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Interdependence between assets and liabilities in the banking system: changes in the last two decades*

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Asset and liability management is a traditional tool used by intermediaries to limit liquidity and interest rate risks. To assess how the intensity of asset-liability linkages evolved over time, Michelangeli and Piersanti (2023) build and decompose an interdependence index, which decreased between the beginning of the century and the onset of the COVID-19 pandemic and started to rise again in 2022 for both larger and smaller Italian banks.

Banks traditionally engage in maturity transformation activities, as they accept deposits with short maturities and grant long-term loans; these activities can expose financial intermediaries to interest rate and liquidity risks (Segura and Suarez, 2017; Bologna, 2018). Mitigating these risks is critical both for the soundness of individual banks and for the stability of the financial system.

Banks can mitigate these risks through the joint management of asset and liability items in the balance sheet, taking into account their maturity and sensitivity to changes in market rates. Risk mitigation strategies can be influenced by several factors, including the macroeconomic conditions in which banks operate, the monetary policy refinancing frameworks, the tax treatment of bank liabilities and the possibility of using off-balance sheet hedging instruments.

This brief analyses the evolution of asset-liability interlinkages between 2003 and the earliest month of 2023 in the Italian banking system. The indicator proposed and its decomposition may enrich the conventional monitoring tools of policymakers, especially in the light of recent increases in interest rates and the related possible changes in bank funding and lending policies.

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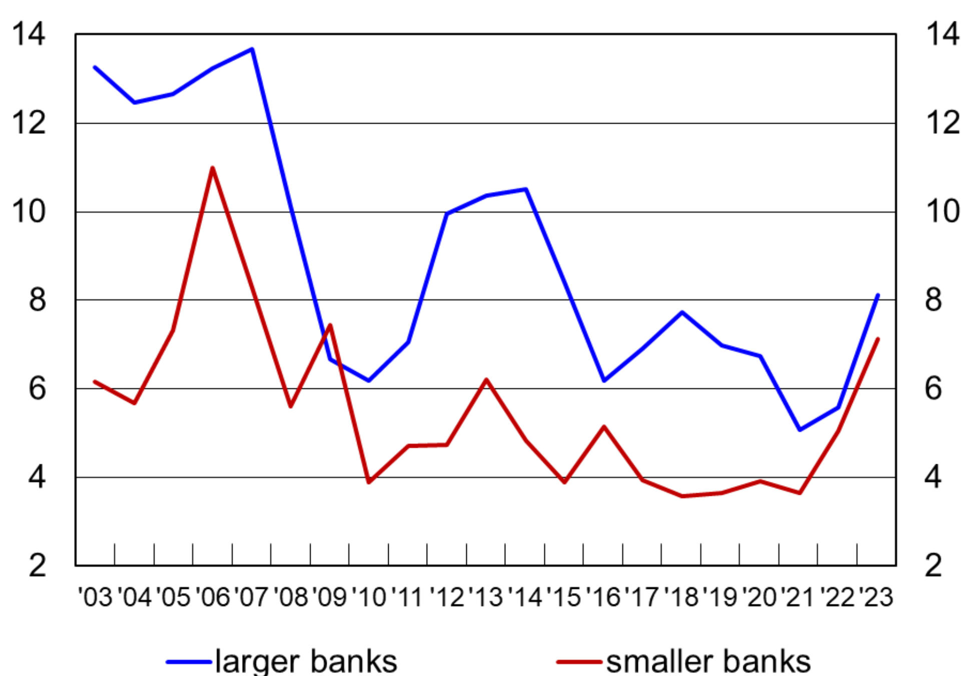
Interdependence index

To assess how Italian banks have faced the risks deriving from the misalignment of maturities, **Michelangeli and Piersanti (2023)** construct a measure of asset-liability interdependence, the *index of interdependence*, building on the work of Memmel and Schertler (2012). This measure imposes no structure on the data and makes no assumptions about the causal direction between asset and liability positions. This flexibility is essential for the analysis as different banks may adopt different policies, i.e. some banks may have a large deposit base and search for profitable lending opportunities, while others may have a large portfolio of loans and search for cheap sources of funding.

