
The future of banking

Does digitalisation increase bank profitability?

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Giulia Bassani

Junior Economist, Financial Markets and Intermediaries practice

giulia.bassani@prometeia.com

Sara Emiliani

Specialist, Financial Markets and Intermediaries practice

sara.emiliani@prometeia.com

Lorenzo Prosperi

Specialist, Financial Markets and Intermediaries practice

lorenzo.prosperi@prometeia.com



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Abstract

Digitalisation can be an important and permanent cost-saving strategy for banks, but it requires considerable investments in the short to medium term, while potential profitability gains may only accrue in the medium to long term. In this paper, we investigate whether digital transformation is an opportunity for banks in order to sustain profitability. Moreover, we analyse the drivers of the choice to invest in digitalisation and shed some light on the determinants of the gap in IT investments between Italian banks and other European peers.

The results of our analysis highlight that an increase in IT expenses can improve banks' profitability, although the magnitude of this impact is smaller for Italian banks. Moreover, balance sheets' weaknesses affect the ability to invest in IT. In particular, credit risk seems to be a great disincentive for IT investments for Italian banks.

Even if there is no "one-size-fits-all" strategy for banks to return to sustainable profitability, investments in information technology may play an important role. Supporting the digital transformation will be crucial to further adapt banks' business models to cope with the rapid pace of technological innovation in financial services, increasing competition from fintech and Big Tech companies and the rising risks from cyber threats.

1 Introduction

Bank profitability in Italy and in the euro area has improved from the post-crisis lows. However, for many banks, earnings are still below what is required by investors and the recent slowdown in economic growth could threaten the recovery in banks' profits. Why is this a problem? **Why does banks' profitability matter overall, not only for their shareholders?** The reason is that persistently low profitability can limit banks' ability to generate capital and can make raising capital very costly. Therefore, it becomes harder to build up buffers against unexpected shocks and this can bind banks' capability to provide financial services to households and businesses.

Weak profitability is one of the key challenges facing the euro area banking sector. Our analysis explores some of its drivers, including digitalisation.

Reducing costs and improving efficiency are necessary steps. Possible strategies to achieve them range from consolidation via mergers and acquisitions, downsizing, as well as branch closures. But another, not necessarily alternative, way would be to adopt new, cost-saving technologies aimed at digitalising financial intermediation services, in particular those with low added value. Notwithstanding a general trend in branch network cutting and staff reductions (Fig. 1-2), a wide dispersion remains across countries in terms of capacity indicators such as the number of branches or bank employees as a percentage of population.

Fig. 1 Number of branches
% change between 2008 and 2018

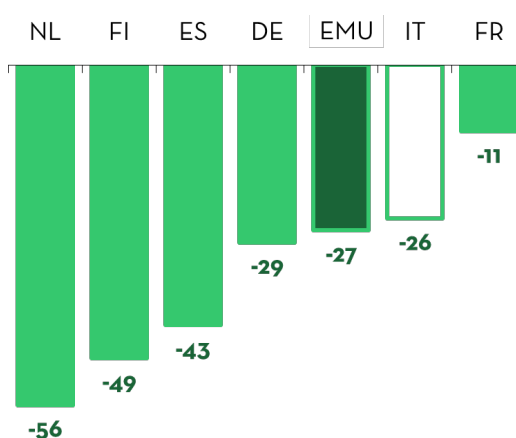
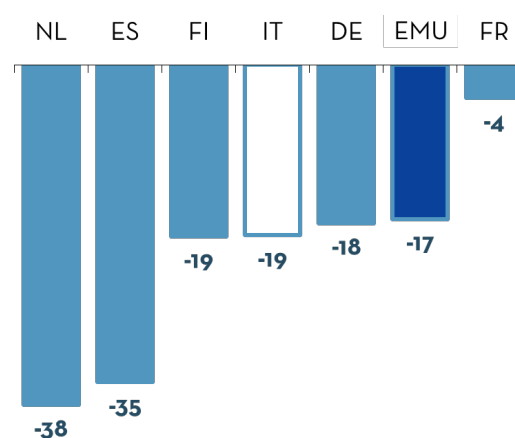


Fig. 2 Number of employees
% change between 2008 and 2018



Source: Prometeia calculation on ECB data.

