



BANCA D'ITALIA
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AN INQUIRY INTO THE DETERMINANTS OF THE PROFITABILITY OF ITALIAN BANKS

by Ugo Albertazzi*, Alessandro Notarpietro* and Stefano Siviero*

Abstract

This paper examines the history and the determinants of bank profits in Italy from 2005-15. We first identify a number of key stylized facts by comparing the income statement of Italian lenders with that of banks in other European countries. The comparison suggests that the profitability gap of Italian banks is partly related to a business model characterized by a more conservative positioning along the risk-return frontier. We then use the Bank of Italy's Quarterly Model of the Italian Economy to provide quantitative estimates of the impact of four factors (the economic activity growth rate, taxation of bank income, dynamics of operating costs and dividend policy) on profits, regulatory capital and bad debt. Our counterfactual simulations suggest that the weak growth of the Italian economy is responsible for a sizeable share of the profitability gap of Italian banks, being by far the main driver of the increase in bad debts in the last decade; nonetheless, the impact of the other factors on their profitability (and capitalization) is far from negligible.

JEL Classification: E27, E37, E65, G21.

Keywords: business cycle, global financial crisis, sovereign debt crisis, banking, Italian economy.

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1. Introduction

The big shocks of the last few years (the financial crisis of 2007-09, the ensuing Great Recession of 2008-09, the sovereign debt crisis of 2010-12 and the resulting new bout of recession) have highlighted, arguably more than ever before, the interplay between the conditions of the banking system and the macroeconomy. The performance of credit institutions – specifically their profitability – directly and heavily depends on macroeconomic developments which are influenced by several other factors unrelated to the banking sector. In several countries, including Italy, the double recession has resulted in an unprecedented worsening of the quality of bank credit, with a dramatic surge in the stock of bad debts and other non-performing loans (NPLs) and a corresponding fall in bank profits. At the same time, the worsening in financial conditions has contributed to the fall in economic activity during the global financial and sovereign debt crises, both in Italy and elsewhere.¹

The profitability of Italian banks has come under scrutiny in the last few years, for at least two reasons. First, in the context of a persistently weak macroeconomic environment, rising credit losses, together with the reduction in intermediated funds and the contraction of interest rate spreads, have exerted downward pressure on both bank profits and bank capital; these developments have in turn affected the availability of credit, thus exacerbating and lengthening the real effects of the crisis.² Second, because of the Basel III Agreement (which imposes tighter capital requirements on banks, to be phased-in fully in 2019) the ability of banks to extend credit to the economy will depend more than ever on their adequate capitalization. Jointly taken, the enduring turbulence in the financial markets and the more stringent Basel III capital requirements imply that bank profitability is bound to become an even more important component of financial stability (BIS, 2012, and, more recently, ECB, 2016). A thorough understanding of the determinants of bank profitability in Italy is therefore warranted, especially given today's relatively poor asset quality levels (IMF, 2016).

The weak profitability of Italian banks is by no means a recent phenomenon. Already in the early 1990s, and for the rest of that decade, Italian banks were underperforming their competitors in other major advanced economies. The differences in profitability were sizable, and only partly ascribable to differences in national economic conditions; Gambacorta, Gobbi and Panetta (2001) show that Italian banks were also heavily disadvantaged by low cost-efficiency levels. Others have argued that Italian lenders' profitability was compressed by their particular business model

¹ For an estimate of the contribution of worsening credit conditions to the downturns of 2008-09 and 2011-12, see Caivano, Rodano and Siviero (2011) and Buseti and Cova (2013), respectively.

² The quantitative relevance of the bank balance-sheet channel in amplifying the effects of recent crises is well documented by an increasing body of literature; see, for instance, Jimenez *et al.* (2012) and, for the Italian case, Gambacorta and Mistrulli (2004), Albertazzi and Marchetti (2011) and Bonaccorsi di Patti and Sette (2012).

entailing, among other characteristics, a limited duration gap (The Economist, 2013; Esposito *et al.*, 2015).³

The long-lasting debate on the sources of the Italian bank profitability gap further intensified during the most recent crisis, when their underperformance became particularly pronounced. In 2011, the tensions in the Italian sovereign debt market swiftly spread to national banks, affecting both the cost and availability of funding, especially in wholesale markets (Panetta *et al.*, 2011; Albertazzi *et al.*, 2014; Bofondi *et al.*, 2013). The possibility of increased vulnerability to credit risk resulting from a deeper, more prolonged recession than anticipated, put additional strains on bank funding conditions and profitability (Panetta, 2013). Not only was the Italian economy hit more heavily by the financial market turbulences caused by the sovereign debt crisis, but because Italian lenders primarily engage in traditional banking activities, they tend to be more negatively affected by macroeconomic slumps (Bonaccorsi di Patti *et al.*, 2016).

The analyses available in the literature have identified a number of factors that are likely responsible for the low profitability of Italian banks. Some of those factors (such as general macroeconomic conditions or the fiscal regime) are by and large external to the banking sector. Other factors may represent intrinsic weaknesses in the sector itself, as is the case of the relative cost efficiency. The differences in profitability may also be a reflection of their particular business model and its related risks, on both the liability (leverage) and asset side (market risk, credit risk, interest-rate risk) of the balance sheet.

With a view to understanding how relevant those various factors have been in shaping Italian lenders' profitability between 2005 and 2015, we first take a detailed look at the structure of their income statement and discuss the developments in net interest income, non-interest income (other income), operating costs, provisions and taxes; all these analyses are first conducted in a comparative manner, contrasting the performance of the Italian banking sector with that of other advanced economies, including the other euro-area countries.

We then produce quantitative estimates of the impact of various potentially relevant factors on Italian bank profits. In the process, the impact of those factors on both the flow and the stock of bad debt is investigated, and the implications for bank capitalization are assessed. The factors we consider are: GDP growth, taxation of bank revenues, dynamics of operating costs, and dividend policy. A crucial feature of our approach is that it allows us to take into account possible feedback loops from the banking sector to the macro-economy, which are typically ignored in other analyses, based on descriptive statistics or reduced-form models. Specifically, our estimates rely on

³ Given the normally positive inclination of the term-structure of interest rates, a large difference between the financial duration of bank assets and liabilities increases the exposure to interest-rate risk but at the same time is beneficial to the formation of net-interest income (Alessandri and Nelson, 2015).

counterfactual simulations conducted with the Bank of Italy's Quarterly Econometric Model, recently enhanced to include a concise but complete description of the interaction between the banking sector and the macro-economy. This implies, for instance, that in assessing the effects of a lower operating cost dynamic, not only is their direct impact on profits and capital taken into account, but also their indirect impact, via lower cost of funding, better credit supply conditions, stronger macroeconomic growth and so on.

Our results suggest that the comparatively low profitability of Italian banks over the past decade largely stems from Italy's sizable economic growth gap, mainly because of its impact on the stock of bad debt. However, our simulations also show that all of the factors listed above have contributed to the modest performance of Italian banks in the reference period. Further improvements along all dimensions considered here are arguably needed to make the Italian banking industry more profitable and resilient. In the most recent past, non-trivial improvements have already been observed for most of the factors examined in this paper; indeed, Italy's growth gap has significantly narrowed from the peak of the last crisis and the tax treatment of bank profits has turned less unfavorable compared with other countries; meanwhile, Italian banks have continued to improve their cost efficiency and have adopted more cautious dividend policies.

The paper is organized as follows. Section 2 documents the profitability gap of Italian banks, using bank-level consolidated data, and examines their balance-sheets, highlighting a number of specific characteristics. Section 3 assesses, by means of a counterfactual exercise, the contribution of the various macroeconomic, fiscal and banking-sector-related factors to the relatively low profitability of Italian banks; their impact on credit quality and bank capitalization is also discussed. Section 4 concludes.

2. The profitability of Italian banks over the last decade: an international comparison

In this section we compare the profitability of Italian banks with that of banks in other European countries (including non-euro area and non EU ones) over the period 2005-2015. The comparison is based on bank-level information on the 50 largest banks in Europe derived from the Bankscope (*Bureau van Dijk*) database.⁴ In order to ascertain the factors underlying the differences in profitability between Italian banks and those of other countries, a comprehensive investigation of the various components of their income statement is also provided.

⁴ See Appendix 1 for the list of banks included in the sample.

In the decade under scrutiny, the profitability of banks both in Italy and in other European countries has sharply deteriorated and, despite the mild recovery in the most recent period, it has nowhere reverted to its pre-crisis levels (Fig. 1).

While recent data show that the profitability gap of Italian banks *vis-à-vis* the rest of Europe is closing, it had been ample in the previous decade. The average ROE of Italian banks in the sample, net of non-recurring items, was 3.0 per cent, lower than in the other countries, where it was on average 7.5 per cent. Specifically, banks' ROE was 8.1 per cent in non-euro area European countries (the sample includes Swiss, British and Swedish intermediaries); 7.6 in the other euro area economies that have been directly hit by the sovereign debt crisis (henceforth: "stressed"); 6.9 per cent in non-stressed euro area countries.

The relative performance of Italian intermediaries, comparatively weak in the pre-crisis years, improved in the course of the global financial crisis, when the deterioration of their profitability was mild, mainly in relation to the limited losses on structured credit products and other toxic assets (Banca d'Italia, 2009). The ROE of Italian banks, however, worsened during the sovereign debt crisis and remained negative from 2011 to 2014; it then recovered markedly last year, when it reached levels close to those of banks in other countries.

These bare data most likely overstate the underperformance of Italian banks profits, as they are not adjusted for a number of factors that distort the comparison, most notably the impact of the massive rescue programs carried out by the governments of almost all countries in our sample, except Italy⁵. Nevertheless, the comparison does point to a comparative weakness of Italian banks' profitability.

2.1 *Leverage and profitability*

When it comes to the business model, Italian banks stand out for their low financial leverage (see, e.g., Visco, 2012). The total asset-to-equity ratio in Italy has been broadly stable at around 15 throughout the whole sample period under scrutiny. In the other economies in our sample, that ratio was systematically higher, although declining over time. It was as high as 28, on average, in non-stressed euro area countries (Fig. 1b)

Given the large differences in the degree of leverage, it is worthwhile appraising the relative performance of the Italian banking sector also on the basis of the ROA, defined as the ratio between

⁵ Considering only recapitalizations, troubled assets purchase programs and liquidity measures, state-aid used in Italy in the context of the recent crises amounts to EUR 8 billion, compared to 149 billion in Germany, 114 in Spain, 58 in the Netherlands, 26 in France. See European Commission "State Aid Scoreboard 2015; aid in the context of the financial and economic crisis". The size of the rescue programs implemented in Italy remains comparatively low also when including guarantees provided on bank liabilities. See also Panetta *et al.* (2009) for an earlier reference.

net income and total assets, which is not directly affected by the leverage. In this case, the underperformance of Italian banks is mitigated, but does not disappear (Fig. 1c). In 2005-2015, their average ROA amounted to 0.21 per cent, a lower figure than in the other groups of countries (0.26 in non-stressed euro area economies, 0.40 in other euro area stressed countries and 0.35 for other European banks in the sample).

The attenuation of the profitability gap measure based on the ROA suggests that the leverage ratio plays a nontrivial role in explaining part of the lower ROE of Italian banks. From this viewpoint, the profitability gap of Italian banks may be viewed as relatively less of a cause for concern, to the extent that it at least partly reflects a more conservative positioning along the risk-return frontier of Italian bank equity holders.⁶ As shown below, other features relating to the business model of Italian banks (and hence to their exposure to risk) are also partly responsible for their profitability gap.