The *interdependence index* is computed as the sum of all (squared) pairwise correlations between all asset and liability positions over total assets, weighed by the average share of each balance sheet item in the bank portfolio. High values of this measure indicate a strong link between assets and liabilities, i.e. banks jointly choosing items on both sides of the balance sheet; low values instead indicate that the asset-liability interdependence is limited.

The index decreased between 2003 and 2021 for both larger and smaller intermediaries (figure 1); it started to rise again from 2022 for both size categories.

Figure 1: Bank asset-liability interdependence index for Italy (1)
(annual data; percentage values)



Notes: *Individual Balance Sheets for Italian banks (IBSI) data*.
(1) The index assumes values between zero (absence of correlation between all items) and one hundred per cent (perfect correlation, positive or negative). Larger (smaller) banks are defined as those with assets higher (lower) than the median of the sample (that excludes mutual banks). Data referring to 2023 are preliminary.

Sub-period analysis and decomposition of the *interdependence index*

In addition to the aggregate index level, it is also important to consider the links between specific balance sheet items (for example, between deposits and purchased securities) that contribute the most to the index dynamics and the sign of the related correlations. Moreover, the analysis by sub-periods shows some differences between larger and smaller banks.

In the period 2003-07 the degree of interdependence between the composition of assets and liabilities was high for both categories of banks and mainly reflected the propensity of intermediaries with a higher share of bond funding (and therefore with a lower share of deposits) to hold a higher share of medium- to long-term loans, mostly to businesses, other than residential mortgages (green and yellow bars; figure 2, panels a and b). In a period of relatively high yields, bank bonds represented an attractive form of investment for households and at the same time guaranteed a stable source of funding for the banking system. On the other hand, large shares of sight deposits were associated with greater investments in securities, including government ones, and with the granting of residential mortgages to households (grey and orange bars). Securities and mortgages are activities mainly at fixed rates, unlike loans to non-financial corporations. This evidence is consistent with asset-liability management practices since sight deposits, whose effective maturity is longer than the contractual one and interest rate is not very sensitive to market rates, allow intermediaries to hedge, at least in part, against interest rate risk associated with medium- to long-term fixed-rate assets (Drechsler et al., 2021).[1]

The reduction in the interdependence index in the years between the global financial crisis and the sovereign debt crisis (2008-11) reflected, in particular, the decrease in the absolute value of the bilateral correlations between the deposits and three main asset categories (purchased securities, medium-long term loans and residential mortgages). Furthermore, larger banks used off-balance sheet derivative instruments to manage, at least in part, the risks associated with the transformation of maturities, a result in line with DeYoung and Yom (2008).