Digitalisation can be an important and permanent cost-saving strategy for banks, particularly in countries with a dense branch network, although depending on structural factors such as labour laws, population density and the level of digitalisation in society. Greater automation and more efficient processes allow cost savings and relieve employees of routine work, allowing them, if appropriately qualified, to take on more demanding tasks. An efficient and modern IT infrastructure is one of the prerequisites to achieve such efficiencies and must, at the same time, be safeguarded against its heightened vulnerability to cyber attacks. In addition, digital 'leaders' may also benefit from additional revenues via market share gains. This will require considerable investment by banks in the short to medium term, with cost savings typically likely to materialise in the medium to long term. At the same time, a higher reliance on digitalised forms of financial services may also threaten the stability of revenues, as it becomes easier for customers to shop around and compare banks' products and prices. This trade off makes it particularly interesting to have a closer look at the overall impact of digitalisation on bank profitability.

Some individual banks have managed to invest large amounts of money in digitalisation in recent years notwithstanding the poor profitability of the euro area banking system as a whole. Figures 3-4 show tech expenses for a sample of European and Italian banks. In terms of IT expenses, Italian banks seem to lag behind: in 2018, IT costs were just 0.12% of total assets in Italy against 0.17% on average for their European peers. In fact, euro area banks (excluding Italian banks) have invested in IT even during the financial crisis or soon after (the ratio increased already in 2013), while it has been at the same level for Italian banks, thus widening the gap with European peers.

What can explain this gap in IT investments? And can investments in IT really boost profitability? To answer these questions, we estimate a panel data model on a sample of 124 European banks from 2006 to 2018 and test if additional investments in IT improve profitability. We also investigate the determinants of the choice of investing in Information & Technology.

The results of our analysis highlight that **an increase in IT expenses can improve banks' profitability**, although a smaller coefficient for the Italian banks compared to European peers signals that the magnitude of this impact can depend on banks' operating environment. In addition, we show that **balance sheets' weaknesses affect the ability to invest in IT**. In fact, higher credit risk is associated with lower investments in digitalisation for the whole sample of European banks: this is particularly true for the subset of Italian banks.

Furthermore, a higher cost of funding has negative effects on the decision to invest in technology. On the contrary, higher profitability, the ratio of labour costs to total assets and a solid capital position contribute positively to banks' decision to invest in digitalisation.

Fig. 3 EMU (excl. Italy), IT costs
% values

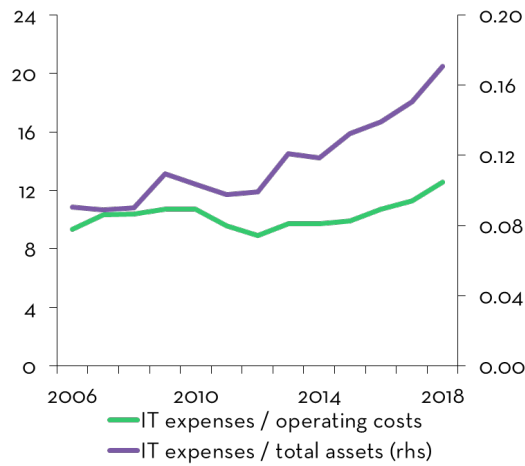
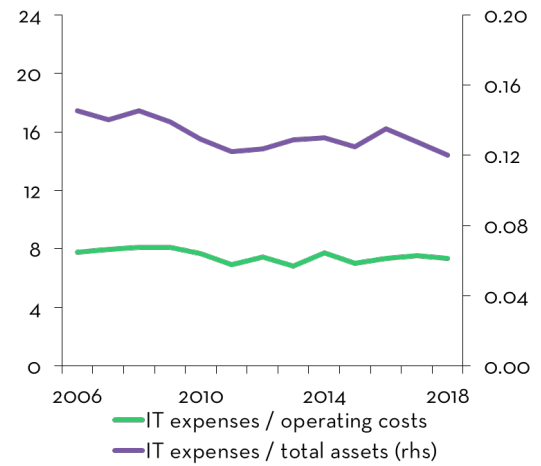


Fig. 4 Italy, IT costs
% values



Source: Prometeia calculation on SNL, ABI and financial statement data.