The quantitative relevance of the leverage in explaining the gap in terms of the ROE may be assessed by considering what the latter would have been in Italy, had local intermediaries pursued leverage ratios on par with those of other countries. In a simplified Modigliani-Miller framework with risk-free debt, an exogenous increase in the leverage ratio would affect the ROE while leaving unchanged the ROA. Under such conditions, if the leverage ratio of Italian banks was the same as in the other economies (i.e., 26, instead of 15), their ROA would remain unchanged, but their ROE would be larger by 1.9 p.p.; this is a considerable increase, but still less than half as needed to fully close their ROE gap vs. the other countries (which amounts to 4.5 p.p. on average).⁷

To further confirm that Italian banks' lower ROE does not only reflect a different positioning along the risk-return frontier, we consider risk-adjusted measures of profitability. For instance, a simple Sharpe ratio (the ratio between the ROE and its standard deviation) points at a systematic underperformance of Italian banks compared to all the other groups of countries in the sample (Fig. 2). The same holds true when considering the corresponding Sharpe ratio computed for the ROA.

In light of the foregoing analysis, we now focus on the main components of the ROA to identify the sources of the profitability gap of Italian banks other than the difference in leverage.

⁶ Relatedly, Acharya, Pierret and Steffen (2016a) find that, had a hurdle based on a leverage ratio (as in the US) been adopted in the recent European stress test, this would have resulted in a much better performance of Italian banks relative to banks of other European countries.

⁷ In a simplified Modigliani-Miller framework, raising one banks' leverage ratio brings about an increase in ROE even for given asset profitability. One implication of the Modigliani-Miller hypothesis is that the weighted-average cost of capital (WACC, the cost for a firm to finance a marginal unit of asset) is independent on the mix of debt and equity chosen. Under the simplifying assumption that debt is risk-free, this requires the cost-of-equity (or equivalently the expected ROE) to increase proportionally with the leverage ratio (A/E). At the same time, given that $ROA = ROE / (A/E)$, changes in A/E should leave the (expected) ROA unaffected. Admati *et al.* (2011) and Miles *et al.* (2013) empirically find that the Modigliani-Miller hypothesis hold for US and UK banks, respectively.

2.2 The components of the ROA

We decompose the ROA into its main components, as follows:

$$ROA = NET\ PROFITS / A = net_ii + non_ii - costs - prov - tax \quad (1)$$

where *net_ii*, *non_ii*, *costs*, *prov* and *tax* denote respectively: the net interest income, other (non-interest) income, operating costs, provisions and taxes, all expressed as ratios to bank total assets, labeled *A*.

Net interest income (*net_ii*). The net interest income is by far the main (positive) contributor to the ROA of Italian banks (Fig. 3), as in the other euro-area stressed countries, reflecting the more traditional business model of these intermediaries. Specifically, in Italy *net_ii* was on average 1.7 per cent between 2005 and 2015 (1.9 in the other euro area stressed countries), while it was only 1.0 per cent in non-stressed euro area economies and in other European countries.

The net interest income in Italy has gradually declined from its peak of 2 per cent of total assets in 2008 to 1.5 in 2015, reflecting the evolution of both the lending volumes (which were affected by the weak macroeconomic conditions and loan demand) and the unit margin (the difference between the average interest rate received on outstanding loans and the average interest rate paid on deposits and other interest-bearing liabilities). The latter has declined since 2008 (Fig. 4); signs of stabilization are apparent only in 2014-15.

Overall, the comparison above confirms that Italian lenders, because of their traditional business model, were relatively shielded from the impact of the global financial crisis but suffered relatively more from the deterioration of the macroeconomic environment, particularly following the sovereign debt crisis.

Non-interest income (*non_ii*). In addition to the traditional deposit-taking and lending activities, banks supply a wide array of other services.⁸ The relevance of these non-interest income generating services increased markedly in the pre-crisis period, owing to financial deregulation and liberalization. The increase varied considerably across institutions and countries.

⁸ These include: more traditional services (e.g. checking, cash management, safety deposit boxes), investment services (e.g. trust accounts), insurance services (annuity contracts), investment banking, securities brokerage, insurance agency and underwriting and mutual fund sales (DeYoung and Rice, 2004).

Non-interest income has important implications for both the level of bank profitability, as these services tend to include relatively more sophisticated, and hence more remunerative, activities, and its riskiness, as the income generated by these activities is comparatively very volatile, while at the same time providing little diversification benefits (Stiroh, 2004).

The non-interest income contribution to banks' ROA has been on average 1 percent in Italy, similar to that in the other economies, although clear differences are found both in the dynamics and the composition of this income component in the various country groups. The difference was larger in the pre-crisis period, in particular when compared to the very large contribution of *non_ii* to the income formation of Swiss, Swedish and British banks. In the course of the global financial crisis, non-interest income declined in all country groups considered and then recovered somewhat. Looking deeper into the components of non-interest income, the most volatile one (i.e., trading income) is larger for banks in non-stressed euro area countries and most of all for Switzerland, Sweden and the UK (Fig. 5). Italian banks have compensated the gap in trading income with a larger contribution of net-fee income, a relatively more stable component, presumably involving less risk but also a lower remuneration.

Operating costs (*costs*). Operating costs provide the most relevant negative contribution to banks' ROA (Fig. 3). The magnitude of *costs* is highest in Italy, being 1.8 per cent, on average, against 1.5 in stressed euro area economies, 1.2 in non-stressed and 1.4 other European countries, mainly reflecting differences in the personnel cost component (Fig. 6).⁹

Provisions (*prov*). As shown in Figure 3, in the first part of the sample period the ratio between provisions and total assets was negligible in all country groups under scrutiny, including Italy. In non-stressed and non-euro area countries it peaked in 2009 and started being reabsorbed thereafter, almost reaching pre-crisis levels in 2014. In stressed economies (including Italy), the peak was reached later, in the course of the sovereign debt crisis, exceeding 2 per cent in the other stressed economies in both 2011 and 2012 (in those years, large and publicly-funded restructuring measures were adopted in several countries).

Compared to the other stressed economies in the sample, the increase in provisions in Italy was more gradual and less pronounced, also reflecting the traditionally low level of indebtedness of Italian households, which averted massive defaults in the mortgage market. By contrast, in Italy the increase in provisions was comparatively longer-lasting, reflecting the protracted weakness of

⁹ The outcome of the comparison would be different if costs were standardized by total operating income (the figures for Italian banks would be roughly in line with those for banks of other countries) or by equity (Italian intermediaries would slightly outperform the average).

economic activity. The provision-to-asset ratio stabilized in 2014 and declined in 2015, to 0.6 per cent. Nonetheless, provisions for loan losses are likely to hinder the profitability of Italian banks for some time, given the usual lags with which new bad loans affect banks' income statement (Bofondi and Ropele, 2011).

The amount of impaired loans as a ratio of total loans kept increasing in Italy throughout the decade, peaking at 18.8% in 2015 for the banks included in the sample (Fig. 7). In the most recent part of the period, developments in impaired loans have been comparatively more favorable in all other banking industries under scrutiny, including those of other stressed economies. Aside from the evident differences in macroeconomic conditions, there are several reasons why Italian banks have experienced a steeper increase in impaired assets. First, differently from what happened in other countries, Italian banks did not benefit from (often massive) publicly-subsidized restructuring schemes. Second, the market for securitization of bad loans came to a halt during the financial crisis and has been showing signs of revitalization only recently. Third, because of the inefficiency of the Italian judicial system, the time necessary to repossess guarantees or execute insolvency procedures tended to be comparatively long in Italy. While the provisioning of impaired loans of Italian banks is slightly higher than in the EU average, the uncertainty about recovery rates and the large stock of impaired loans may still weigh negatively on Italian banks' intermediation capacity. To alleviate this constraint, a number of relevant initiatives have been recently taken. These include the launching of private investors' funds to both support increases in bank capital and purchase bad loans, the state guarantee scheme to securitize bad loans and the recent reform of the procedures for collateral repossession (Panetta, 2015; Banca d'Italia, 2016).¹⁰

Taxes (tax). Although part of the tax burden on banks has been shown to be transferred onto their customers,¹¹ differences in fiscal pressure across countries may contribute to explain differences in observed banks' (net) profitability and hence own capital accumulation. In the decade examined here, Italian banks faced a relatively unfavorable fiscal treatment, in particular over the pre-crisis period, posting the largest (negative) contribution of taxes to the ROA (-0,28 per cent in 2005-07, as in other stressed euro-area economies, almost twice as much as in the remaining groups of countries; Fig. 3. These findings are in line with those of Ricotti *et al.*, 2016).¹² The situation appears to have reversed in the course of the sovereign crisis; this is partly a side effect of the

¹⁰ In addition to the initiatives listed in the text, the Bank of Italy has recently launched a new survey aimed at providing potential investors with reliable and detailed information on bad loans characteristics, on the guarantees used to back them and on the status of recovery procedures (Visco, 2016).

¹¹ Albertazzi and Gambacorta (2010).

¹² As mentioned earlier, these figures are derived from consolidated balance-sheet. Therefore, in our data the tax burden of Italian banks proportionately reflects the tax burden in Italy and that in the other countries where they operate.

particularly severe decline of profits in Italy, which resulted in very low taxes payments by Italian banks, and even tax credits in some years. Looking forward, a number of recent tax reforms (e.g., the introduction of the Allowance for Corporate Equity and the new tax treatment of provisions for loan-losses) will significantly contribute to reducing the comparatively higher tax burden weighing on Italian banks (De Vincenzo and Ricotti, 2014). Nonetheless, should profitability return close to its historical values, the tax regime would still negatively affect Italian banks, even though less than in the past. A deeper harmonization of tax systems, at least for the countries participating in the Single Supervisory Mechanism, is arguably still warranted (Ricotti *et al.*, 2016).

The descriptive analysis above suggests that the underperformance of Italian banks is related to a number of factors, there being no single culprit. Some of those factors are internal to the banking sector and are not necessarily of a malign nature. To start with, the business model of Italian banks, being oriented to a more conservative positioning in the risk-return frontier, explains at least some of the profitability gap. Together with the comparatively low degree of financial leverage, the low exposure to interest rate risk and the high reliance on more traditional intermediation activities are also part of the story. But these features are not the whole story. The profitability of Italian banks was also hindered by their relative operational inefficiency, at least when costs are standardized by total assets, in particular as regards higher labor costs. It was also negatively affected by factors relating to the characteristics of the environment in which banks carry out their business, such as the tax regime and the macroeconomic conditions. The latter were particularly unfavorable in Italy in the decade under review. Their relevance in explaining bank profits cannot be directly assessed by a mere descriptive analysis, but requires a model that describes how banks income statements are affected by macroeconomic developments at large (e.g., dynamics of GDP and its components, prices, etc.). Even for other factors, whose influence may in principle be appraised on the basis of a simple accounting exercise, the use of a model provides a more complete quantification, in that the complex and two-way interactions between the banking sector and the overall economy may be fully taken into account. In the following section we report the results of a number of counterfactual simulations based on a comprehensive model of the Italian economy that accounts for those interactions.

3. A counterfactual analysis of Italian banks' profitability and capitalization

In this section we estimate the quantitative contribution of a number of potentially relevant determinants to the profitability of Italian banks. In doing that, we broaden the analysis and consider two aspects that were only lightly touched upon in the previous section. First, in order to explain the evolution of Italian banks' profitability, one needs thoroughly to investigate the role of

bad debt, which weighs on profit margins mainly through larger provision requirements. Second, as the accumulation of non-distributed profits is an important driver of bank capital, the analysis of profitability will help shedding light on the latter as well.

