; Deloitte 2019). Badania firmy Doxa (Doxa 2018) dotyczące zrównoważonych finansów wykazały, że prawie połowa kobiet we włoskich rodzinach podejmuje decyzje finansowe autonomicznie. Świadczy to o roli płci w podejmowaniu decyzji finansowych, w tym inwestycyjnych, a co za tym idzie – o zakresie korzystania z bankowości internetowej.

Zbiór danych wykorzystanych w artykule obejmuje 216 włoskich banków w okresie od 2011 do 2016 r. Wybór Włoch jako przedmiotu analizy wynika z faktu, że w planach włoskich banków strategia cyfryzacji usług bankowych stanowi element dominujący.

W badaniu wykorzystano model panelowy ze stałymi efektami. Dwuwymiarowy, czasowo-przestrzenny panel pozwala bowiem lepiej opisać złożoność ludzkich zachowań niż pojedyncze dane przekrojowe (Ben-Porath 1973; Hsiao 2007). W celu weryfikacji adekwatności modelu do natury badanego zjawiska zastosowano trzy testy: Chowna, Lagrange'a i Hausmana.

W części dotyczącej wyników można stwierdzić, że na marżę odsetkową netto włoskich banków mają wpływ zarówno czynniki wewnętrzne, jak i zewnętrzne. Zmienne o stałych efektach, takie jak wielkość banku oraz jego efektywność wynikająca z systemu zarzadzania, są statystycznie istotne. Zauważono bowiem, że w przypadku zbyt dużych banków biurokracja wpływa negatywnie na efektywność i tym samym prowadzi do obniżenia marży odsetkowej. Ujemna korelacja wskaźnika kosztów do dochodów z dochodami z odsetek netto sugeruje, że strategia włoskich banków w polityce odsetkowej polega na oferowaniu korzystniejszych stóp procentowych swoim dobrym, stałym klientom. Jest to związane z decyzją o nieprzenoszeniu kosztów operacyjnych na klientów banku.

Nawiązując z kolei do liczby oddziałów włoskich banków, można zauważyć, że korzystanie z bankowości internetowej wpływa negatywnie na liczbę oddziałów. Innymi słowy, im większy zakres korzystania z bankowości internetowej, tym większa skala redukcji oddziałów. Statystycznie istotną grupą ograniczającą tę redukcję jest grupa wiekowa od 65 do 74 lat. Jest to zrozumiałe z tego względu, że osoby te wykonują jeszcze przez internet bardziej złożone operacje, które mają wpływ na działalność banku, takie jak inwestycje czy wnioski kredytowe. Pozostałe dwie młodsze grupy wiekowe wykazują statystycznie nieistotny wpływ bankowości internetowej na liczbę oddziałów, ponieważ w coraz większym stopniu przechodzą z bankowości internetowej na bankowość mobilną. Ten model ewolucji zachowań w różnych grupach wiekowych związanych z korzystaniem z usług bankowych stwarza nowe wyzwania dla strategii marketingowych sektora bankowego.

Słowa kluczowe: bankowość internetowa, oddziały banków, wiek, płeć, wynik finansowy