2 Dataset and model specification

2.1 Dataset

The exercise was carried out on 124 European banks,¹ operating in seven countries, and covers a time span that goes from 2006 to 2018. To investigate the role of bank's investments in digitalisation, we used the item "Information & Technology expenses" of the profit and loss statement as a proxy² for the digitalisation expenses. The time series of this variable (from now on, IT expenses) as well as all the other relevant balance sheet variables for the European banks in the sample are from SNL Financial³. Data on Italian banks are from the Italian Banking Association (ABI) and financial statements.

2.2 Model specification

The aim of this study is twofold. First, we want to analyse the impact of IT expenses on bank profitability. Second, we investigate the determinants of investments in digitalisation. In both cases, we control for the effect of other bank-specific characteristics on the two endogenous variables. Moreover, we include country fixed effects to control for unobserved time-invariant heterogeneity across different banking sectors. To correct for the bias induced by potential endogeneity between profitability and IT expenditure, we run a Two Stage Least Squares estimation. Lags of the variables ROA and IT expenses are used as instruments in the first stage of each regression. Since banks in the sample have very different sizes, we scaled the variables expressed as amounts on total assets.⁴

¹ The banks of the dataset are distributed across countries as follows: 55 banks in Italy, 30 in Germany, 20 in Spain, 8 in Belgium, 5 in France, 3 in Greece and 3 in Ireland.

² The indicator is not perfect but a good proxy. In fact, IT spending can also relate to other things, such as maintenance of potentially old and obsolete technical infrastructures, while it does not capture the cost of new IT investments, which are capitalised and are not included in the profit and loss statement.

³ Balance sheet definitions for this variable on SNL Financials include: postage and transport of documents; telephone and data transmission; information technology expenses; charges for measurement and information; rental and/or maintenance of hardware, software and other assets; third-party data processing; EDP (electronic and data processing); data transmission fees and use of databases.

⁴ That is, IT expenses, loan loss provisions (credit risk), personnel expenses, interest expenses (cost of funds) and equity.

For the first question, we estimate the following regression equation:

$$\begin{aligned}
 \mathbf{ROA} = \alpha + \beta_1 \mathbf{IT\ expenses}_{t-1} + \beta_2 \mathbf{credit\ risk} + \\
 \beta_3 \mathbf{personnel\ expenses\ to\ total\ assets} + \\
 \beta_4 \mathbf{\log\ of\ total\ assets}
 \end{aligned} \tag{1}$$

The dependent variable is defined as pre-impairment operating profit on total assets. Credit risk⁵, personnel expenses to total assets and bank size (logarithm of total assets) act as control variables. For the second question, we assume that some specific variables – such as loan loss provisions, personnel expenses, bank size, profitability, cost of funding, financial soundness⁶ and funding gap⁷ – may play a role in spurring higher investments in digitalisation. We run the following regression equation:

$$\begin{aligned}
 \mathbf{IT\ expenses} = \alpha + \beta_1 \mathbf{credit\ risk} + \\
 \beta_2 \mathbf{personnel\ expenses\ to\ total\ assets} + \\
 \beta_3 \mathbf{\log\ of\ total\ assets} + \beta_4 \mathbf{ROA}_{t-1} + \beta_5 \mathbf{cost\ of\ funds} + \\
 \beta_6 \mathbf{equity\ to\ total\ assets} + \beta_7 \mathbf{loan\ to\ deposit}
 \end{aligned} \tag{2}$$

The analysis is carried out for the whole dataset, described in the previous section, as well as for two subsets: a first one comprising all the EMU banks excluding the Italian ones and a second one with only the Italian banks.