In order to quantify the contribution to the comparatively low profitability of Italian banks of the various factors identified in the previous section, we resort to counterfactual analysis. Specifically, we construct a number of “alternative histories”, each of which rests on specific assumptions about the various determinants of banks’ profitability, one at a time.¹³ These alternative histories are meant to provide answers to questions such as the following: How much higher would Italian banks’ profitability have been if, *ceteris paribus*, Italian GDP growth had been in line with that of the rest of the euro area for a full decade? What if dividend policy, operating costs structure and taxation of bank profits were aligned with those of our partners? How about the impact of those factors on bad debt and bank capital? The tool we use to explore those alternative histories is the Bank of Italy’s Quarterly Econometric Model (BIQM). The original BIQM focussed mostly on macroeconomic variables, the bi-directional feedbacks between the latter and financial variables being by and large ignored. However, following the global financial crisis the model was modified and enriched with a succinct, yet comprehensive, description of the banking sector.¹⁴ In a nutshell, the (enriched) BIQM includes separate estimated relationships for the net interest income, non-interest income, operating costs and provisions. Through these relationships, macroeconomic variables impact in various ways on the different components of bank profits. Banks’ capital is then given by cumulated post-tax undistributed profits, taking into account the issuance of new capital which is not modelled and is therefore assumed to remain unchanged at the historically observed levels in all counterfactual simulations¹⁵. Higher bank capital, in turn, results in more favourable credit conditions and hence feeds back onto the macroeconomy; by contrast, constraints to credit supply (whose identification relies on Italian banks’ replies to the Eurosystem’s Bank Lending Survey, BLS) may severely affect investment and hence both current GDP growth and its medium-to-long run potential.¹⁶ In addition, the BIQM includes equations for the new bad debt rate – defined as the ratio between new bad debt and the total outstanding amount of loans net of bad debt – and the stock of bad debt. The former depends on macroeconomic and financial conditions; the

¹³ For a discussion of the potentials and limits of counterfactual analysis, see Caivano, Rodano and Siviero (2011), where a model similar to the one employed here is used to appraise the channels through which the Great Recession of 2008-09 transmitted to the Italian economy.

¹⁴ For a synthetic description of the structure and main properties of the BIQM see the Appendix. For a detailed description of the changes made to the basic structure the BIQM in order to include the interactions between the macroeconomy and the banking sector see Miani *et al.* (2012). The Appendix reports the main equations for the banking sector.

¹⁵ The possibility that the issuance of new capital may be affected by the dividend policy is therefore ignored.

¹⁶ For a complete description of the feedback effects between the banking sector and the macroeconomy, see Rodano (2009), Caivano, Rodano and Siviero (2011) and Panetta and Signoretti (2010).

latter is obtained by cumulating the (net) flows of new bad debt.¹⁷ Hence, the scope of our counterfactual simulations exceeds that of a simple accounting exercise, in that they fully take into account the feedback effects from the banking sector to the macroeconomy.

All counterfactual exercises are conducted over a ten-year period; only the results for the variables of interest at the end of the period are reported; the choice of the starting year of the simulations does not significantly affect our findings.

3.1 *Design of counterfactual simulations*

We consider four factors that are likely to have played a prominent role in shaping Italian banks' profits, capital accumulation and bad debt; specifically: (1) macroeconomic growth; (2) tax policy; (3) the efficiency of the banking industry (measured by the dynamics of its operating costs); (4) banks' choices regarding the destination of their net income (dividend policy).

To appraise the impact of each of those factors on the variables of interest, we run the following four simulations:

- (1) *GDP growth in line with the rest of the euro area.* In the past decade (and in the previous one), the growth performance of the Italian economy was systematically modest *vis-à-vis* that of its European partners. Annual real GDP growth in non-stressed euro area countries averaged 1.2 per cent between 2005 and 2015, while it amounted to -0.4 per cent in Italy; even considering only the pre-crises years (2005-07), the growth gap between Italy and its counterparts is sizable, amounting to about 1 p.p. per year. To appraise the impact of the relatively weak growth performance of the Italian economy on the profitability, capitalization and bad debt of Italian banks, a counterfactual simulation was run in which Italian GDP is assumed to grow by an additional 1 p.p. per year (on top of its rate of growth in history), over a ten-year horizon, hence closing the pre-crisis growth gap with respect to the rest of the euro area.¹⁸ As mentioned earlier, the improvement in banks' capitalization induced by this favourable shock feeds back onto the macroeconomy, thanks to the improvement in financing conditions for both firms and households. However, the quantitative relevance of this feedback channel turns out to be relatively small.

¹⁷ See Appendix 2 for details.

¹⁸ The results reported below refer to the case in which the stronger growth of Italian GDP is assumed to stem from an improvement a rise in investments; for robustness purposes, other alternatives were explored as well (with GDP growth stemming from the various components of output, one by one), with no significant changes in the results.

- (2) *Tax rate on bank revenues in line with the rest of the euro area.* In the period preceding the global financial crisis (2005-07), taxation on bank profits was higher in Italy than in non-stressed euro-area countries, the effective tax rates for the banks included in our sample being 30 and 24 per cent, respectively; the extra tax burden in Italy thus amounts to 6 p.p., a figure in line with the evidence reported in Ricotti *et al.* (2016) for the same time period. All else being equal, the higher taxation results in lower post-tax profits and hence lower bank capital. While, as reported above, recent changes in taxation in Italy have gone some way toward narrowing that difference, to gauge the impact of this factor in the past a counterfactual simulation was run in which the average tax rate on bank profit in Italy was imposed to be the same as in the other euro-area countries.
- (3) *Lower operating costs.* In the pre-crisis period, the operating cost burden in Italy was systematically higher than in other countries. Specifically, the operating costs-to-total assets ratio was equal, on average, to 1.67 in Italy and 1.13 per cent in the average of non-stressed euro area countries, which were the most efficient ones. Against this background, an improvement in cost efficiency is a natural candidate to be included among those that may contribute to fill the profitability gap of Italian banks *vis-à-vis* the rest of the euro area. To appraise its quantitative relevance, we report the results of a counterfactual simulation in which Italian banks' operating costs are assumed to grow by 1 p.p. less per year, compared with historical values, for a decade; the overall reduction in operating costs in the final year of the simulation thus amounts to about 10 p.p.. This sustained reduction in the growth rate of operating costs would be enough to close, by the end of the decade, one third of Italy's initial efficiency gap.
- (4) *Share of distributed profits in line with the rest of the euro area.* Dividend distribution policies in Italy and in the other euro area countries diverged significantly over the period 2005-07: while in the euro area about 47 per cent of after-tax profits were on average distributed to stockholders, the share was considerably higher in Italy, where it amounted to about 67 per cent. As documented by Acharya *et al.* (2016b), the situation has by and large reversed in the recent past, when the contribution of generous dividend policies to capital shortages was much less pronounced in Italy than elsewhere. However, to gauge the contribution of this factor to Italy's profitability gap in the past, a counterfactual simulation was run in which the share of distributed profits in Italy is about 20 p.p. lower than the historical figure for a full decade. Given the lower bank profitability in Italy, even in the

counterfactual the ratio between dividends and capital remains lower than in the other countries.

3.2 *Results*

The results of all four counterfactual simulations for banks' profitability, capital and bad debt (both flow and stock) are reported in Figures 8-9. The figures show the reaction of those variables ten years after the beginning of the shock. The effects of the shocks are separately presented along the four axes. Outcomes improve moving outwards in Figure 8 and moving inwards in Figure 9. The sum of the values reported on all axes provides the overall effect of the four shocks.

In all cases, Italian banks' profitability and capital rise above their respective baseline levels, while bad debt falls; in several cases, the improvement is substantial.

A jointly more favourable evolution of all factors we consider (with macroeconomic conditions and tax and dividend policies all simultaneously aligned with those of the rest of the area, along with a more favourable cost dynamics) implies that, after a ten-year period, pre-tax profits would be sizeably higher (by some 4 p.p. of capital and 0.4 p.p. of total assets, Fig. 8.a and 8.b, respectively); Italian bank capital would be about 47 per cent higher (results not reported); the regulatory capital ratio (capital/risk weighted assets; Fig. 8.c) would be about 5 p.p. higher, with part of the increase in the numerator being matched by an increase in the denominator, stemming from higher (real and nominal) GDP growth and hence faster credit expansion.

Figures 9.a and 9.b provide evidence on the reaction of the flow and stock of bad debt, respectively, in the four counterfactual simulations. Jointly taken, the four factors considered in this paper exert a significant impact on the probability that loans to firms and households are not repaid; after a decade, that probability would be more than 1 p.p. lower than in the baseline (Fig. 9.a),¹⁹ while the stock of bad debt as a share of total outstanding loans would fall by around 13 p.p. (Fig. 9.b). These results are in line with those of Notarpietro and Rodano (2016), where an approach similar to the one followed here is used to assess to what extent the increase of bad debt in Italy in the last decade may be attributed to the macroeconomic consequences of the global financial and sovereign debt crises.

The main results of the individual counterfactual simulations are the following.

¹⁹ The total new bad debt rate is the weighted average of firms' and households' new bad debt rate. The former actually falls by around 2 p.p. in the simulated scenario, while the latter is mildly affected, if at all, by the more favorable conditions. As a result, the overall rate falls by about 1 p.p..

- (1) *GDP growth in line with the rest of the euro area.* In this counterfactual simulation, bank profits are considerably higher than in the baseline: at the end of the ten-year period, they rise by 1.6 p.p. as a ratio to bank capital; this would *per se* close about 40 per cent of the profitability gap with respect to non-stressed euro-area countries (3.9 p.p. in the 2005-15 period, as reported in Section 2). The improvement mostly reflects the following mechanisms. Firstly, the higher pace of growth of the economy results in higher demand for credit, from both firms and households. The increase in credit is, however, moderate (around 8 per cent after ten years), as it is somewhat dampened by the rise in non-financial corporations' profits (and hence self-financing) brought about by the better macroeconomic conditions. Secondly, the higher growth rate of the Italian economy in the counterfactual simulation implies a non-negligible decline in provisions, which after ten years are about 12 per cent lower, in nominal terms, than in the baseline. The decline in provisions follows from the impact of the higher GDP growth rate on bad debt. Ten years after the shock, the stock of the bad debt, as a ratio to total loans, is about 13 p.p. lower in the counterfactual scenario than in the actual data (in nominal terms it more than halves). The new bad debt ratio falls by 1.2 p.p. below the actual value, taking the end-of-period counterfactual close to its pre-crisis value. Hence, ten years of higher GDP growth (in line with that of non-stressed euro-area countries) would have a sizable impact on both new bad debt and its stock; as shown in Notarpietro and Rodano (2016), the size of this effects is such that, absent the recent crises, new bad debt in Italy would have remained roughly unchanged in the last decade and the stock of bad debt would have posted only a marginal increase. Following the brisker growth of economic activity, other revenues and operating costs increase by 15 and 27 per cent, respectively, after ten years, with a relatively small overall net effect on profits. The increase in operating costs reflects both the larger business volume and the increase in prices and wages due to the higher GDP growth. Shutting down the latter effect, under the assumption that prices and wages remain constant at the baseline level, the increase in pre-tax profits would be somewhat larger, but the main thrust of the results would not significantly change. Thanks to the higher ROE, capital accumulation is also higher. Bank capital increases by about 25 per cent at the end of the period and the regulatory capital ratio rises by almost 3 p.p.: the larger scale of bank operations results in higher risk weighted assets, which partly dampen the positive effect of higher (nominal) bank capital on the regulatory ratio.
- (2) *Tax rate on bank revenue in line with the rest of the euro area.* With lower taxation on bank revenue, the ratio between pre-tax profits and capital is, by the end of the ten-year

simulation period, only ½ p.p. higher than in the baseline simulation; the increase in after-tax profits, however, is sizable, and results in a non-negligible increase in bank capital. The small indirect effect of this shock on the macroeconomy (and hence also on pre-tax bank profits) stems from the fact that the higher bank capital is accompanied by more favorable bank lending conditions. Capital increases by about 9 per cent with respect to the baseline; the regulatory capital ratio rises by 1.4 p.p.. Overall, the impact of this factor on Italian banks' capital accumulation is sizable, albeit considerably smaller than the one associated with higher GDP growth.