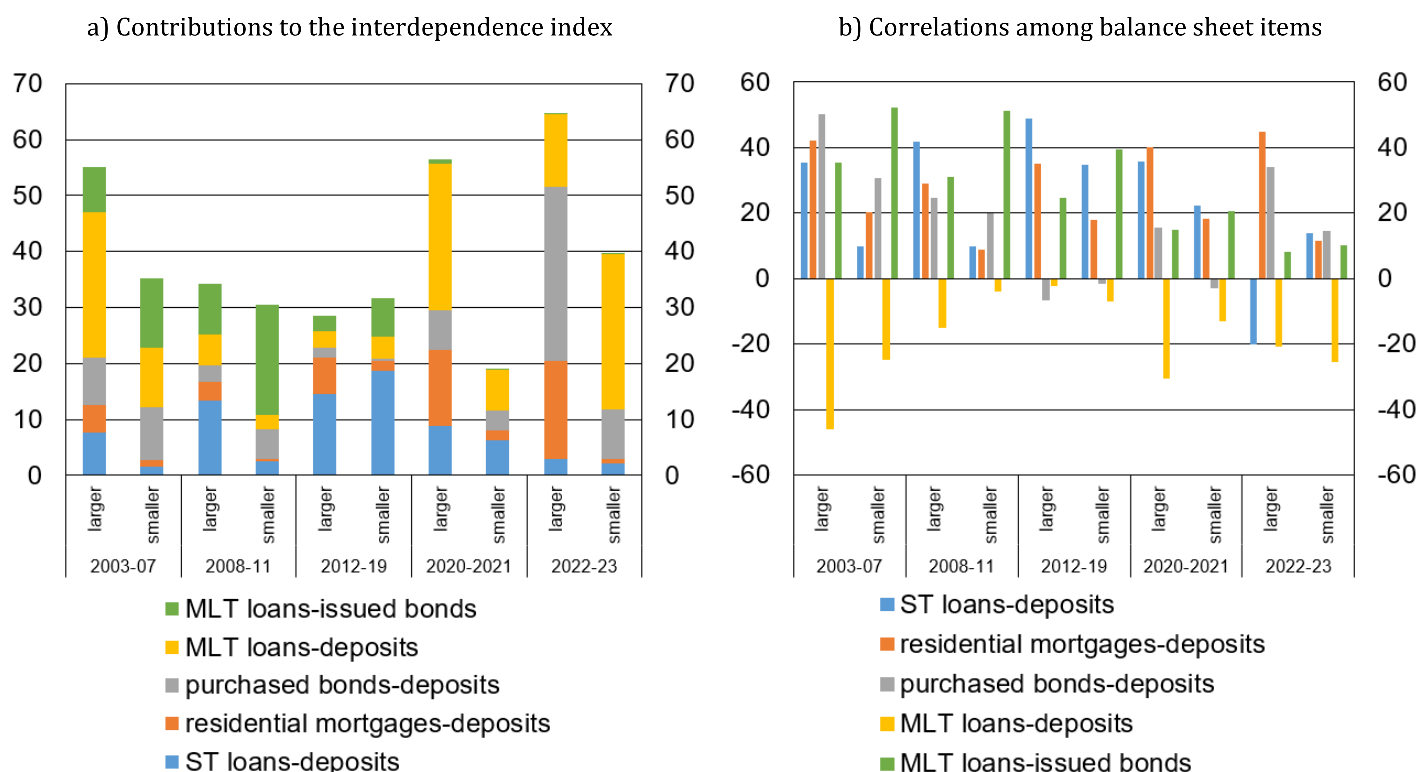
In the 2012-19 period, the interconnections between balance sheet items were affected by the increase in the taxation of bank bond yields, which began in 2012 and led subscribers to replace maturing securities with deposits (Carletti et al., 2021). The reduction in the share of bonds issued by banks was not associated with a corresponding decline in the share of medium- to long-term loans, leading to a decrease in the correlation between these items. The changes in the macroeconomic scenario also had an impact. The high availability of liquidity granted by the Eurosystem (Bank of Italy, 2012) and the expectations regarding the continuation of an expansionary monetary policy led to a lower need for intermediaries to hedge against interest rate and liquidity risks through the joint management of balance sheet items. A moderate decrease can be observed, on average, in the values of the correlations between the balance sheet items (figure 2, panel b).

In the 2020-21 period, the index remained at low values. Medium- to long-term loans, although growing in terms of amount, remained practically unchanged as a share of total assets, due to the expansion of bank balance sheets connected with the extensive recourse to refinancing of the Eurosystem. In response to the higher uncertainty associated with the Covid-19 crisis and the more limited spending opportunities due to the lockdowns, deposits, as well as their weight in the balance sheet, increased. On the asset side, the share of securities, which are more readily purchasable, raised more than that of loans, and the correlation between deposits and securities (both as a ratio to total assets) increased.

Since 2022 the index has been increasing. This pattern is primarily associated with a stronger relationship between deposits and purchased securities. Against a backdrop of tighter monetary policy, banks whose share of deposits declined also experienced a drop in securities holdings. The uncertainty connected with the macroeconomic scenario and the expectations of a rise in interest rates therefore seem to have pushed intermediaries towards a closer joint management of balance sheet assets and liabilities.

[1] It should be noted that in stressful situations these relationships may not apply to individual intermediaries.

Figure 2: Main relationships between asset and liability items in bank balance sheets (1)
(percentage values)



Notes: *Individual Balance Sheets for Italian banks (IBSI) data*.
(1) "ST loans" refer to short-term loans (with a duration of less than one year) mainly aimed at businesses and households, with "MLT loans" to medium-to long-term loans (other than residential mortgages). – (2) The individual colored segments in the vertical bars indicate that the specific relationship explains a certain fraction of the overall value of the index; the difference from 100 is attributable to unrepresented minor relationships.

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