⁵ The variable “credit risk” is computed as loan loss provisions to total assets.

⁶ Financial soundness is calculated as equity to total assets.

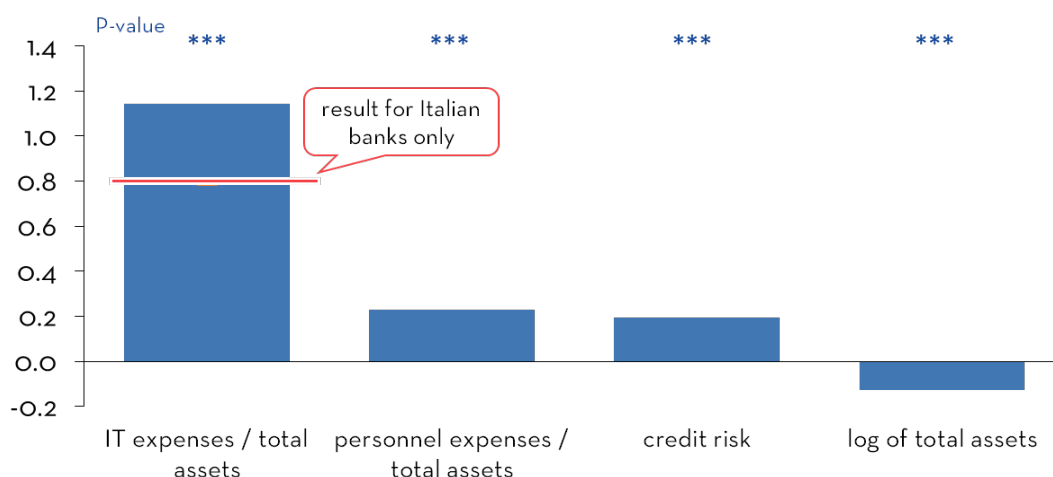
⁷ The funding gap corresponds to the ratio of loans over deposits.

3 Results

3.1 Impact of IT expenses on bank's profitability

In figure 5, we present the results from the regressions run on the three samples just described. They show that an increase in IT expenses can improve banks' profitability, up to 1.1 p.p. (for the sample including all banks) and 0.8 p.p. for the Italian banks. The positive and statistically significant coefficient of credit risk in the EMU sample can be explained by the fact that the dependent variable (ROA) is computed as pre-impairment profits to total assets and therefore it does not incorporate the impact on profitability of loan loss provisions. Higher credit risk may result from riskier assets, such as riskier loans, which entail higher pre-impairment returns. Also higher personnel expenses determine greater return on assets. This result may be explained by the fact that staff expenses in banks that invest more in IT might already reflect the compensation of more skilled and specialised employees. Finally, concerning total assets, the empirical results show that the size of a bank does not necessarily affect its profitability.

Fig. 5 Results of the regression on bank profitability (ROA) - full sample



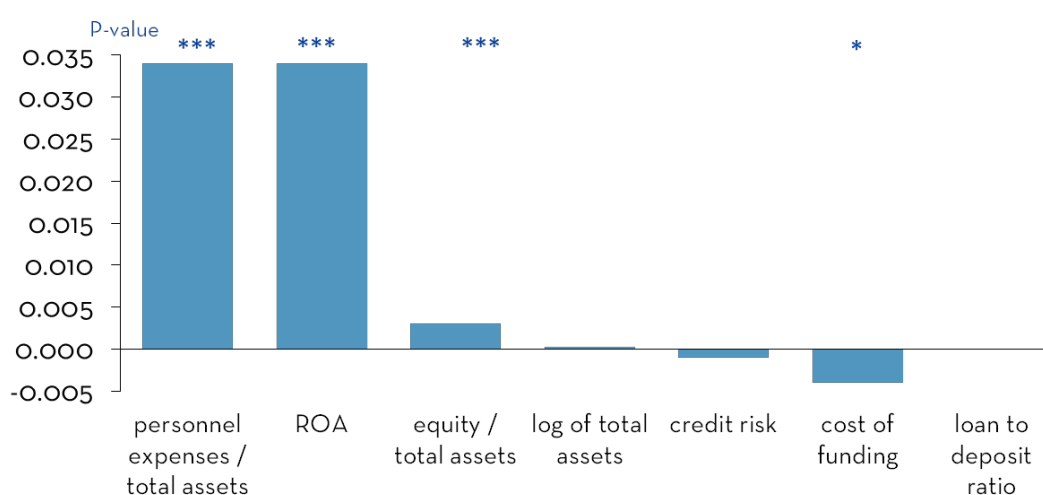
Source: Prometeia calculation on SNL, ABI and financial statement data