- (3) *Lower dynamics of operating costs.* Lower operating costs have the mechanical effect of boosting both pre-tax and retained profits by approximately the same amount. All other components of profits are virtually unaffected: as in the case of the previous shock, the additional accumulation of bank capital only exerts a feebly favourable effect on the macroeconomy. As a ratio to capital, retained profits end up being 2 p.p. higher, raising Italian banks' capital to a level that exceeds that of the baseline by almost 9 per cent; regulatory capital ratio is 1.4 p.p. higher, similarly to the case of lower taxation.
- (4) *Share of distributed profits in line with the rest of the euro area.* The counterfactual simulation in which the pre-crises payout ratio in Italy is aligned with that of the other euro area countries over the same time period results in almost unchanged pre-tax profits as a ratio to capital. However, the higher share of profits that accrues into further bank capital raises the latter by about 3 per cent; the regulatory capital ratio is about 0.5 p.p. higher.²⁰

4. Conclusions

The profitability gap of Italian banks reflects a number of features, relating to the macroeconomic context, fiscal factors, and banks' business models and policies. Our analysis suggests that if, for a decade, macroeconomic conditions and tax and dividend policies were aligned with those of the rest of the area, and cost dynamics was more effectively contained, the Italian banks' profitability gap in terms of ROA and ROE would virtually disappear. Both the flow of new bad debt and the corresponding stock would be much lower, and the regulatory capital ratio of Italian banks would be higher by about 5 p.p.. According to our findings, Italy's modest

²⁰ Those figures are likely to overestimate the overall (net) impact of a more prudent dividend policy on bank capital, because, as mentioned earlier, the model cannot account for the possibility that a more generous dividend policy may facilitate the issuance of new shares.

macroeconomic growth is the main – though by no means the only – ingredient underlying the profitability gap of Italian banks; all other features considered here (including fiscal treatment and dividend policy) have also played a non-trivial role in shaping profits and capital of Italian banks.

The most recent data show that the profitability gap of Italian banks is shrinking, mostly reflecting the support provided by the gradual recovery of the Italian economy ongoing since early 2015. Looking forward, a sustained improvement in macroeconomic conditions is expected to further support the performance of Italian banks. However, other factors may keep impacting negatively on the profitability of Italian banks in the coming years.

First, the burden of past bad debt and NPLs may still weigh on Italian banks' balance sheet, thus negatively affecting their profitability. Several initiatives aimed at tackling the stock of bad debt – such as the launching of a private investors' fund to both support increases in bank capital and purchase bad loans, and the recent reform of the procedures for collateral repossession – are likely to help Italian banks' intermediation capacity, and hence their profitability. However, the effects of those initiatives are expected to materialize in the medium-long term.

Second, the current low-interest rate environment, which may not be a short-lived phenomenon, may pause some risks to the traditional intermediation activity that characterizes Italian banks. With low interest rates and a flat term structure, the ability of banks to produce net interest income by taking duration risk is reduced, while the capital gains associated with the decline in the interest rates are one-off. This does not mean that the expansionary monetary policy currently pursued in the euro area is hampering bank profitability, as a full appraisal of the impact of low rates should take into account also the effects on the macroeconomic environment, which positively affect the quality of credit and hence provisions. Nonetheless, the current low interest rate environment is doubtless a challenging one for bank profitability.

Third, the creation of a full-fledged Banking Union will increase competition in the European banking sector, as pressure will be exerted also by non-banks, since the new regulatory framework will likely encourage firms to borrow in financial markets, hence reducing their bank loans. The Capital Markets Union, once accomplished, will also push in the same direction. Italian banks may in part benefit from this process, by providing services to firms trying to directly tap financial markets.

Against this background, further progress along all dimensions explored in this paper is required to sustain the profitability and resilience of the Italian banking sector. Italian banks will need to keep improving their cost efficiency and implementing best practice standards. The recent change toward a more forward-looking dividend policies is also likely to help, although dividend policies cannot be too tight, as this may hurt a bank's ability to access the stock market when

needed. Finally, the harmonization of tax regimes will need to be pursued, to ensure that European banks compete in a level playing field.

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List of banks in the sample

Name	Country	Total assets (dec. 2015; million of euro)
Euro area banks		
BNP Paribas	FR	1,994,193
Crédit Agricole-Crédit Agricole Group	FR	1,698,859
Deutsche Bank AG	DE	1,629,130
Banco Santander SA	ES	1,340,260
Société Générale SA	FR	1,334,391
BPCE Group	FR	1,166,535
UniCredit SpA	IT	860,433
Banco Bilbao Vizcaya Argentaria SA	ES	750,078
Intesa Sanpaolo	IT	676,496
Coöperatieve Rabobank U.A.	NL	670,373
Fédération du Crédit Mutuel	FR	570,644
Commerzbank AG	DE	532,641
DZ Bank AG-Deutsche Zentral-Genossenschaftsbank	DE	408,341
ABN AMRO Group N.V.	NL	390,317
Fundacion Bancaria Caixa D Estalvis I Pensions De Barcelona (2)	ES	349,996
KBC Groep NV/ KBC Groupe SA-KBC Group	BE	252,356
Landesbank Baden-Wuerttemberg	DE	234,015
Dexia SA	BE	230,281
La Banque Postale	FR	218,708
Bayerische Landesbank	DE	215,711
BFA Tenedora de Acciones SAU	ES	213,699
Banco de Sabadell SA	ES	208,628
Erste Group Bank AG	AT	199,743
Norddeutsche Landesbank Girozentrale NORD/LB	DE	180,998
Belfius Banque SA/NV-Belfius Bank SA/NV	BE	176,962
Landesbank Hessen-Thüringen Girozentrale - HELABA	DE	172,256
Banca Monte dei Paschi di Siena SpA-Gruppo Monte dei Paschi di Siena	IT	169,012
Banco Popular Espanol SA	ES	158,650
Bank Nederlandse Gemeenten NV, BNG	NL	149,511
NRW.BANK	DE	139,506
Raiffeisen Zentralbank Oesterreich AG - RZB	AT	138,426
Bank of Ireland-Governor and Company of the Bank of Ireland	IE	130,960
Banco Popolare - Società Cooperativa-Banco Popolare	IT	120,510
Unione di Banche Italiane Scpa-UBI Banca	IT	117,201
National Bank of Greece SA	GR	111,232
DekaBank Deutsche Girozentrale AG	DE	107,981
Allied Irish Banks plc	IE	103,122
Banco Comercial Português, SA-Millennium bcp	PT	74,885
Other European banks		
HSBC Holdings Plc	GB	2,213,269
Barclays Plc	GB	1,524,498
The Royal Bank of Scotland Group Plc	GB	1,109,888
Lloyds Banking Group Plc	GB	1,098,019
UBS AG	CH	873,280
Credit Suisse Group AG	CH	759,913
Nordea Bank AB	SE	646,868
Standard Chartered Plc	GB	588,284
Svenska Handelsbanken	SE	274,450
Skandinaviska Enskilda Banken AB	SE	271,603
Swedbank AB	SE	233,831

Source: *Bankscope* BvD

Note: (1) Top 50 intermediaries by December 2015 total assets, based on consolidated balance sheet. For the euro area banks have been selected from the list of significant entities directly supervised by the SSM. National promotional banks or similar intermediaries excluded. ING has been dropped from the sample due to limited data availability on the banking part of the group. (2) Data for 2014.

Appendix 2 – Short description of the Bank of Italy’s Quarterly Model (BIQM)

The new version of the BIQM shares many of the characteristics of the previous one, released in 1986 (see Banca d’Italia, 1986). Its long-term properties are consistent with a neoclassical model postulating exogenous growth, in which full employment of factors is accompanied by a constant rate of inflation, hence constant relative prices. The level of output and the employment of capital and labor are consistent with the parameters of the aggregate production function and with the relative factor costs. The steady-state growth path of the model, stemming from technical progress and the accumulation of real and financial wealth, interacts with the dynamics of various adjustment processes to determine short-term characteristics.²¹ The adjustment processes essentially reflect three factors: the stickiness of prices and wages, which prevents their instantaneous adaptation to the situation of full resource utilization; the non-malleability of installed physical capital, which limits the short-term modifiability of the relative composition of productive factors; and the possibility that expectations and outcomes may not coincide. In the short run, therefore, given these rigidities, the characteristics of the model are in line with the Keynesian framework, in which the level of output is determined by aggregate demand, in a situation of oversupply in both the goods and the labor market.²²

For the analyses reported in this paper, the basic structure of the model has been supplemented with a block of equations and identities tracking banks’ profits and capital;²³ that block is documented in detail in Miani *et al.* (2012); its main features are briefly recalled below.

Bank accounts and macroeconomic conditions

In this section we report the main equations characterizing the banking sector and provide an illustration of the linkages between the determinants of banks’ profits and macroeconomic conditions.

²¹ The coexistence of a neoclassical macroeconomic equilibrium framework with Keynesian short-to-medium-term adjustment processes is a feature shared by most existing macroeconometric models (see, e.g., Church *et al.* (2000)).

²² For a more detailed, yet succinct, description of the main properties of the model, see Busetti, Locarno and Monteforte (2005).

²³ In addition to the changes documented in Miani *et al.* (2012), the version of the BIQM used for the experiments below includes a simple equation relating the dividend policy to the conditions prevailing in the banking sector. Specifically, according to the equation parameters (estimated with data from 1999Q1 to 2007Q4), the share of profits distributed to shareholders is an inverse function of the ratio between (post tax) profits and capital. I.e., the higher the profitability of banks, the higher is the share of profits that is retained and cumulates into new capital. The effect of the cyclical conditions of the banking sector on the dividend policy is moderate.

Factors determining the banking sector gross profits

The estimated banking sector's revenues and costs (net interest income, NET_II , other (non-interest) income NON_II , operating costs, $COSTS$ and provisions, $PROV$) are related to gross profits by the following identity:

$$GROSS\ PROFITS_t \equiv NET_II_t + NON_II_t - COSTS_t - PROV_t \quad (A1)$$

Each term on the right-hand side of (A1) is determined by a specific equation that relates it to a set of macroeconomic and policy variables.²⁴

Net interest income

This variable measures the difference between interest income and the amount of interest paid to lenders and depositors, both on retail and interbank markets. We regress the (log) net interest income (NET_II) on the (log) nominal gross domestic product ($NGDP$), the spread between short-term loan interest rates (R^{LS}) and deposit interest rates (R^D), the lagged growth rate of total credit to the non-financial private sector (CR) and changes in the yield of long-term government bonds (R^{GL}):

$$NET_II_t = .86NET_II_{t-1} + .14GDP_{t-1} + .04(R_{t-1}^{LS} - R_{t-1}^D) + \beta(L)_{NET}\Delta\ln(CR_t) + .03\Delta R_t^{GL} \quad (A2)$$

Nominal GDP is a proxy for the size of economic activity; spread and total credit control for, respectively, the impact of loans' prices and quantities; changes in the long-term rate on government bonds (R^{GL}) proxy for bank revenues from the maturity transformation activity. A positive cointegration restriction between NET_II and $NGDP$ is imposed after successfully testing for it. The growth rate of lending volumes, in the form of an Almon lag polynomial (with $\beta_{NET}(1) = 1.62$), provides a positive contribution to the net income. The coefficient on nominal GDP is positive, as economic activity positively affects bank margins. The coefficient on the spread is also positive, as the net interest income benefits, all other things being equal, from higher interest rates on loans and lower interest rates on deposits.

Other (non-interest) income

This variable includes all revenues that are not included in the net interest margin. These typically comprise fees and commissions from financial intermediation activities provided to depositors and, more generally, net profits on financial operations. The main explanatory variables of (log) other

²⁴ The variables on the right-hand-side of equation (1) in the text (denoted by lower-case letters) are given by the corresponding variables on the right-hand-side of equation (A1) above, divided by total assets.

income are the (log) nominal gross domestic product (*NGDP*), the change in the three months Euribor rate volatility (*VOLA*) and a level shift dummy in 1995:Q1, which is meant to capture a shift in Italian banks' core business from traditional lending activities to financial services provided to the private sector. Other regressors include an Almon polynomial of the lagged growth rate of the dependent variable (with $\beta_{NON_II}(1) = -.9$):

$$NON_{II_t} = .93NON_{II_{t-1}} + .07NGDP_{t-1} + .59\Delta VOLA_{t-1} + .07(1 - DUM951) + \beta(L)_{NON_{II}}\Delta NON_{II_{t-1}}$$

Digitare l'equazione qui. (A3)

After testing, a positive cointegration restriction between other revenues and the nominal GDP, acting as a scale variable, is imposed. The change in the Euribor volatility is computed as the standard deviation of the two-period moving average divided by the moving average. The Euribor volatility positively affects other revenues, as the latter benefit from the higher number of transactions that characterize periods of increased market volatility.

Operating Costs

This variable tracks the labor and overhead costs of the banking sector. We regress (log) operating costs on the (log) total amount of wages (*WAGE*) paid in the banking sector and a level dummy in 1999:1:

$$COSTS_t = .65COSTS_{t-1} + .35WAGE_{t-1} + 0.04(1 - DUM991) + \beta(L)_{COSTS}\Delta COSTS_{t-1} \quad (A4)$$

The dummy captures the restructuring of the bank industry that took place in the late 1990s. Operating costs and the banking sector wage bill are cointegrated. Other regressors include a lag and an Almon polynomial of the lagged growth rate of the dependent variable (with $\beta(1)_{COSTS} = -0.5$), as well as outlier dummies.

Provisions

Provisions are resources set aside by banks to face future expected defaults in the private sector. Our endogenous variable is defined as provisions (*PROV*) over total credit to the non-financial private sector (*CR*). The estimated equation is the following:

$$\frac{PROV_t}{CR_t} = 0.62 \frac{PROV_{t-1}}{CR_{t-1}} - 0.06\Delta RGDP_t + 0.03DP_{t-1} \quad (A5)$$

The regressors include the lag of the dependent variable, the growth rate of real GDP (*RGDP*) and our (lagged) default probability measure for the non-financial private sector, which coincides with the new bad debt rate (*DP*, see next subsection). According to our estimates, the coefficient on the growth rate of GDP is negative, as a higher growth rate implies lower credit devaluations. The

coefficient on the probability of default is positive, as the latter variable is associated with default risk.

Macroeconomic conditions, default probabilities and flow of new bad loans

Consistent with the definition used in the Bank of Italy's Financial Stability Review and the Annual Report, we choose to proxy private sector default probability with the new debt rate. Specifically, we distinguish between the new debt rate for loans to firms and loans to households. In the following, the main properties of the equation for the non-financial corporations' new bad debt rate are described. Contrary to that of non-financial corporations, households' new bad debt rate grew moderately in the recent years. In light of this, it plays a minor role in the counterfactual analysis below. The new debt rate for loans to firms is defined as follows:

$$BDIMP_t = \left(\frac{NEW\ BAD\ LOANS_t}{LOANS_{t-1} - BAD\ LOANS_{t-1}} \right) \cdot 400 \quad (A6)$$

where *NEW BAD LOANS* denotes the flow of new bad debt, *LOANS* is the total outstanding amount of loans to non-financial corporations and *BAD LOANS* is the stock of bad debts. The expression on the right-hand side is multiplied by 400, for the following reasons: (i) since the numerator and the denominator are both quarterly data, but the former is a flow and the latter is a stock, the numerator is multiplied by 4 in order to express everything in annual terms; (ii) the whole ratio is multiplied by 100 in order to express it in percentage points. The following specification is estimated:

$$BDIMP_t = 0.4312 + 0.8184 * BDIMP_{t-1} + 0.0703 * RR_{t-1} - 0.0448 * GAP_t$$

Where *RR* is a measure of the real interest rate, defined as the difference between the interest rate on loans to non-financial corporations and year-on-year, beginning-of-quarter consumer price inflation expectations. The term *GAP* is a measure of the output gap.

The new bad debt rate shows an inertial component and increases in response to a rise in the real interest rate. An increase in GDP above potential (akin to a reduction of the output gap) implies instead a reduction in the new bad debt rate: improving macroeconomic conditions favor firms' profitability and therefore contribute to reducing the probability that loans will not be repaid. A similar formulation is adopted for the flow of new bad loans to households (not reported; available upon request).

Stock of bad loans

The flow of new bad debt – denoted as *NEW BAD LOANS* – can be obtained by inverting the definition of the new bad debt rate (identity A6 above).

Given the outstanding amount of bad debt (*BAD LOANS*), it is possible to construct the stock of bad loans (i.e. bad debt) as follows:

$$BAD\ LOANS_t = BAD\ LOANS_{t-1} + NEW\ BAD\ LOANS_t - WRITE\ OFFS_t$$

where *WRITE OFFS_t* includes writes-off and a number of other items (such as value adjustments, bad loan sales, etc.) which are not modelled (and are kept unchanged in the counterfactual simulations).

The relationship between banks income statement and capital

Excess capital with respect to the regulatory requirement is defined as follows:

$$REXC_t \equiv \frac{K_t}{RWA_t} - k^* \quad (A7)$$

where *K* is (total) regulatory bank capital, *RWA* are risk-weighted assets and *k** represents the minimum amount of capital over risk-weighted assets that banks must hold as a regulatory requirement. We model bank capital *K* as resulting from the accumulation process of retained bank profits:

$$K_t = K_{t-1} + NET\ PROFITS_t - \omega_t + \varepsilon_t^k \quad (A8)$$

where *NET PROFITS* are (after tax) bank profits and ω_t is the sum of distributed dividends and taxes. The error term ε_t^k captures un-modelled factors may affect capital: among others, the issuance of new capital and a possible mismatch between definitions of regulatory capital accumulation and profits as they appear in banks' balance sheets. Our definition of *K* corresponds to the total regulatory capital and does not distinguish between the Tier 1 and Tier 2 components defined by regulatory standards. Risk-weighted assets are modelled in accordance with the method adopted in the banking supervision regulatory guidelines. These assets are essentially composed of loans and other securities, weighted by a measure of their respective risk:

$$RWA_t = \sum_i \omega_t^i LOANS_t^i + \sum_j \omega_t^j SECURITIES_t^j$$

where ω_t^i and ω_t^j are the corresponding (time varying) risk weights and *LOANS* denote (performing) loans (we assume that banks can exclude bad loans from the *RWA* by setting aside provisions. Therefore, for this purpose “*LOANS*” excludes bad loans). A major issue related to the introduction of *RWA* into an aggregate model is risk heterogeneity across assets (performing loans and securities). In principle, one would need to track the dynamics of a large amount of heterogeneous loans and securities, also taking into account how their risk profiles evolve over time, which is unfeasible in our stylized aggregate framework. We keep the model parsimonious by approximating

the accumulation of RWA using only information on the dynamics of total loans including bad loans and the probability of default of the private sector. We proceed as follows:

1. we track only loans to the private sector and disregard securities (which amounts to assuming that $RWA_t \propto \sum_i \omega_t^i LOANS_t^i$. A large amount of securities in Italian banks' portfolios are in fact government bonds, which receive zero risk weight. We also disregard interbank market loans, most of which are assigned a small risk weight (20%);
2. loans comprise loans to firms (F) and households (H) with risk-weights ω_t^F and ω_t^H , respectively. It is further assumed that the ratio between loans to firms and loans to households is constant. Therefore:

$$RWA_t \propto \omega LOANS_t, \quad \text{where} \quad \omega = (\omega_t^H LOANS_t^H + \omega_t^F LOANS_t^F) / LOANS_t \quad \text{and} \\ LOANS_t = LOANS_t^H + LOANS_t^F;$$
3. the definition of the stock of loans (L_t) commonly used includes bad loans, which should be excluded from the RWA , as discussed; to this end, we use the probability of default of the private sector (DP), and define: $LOANS_t = (1 - DP_t)L_t$.

Hence, risk-weighted assets are given by:

$$RWA_t \propto \omega L_t (1 - DP_t) \tag{A9}$$

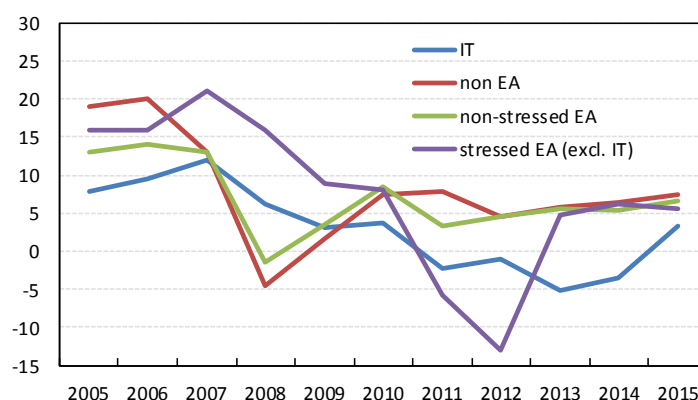
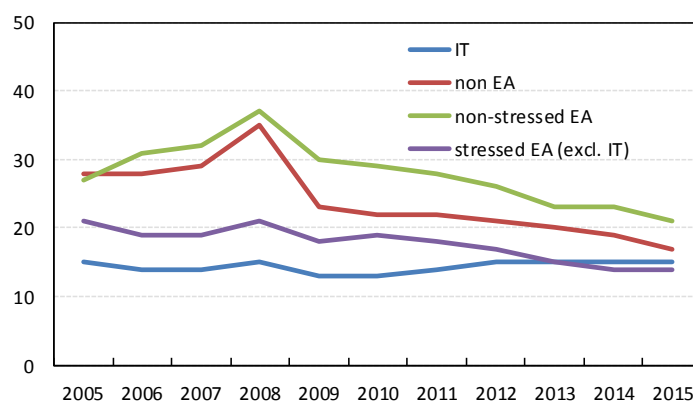
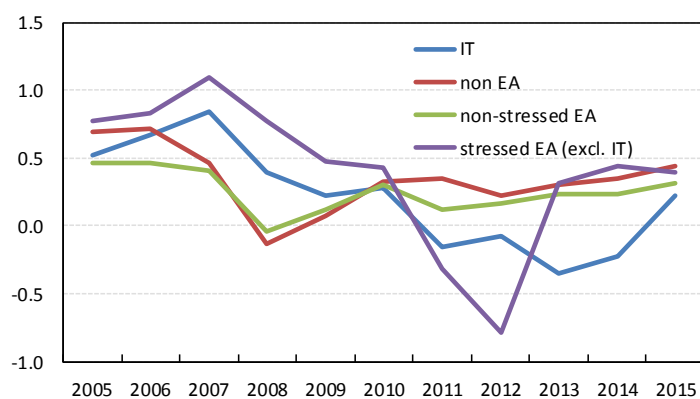
The stock of total loans grows at the rate g_t (which already takes write-offs into account):

$$L_t = (1 + g_t) L_{t-1} \tag{A10}$$

Using the equation above, one can solve (A9) for L_t as a function of RWA_t and DP_t :

$$RWA_t = RWA_{t-1} (1 + g_t) \frac{1 - DP_t}{1 - DP_{t-1}} + \varepsilon_t^{RWA} \tag{A11}$$

where g accounts for the effects of lending volumes on RWA and the growth rate of DP provides a measure of the effect of risks on RWA . The term ε_t^{RWA} is a (small) error term which accounts for the approximation we use in the law of motion of RWA .