3.2 Determinants of the choice of investing more in digitalisation

Balance sheets' weaknesses affect the ability to invest in IT. The results of the second regression (Fig. 6) show that, for the whole sample of European banks, higher credit risk entails lower investments in digitalisation: this is especially true

for the subset of Italian banks. Moreover, higher cost of funding has a negative effect on the decision of investing in IT. On the contrary, higher profitability the previous year is particularly relevant to the choice of allocating more resources to IT investments. Also labour costs to total assets contributes positively, since the variable may reflect the severance payments following recent reorganizations, aimed precisely at enhancing the digital transformation of the bank, or it could already incorporate the higher cost of labour of a more specialised workforce, which typically goes hand-in-hand with more IT investments. Moreover, banks with a more solid capital position (equity to total assets) are more capable of investing in digitalisation. It is interesting to note that size has a completely different effect in the regressions run on the sample of European banks, excluding Italian banks and on the one including only Italian banks. In the first case, larger banks appear to be stimulated to invest in IT, while the opposite is true for Italian banks. Finally, the loan-to-deposit ratio – that can be interpreted as a business model variable – does not have any significant impact.

Fig. 6 Results of the regression on IT expenses - full sample



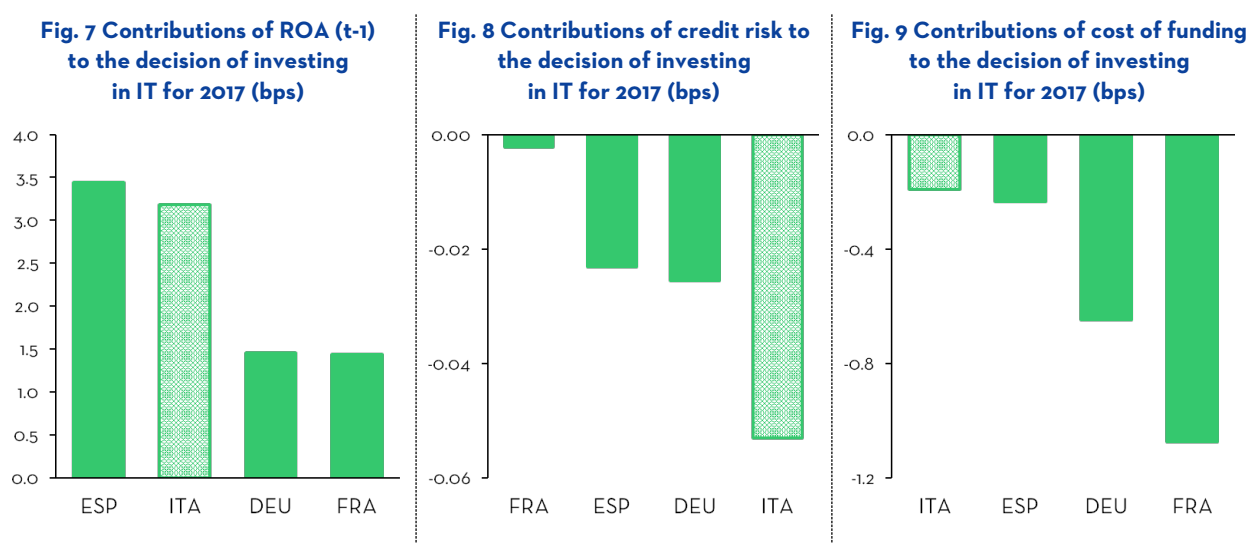
Source: Prometeia calculation on SNL, ABI and financial statement data