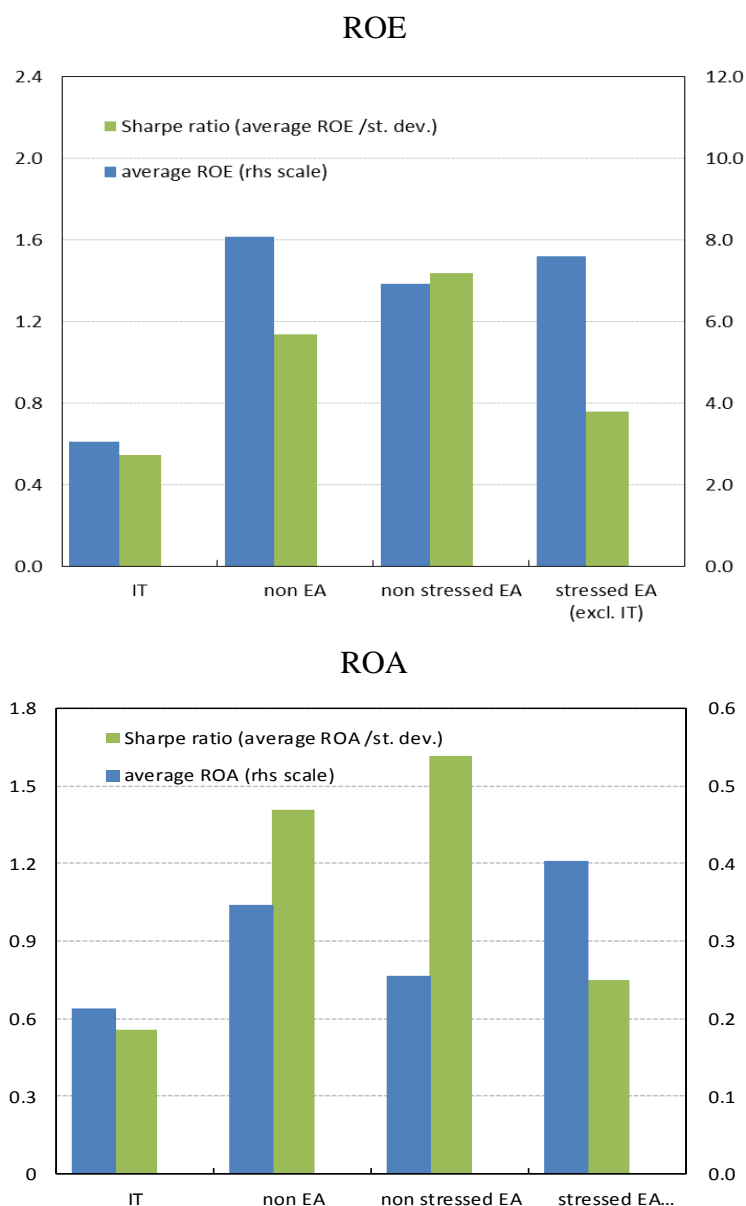
Fig. 1**Banks' profitability and leverage⁽¹⁾****a) ROE⁽²⁾****b) Total asset-to-total equity ratio****c) ROA⁽²⁾**

Source: *Bankscope BvD*

Notes: (1) Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets. (2) Ratio of net profits (excluding non-recurring items) to total equity (common equity and reserves), for ROE, and to total assets, for ROA. Percentages. Net of non-recurring items.

Fig. 2

**Banks' profitability in 2005-15:
period averages and Sharpe ratios⁽¹⁾**
(percentages)

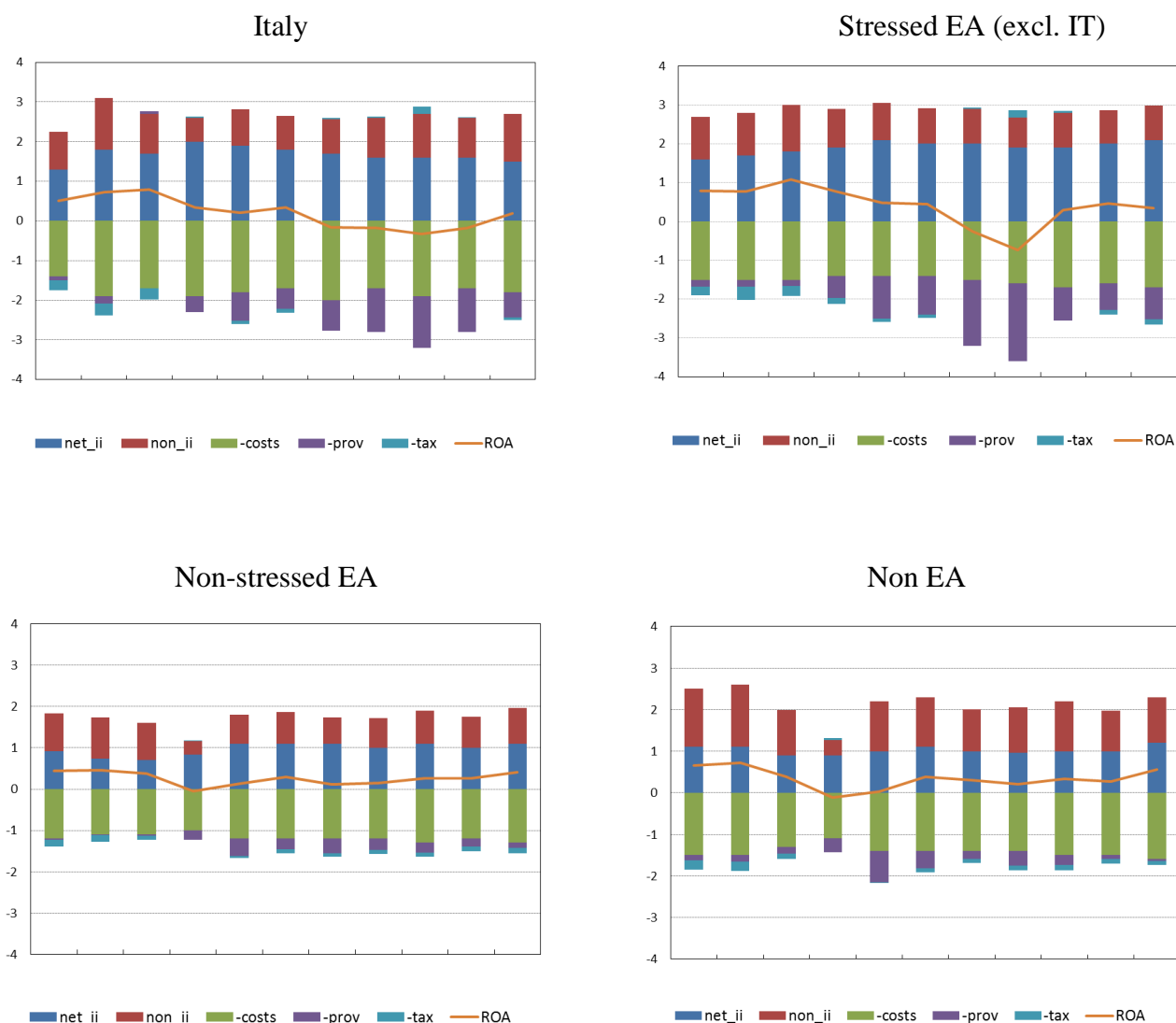


Source: *Bankscope BvD*

Notes: (1) Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets. Period averages and standard deviations computed over the years 2005-2015. ROE is the ratio of net profits (excluding non-recurring items) to total equity (common equity and reserves). The Sharpe ratio is the ratio between the period average ROE and the corresponding standard deviation. Net of non-recurring items.

Fig. 3

Decomposition of banks' ROA⁽¹⁾ (percentages)

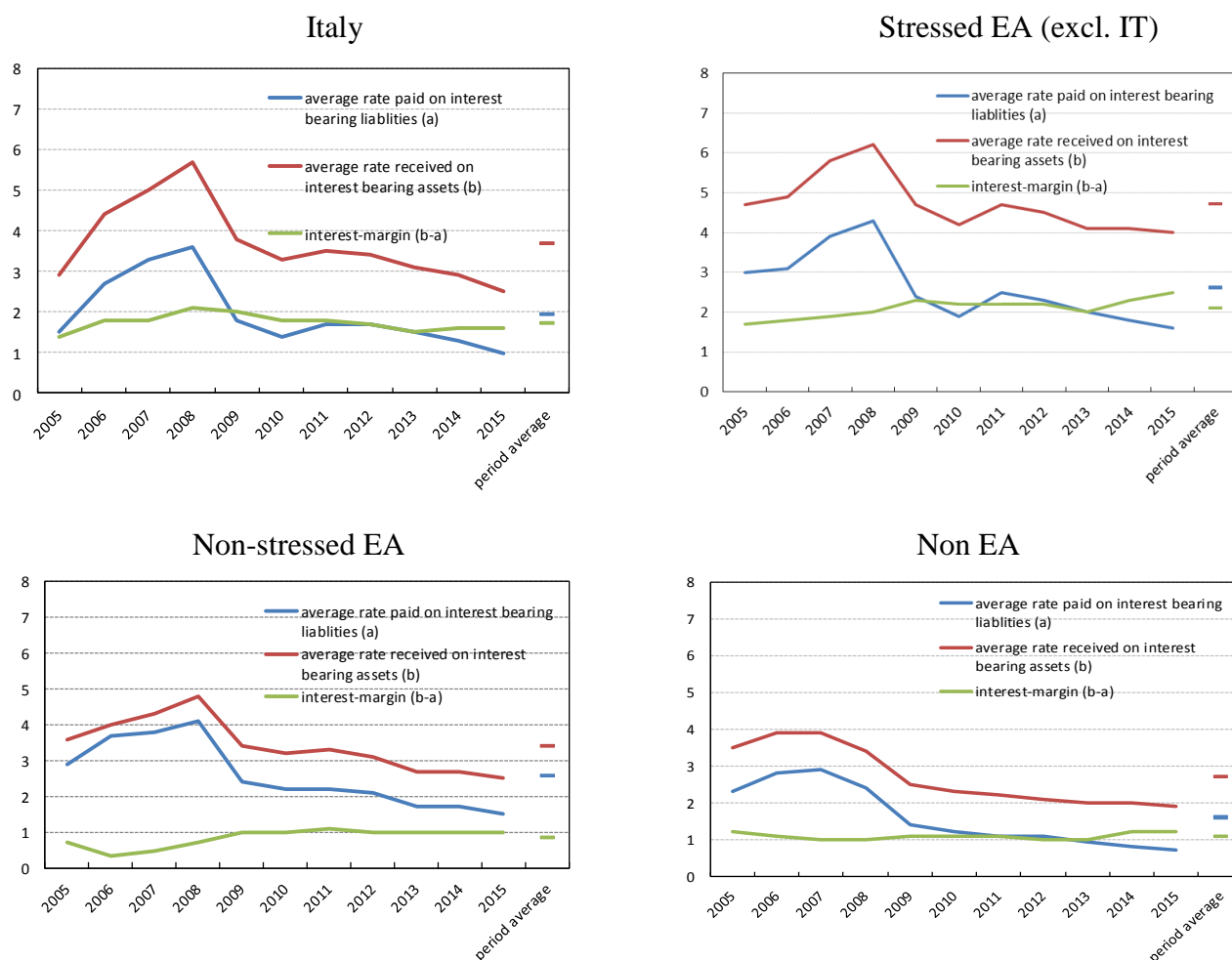


Source: *Bankscope BvD*

Notes: (1) Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets. ROA is net profits (excluding non-recurring items) to total assets. The contribution to the ROA of the different components is defined as follows: net_ii=net-interest income/total assets; non_ii=non-interest income/total assets; costs=-operating expenses/total assets; -prov=-provisions/total assets; -tax=-taxes paid/total assets. Net of non-recurring items.