3.3 The contribution of some determinants for the main European countries

We also tried to understand whether the relevance of some particular variables in driving higher investments in IT might vary across countries.⁸ Figure

⁸ To do so, we computed the contribution of each variable by multiplying the coefficients of regression (2) by the correspondent observation. We then computed the mean of these new vectors, per year and per country. Figures 7-9 show results for the 2017, being the most recent year with a high number of observations.

7-9 show results for Italy, Spain, Germany and France. Italian and Spanish banks appear to rely on previous year's profitability when deciding whether to invest more in technology or not. The share of loan loss provisions over total assets is a great disincentive for Italian banks, especially if compared to the other countries. On the contrary, Italian banks' IT investments are the least affected by their cost of funding, while investments by French banks appear to suffer significantly from higher costs of funding.



3.4 Robustness checks

To verify the robustness of our results, we performed some additional checks. First, following a boxplot analysis of each variable, we excluded potential outliers from the database. Second, we tried a different definition of digitalisation, namely the share of IT expenses in total operating expenses and the logarithm of IT expenses. Finally, starting from the “benchmark” equations, we also tested alternative specifications.⁹ Overall, the results appear to be robust since we do not observe marked changes in the magnitude and in the significance of the coefficients.

⁹ (1) Inclusion of a dummy variable which takes into account whether a bank is under the direct surveillance of the European Central Bank; (2) Panel regressions with individual fixed effects, in which the individuals are represented by the banks to remove the individual-specific components; (3) Panel regressions with time fixed effects, including year dummies that eliminate unobservable variables evolving over time but constant across banks; (4) Panel regressions with both individual and time fixed effects.

4 Conclusions

Our analysis shows that banks' digital transformation can lead to profitability gains, but it needs to be accompanied by structural changes and balance sheet adjustments that create an environment conducive to digitalisation. Even if there is no "one-size-fits-all" strategy for banks to return to sustainable profitability, investments in information technology may play an important role. Supporting the digital transformation will be crucial to further adapt banks' business models to cope with the rapid pace of technological innovation in financial services, increasing competition from Big Tech and fintech companies as well as the need to strengthen their resilience to cyber threats.

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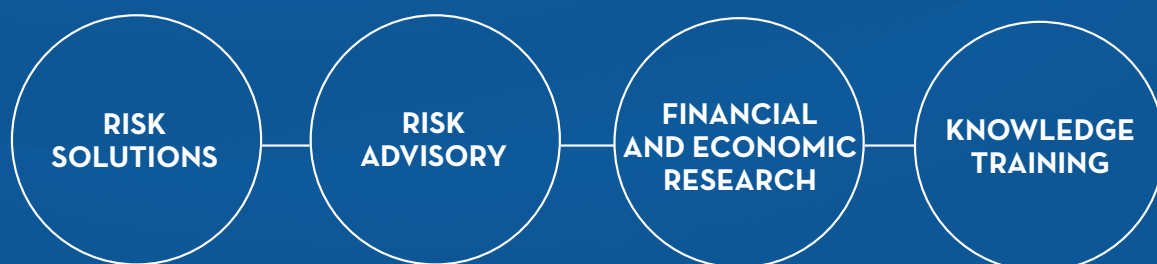
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www.prometeia.com

risk.community@prometeia.com

+44 (0) 207 786 3525

BOLOGNA

italy@prometeia.com

MILAN

italy@prometeia.com

LONDON

uk@prometeia.com

ISTANBUL

turkey@prometeia.com

MOSCOW

russia@prometeia.com

CAIRO

egypt@prometeia.com