Fig. 4

Rates on banks' interest-earning assets and liabilities⁽¹⁾ (percentages)

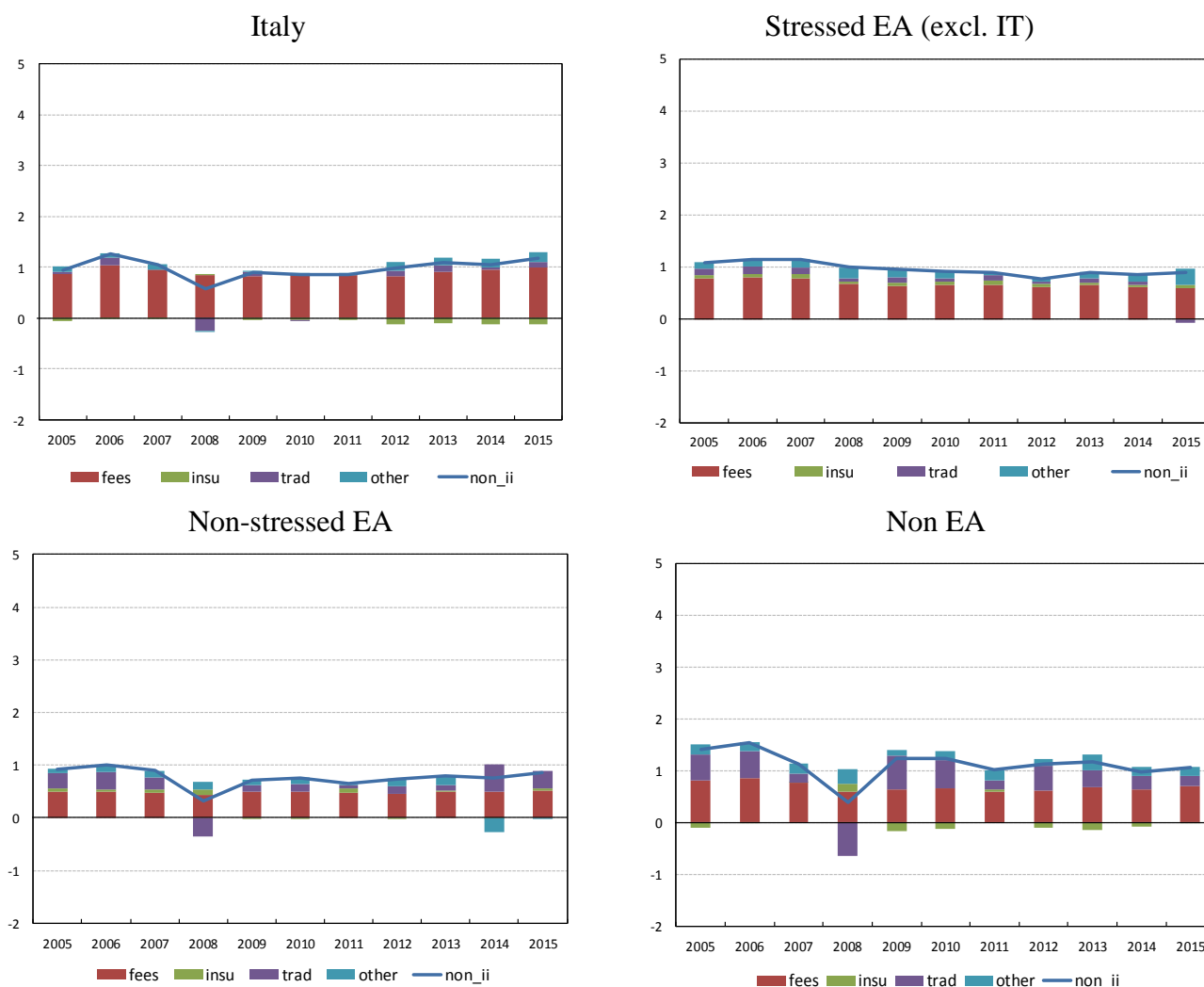


Source: *Bankscope BvD*

Notes: Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets.

Fig. 5

Decomposition of non-interest income/total assets ratio⁽¹⁾ (percentages)

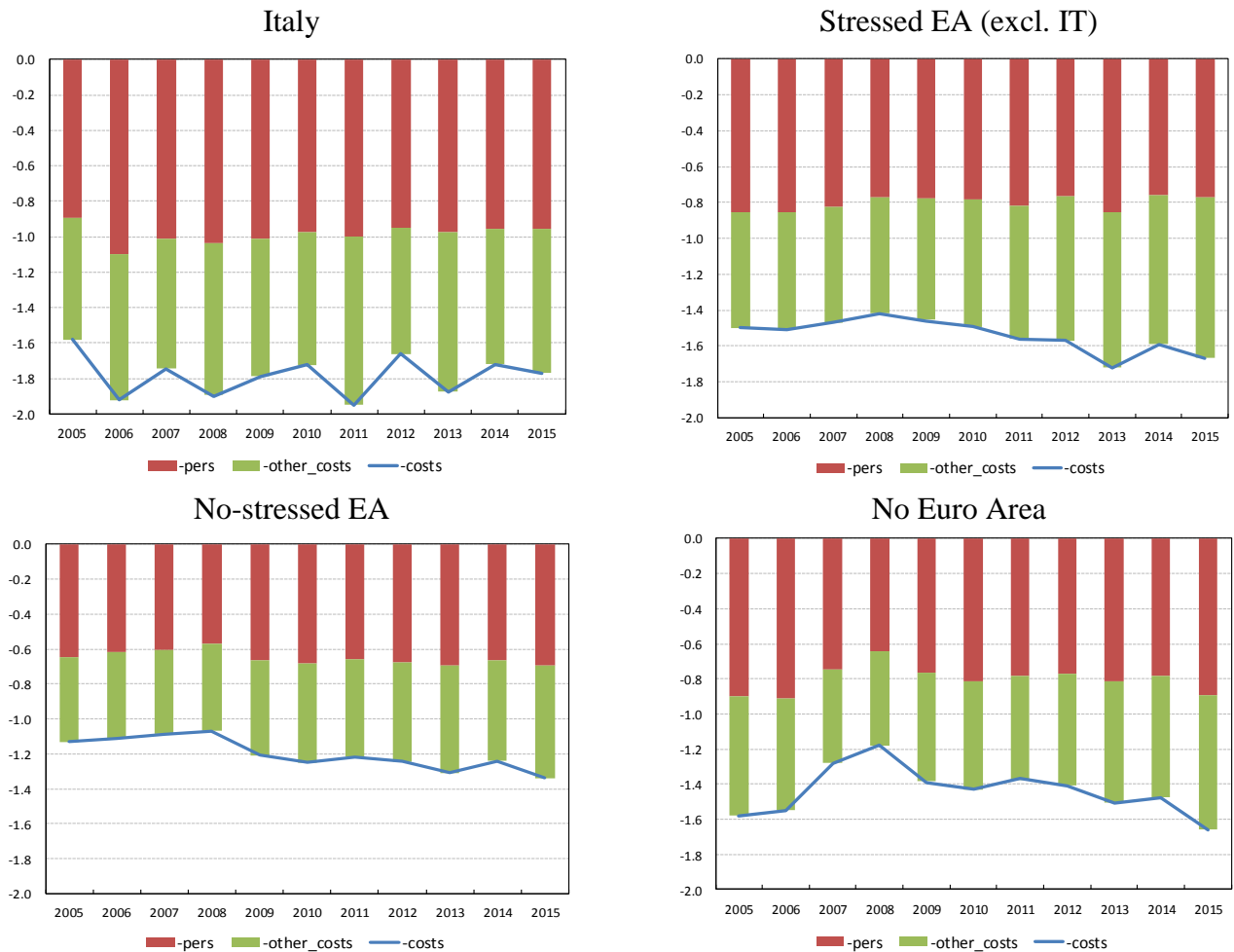


Source: *Bankscope BvD*

Notes: (1) Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets. The contribution to “non_ii” (non-interest income/total assets) of the different components is defined as follows: fees=net fees and commissions/total assets; insu=net insurance income/total assets; trad=net gains (losses) on trading/total assets; other=other operating income/total assets.

Fig. 6

Decomposition of the operating costs/total assets ratio⁽¹⁾ (percentages)

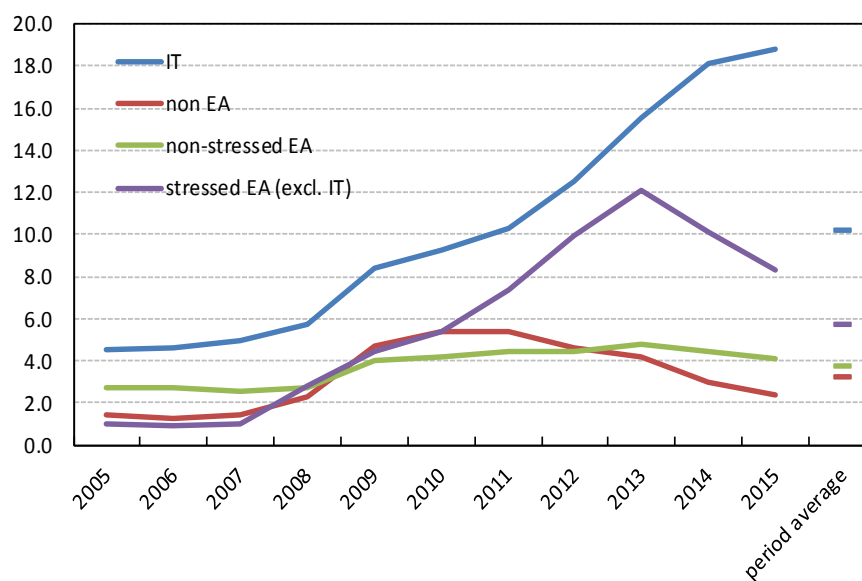


Source: *Bankscope BvD*

Notes: (1) Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets. The contribution to “-costs” (-operating expenses/total assets) of the different components is defined as follows: -pers= -personnel expenses/total assets; -other_costs=other -operating expenses/total assets.

Fig. 7

Impaired loans, as a ratio of total loans⁽²⁾
(percentages)

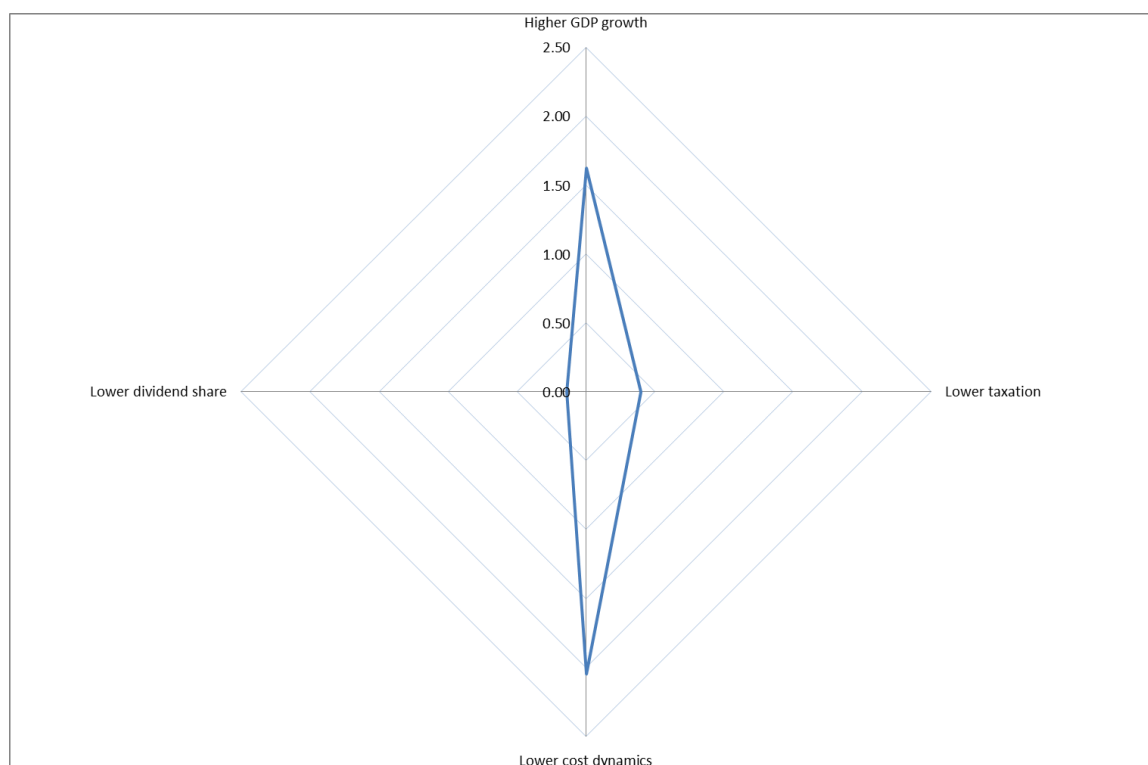


Source: *Bankscope BvD*

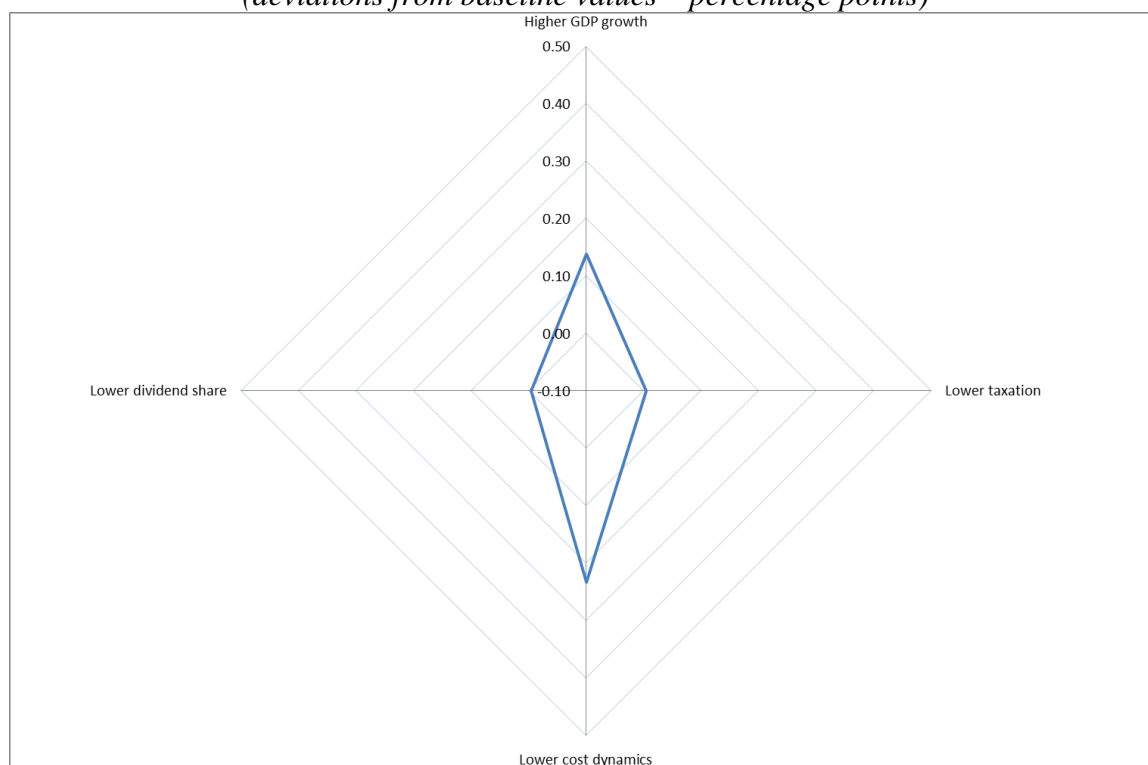
Notes: (1) Based on bank-level consolidated data for an unbalanced sample including the largest 50 banking groups in EU. Stressed euro area countries: ES, GR, IE, IT, PT; non-stressed euro area countries: AT, BE, DE, FR, NL; non euro area countries: CH, GB, SE. Weighted averages, with weights equal to total assets. (2) Based on non-harmonised data on impaired loans (total value of the loans that have a specific impairment against them).

Fig.8

a) Pre-tax profits / capital – Counterfactual simulations
(deviations from baseline values – percentage points)²⁵



b) Pre-tax profits / assets – Counterfactual simulations
(deviations from baseline values – percentage points)



²⁵ On each axis, the effect of the corresponding shock after 10 years is reported. Outcomes improve moving outwards. The sum of the values reported on each axis provides the overall effect of the combination of the four shocks on each variable.

c) Regulatory capital requirement ratio – Counterfactual simulations
(deviations from baseline values – percentage points)

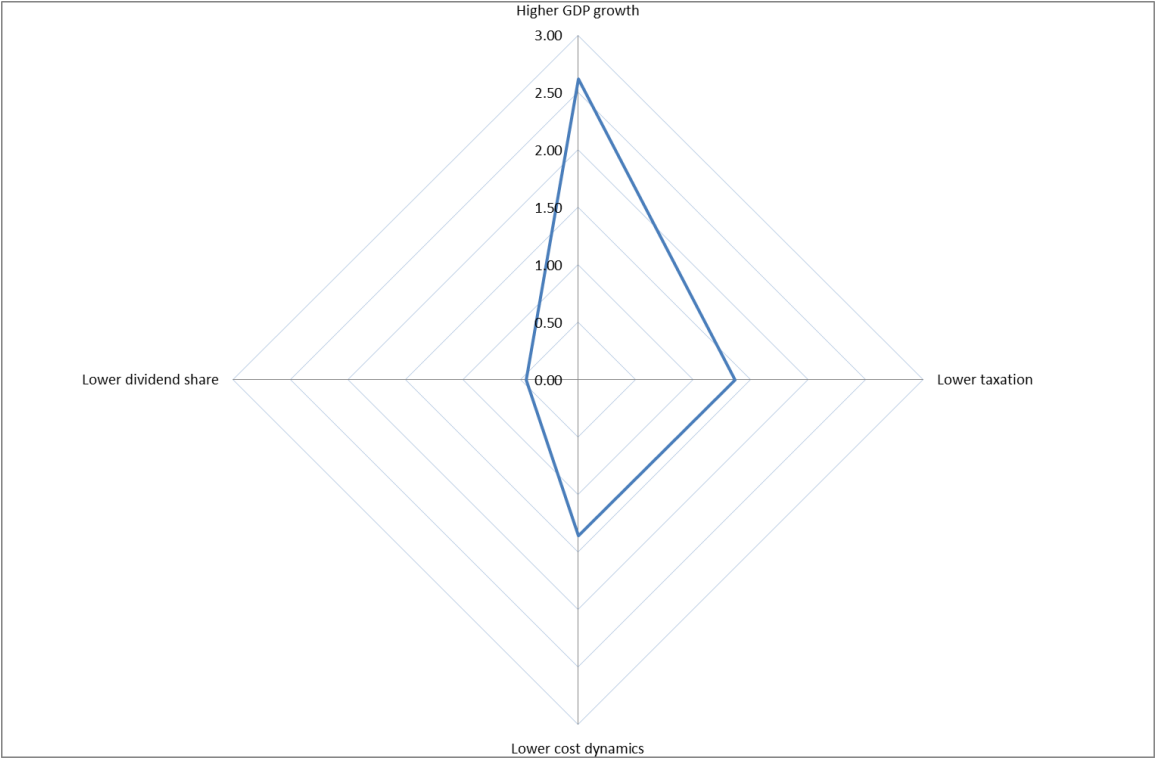
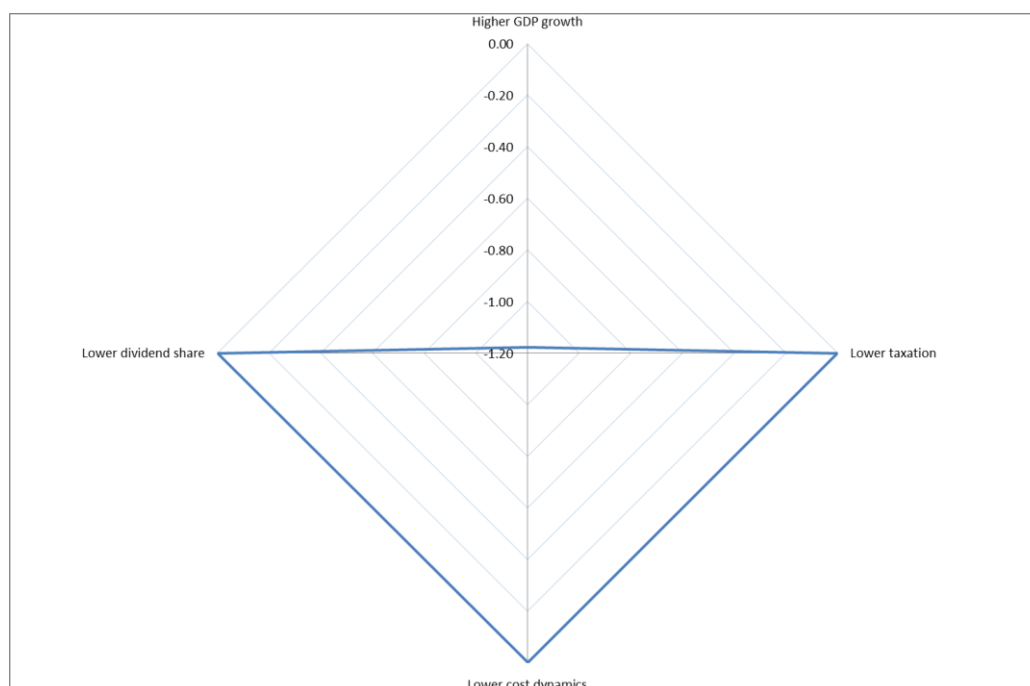


Fig.9

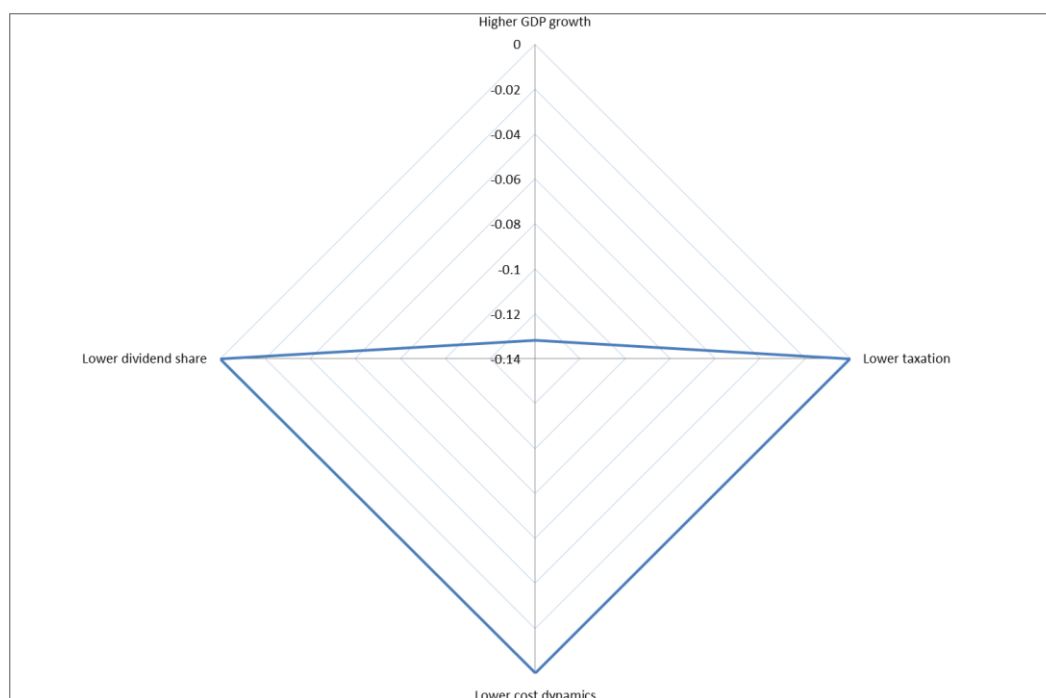
a) New bad debt ratio to total loans, net of bad debts – Counterfactual simulations

(deviations from baseline values – percentage points)²⁶



b) Bad debts/Total loans– Counterfactual simulations

(deviations from baseline values – percentage points)



²⁶ On each axis, the effect of the corresponding shock after 10 years is reported. Outcomes improve moving inwards. The sum of the values reported on each axis provides the overall effect of the combination of the four shocks on each variable.