Box 3

PROBABILITY OF DEFAULT IN BANK LENDING TO FIRMS: RECENT DEVELOPMENTS

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This box discusses developments in the probability of default (PD) of Spanish banks' lending to non-financial corporations (NFCs). It uses information from the Central Credit Register (CCR) on the PDs reported by banks that use the internal ratings-based (IRB) approach to calculate their risk-weights. Specifically, each month banks report the PD of their corporate borrowers to the CCR.

Using this information, each firm's average quarterly PD was calculated as the average of the PDs assigned to it by each lender, weighted by the size of each bank's exposure to the firm.[1] Likewise, the average PD for all firms with bank loans[2] is calculated as the average PD of each firm,[3] weighted by each borrower's share of the debt. Based on this indicator, since mid-2022 PD has steadily declined

from 5.7% to 4.1% for NFCs overall (Chart 1). By firm size, PD has decreased across the board, although the decline is less pronounced among microenterprises, whose PD was 187 basis points higher than the NFC average in 2024 Q3.

The change in the corporate sector's average PD between two points in time, t = 0 and t = 1, depends on how the PD of firms with loans in both periods ("fixed firms") performs and on the PD of new borrowers ("incoming firms") and of those that cease to be borrowers ("outgoing firms"). Therefore, the change in average PD between two points in time can be broken down into four factors based on the lending dynamics and credit quality of these types of firms (see the methodological annex for more details on the calculations):

Chart 1
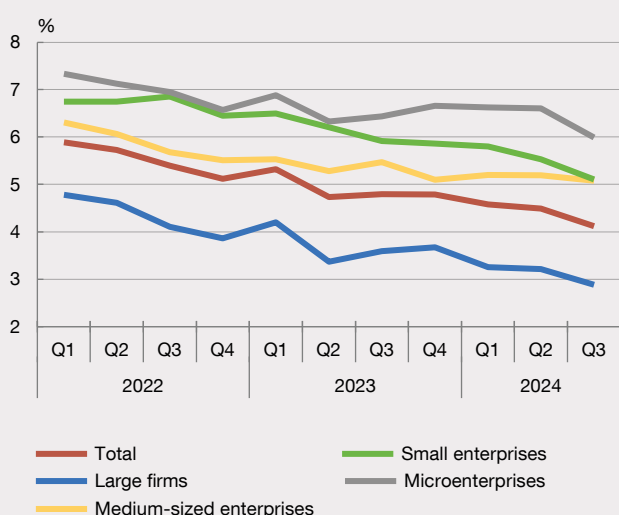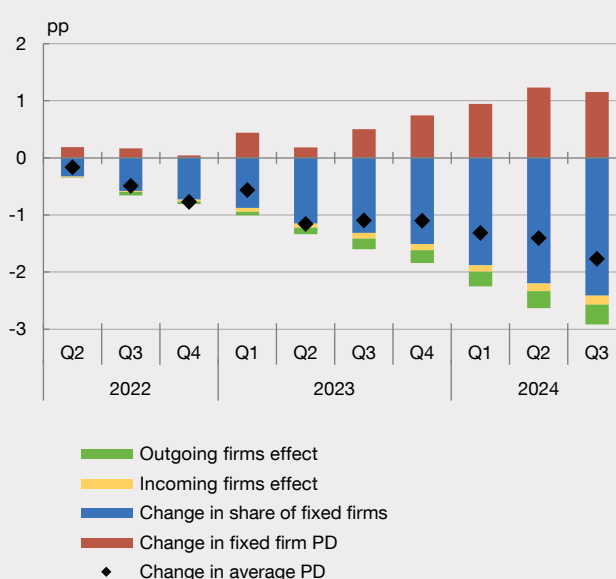Average PD of bank lending to NFCs, by firm size (a)

Chart 2
Contributions to the cumulative change in the average PD of lending to NFCs (b)

SOURCE: Banco de España.

a Average of the PDs estimated by each lender for each NFC, weighted by share of lending. Excluding write-offs. Where there is no information on PD, firms are assigned their average PD according to the other banks or, where that is not possible, they are imputed the average PD of similar-sized firms from the same sector (NACE Rev. 2 division level).

b Fixed firms are those which are borrowers in t = 0 and t = 1. Their contribution to the change in PD is split between the effect of the change in their debt and the effect of the change in their PD. Incoming firms effect and outgoing firms effect reflect the difference between the average PD of incoming firms (new borrowers) and outgoing firms (those which have paid off their debt), respectively, and that of fixed firms, using the weightings described in the methodological annex for each group.

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1   Excluding write-offs.

2   Where there is no PD information for a firm from a specific bank because it does not use the IRB approach, the average PD from the other banks is taken.

3   Where there is no information on the PD of a firm, it is imputed the average PD of similar-sized firms from the same sector (NACE Rev. 2 division level).

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1   "Change in fixed firm PD" reflects how the average PD would have changed in the absence of incoming and outgoing firms, with each borrower's share of the debt remaining stable.

2   "Change in the share of fixed firms" reflects the change in the weight of firms that remain borrowers in t = 1.

3   "Incoming firms effect" reflects the effect of the average PD of new borrowers compared with that of borrowers in the previous quarter.

4   "Outgoing firms effect" reflects the effect of the average PD of the firms that no longer have bank debt, typically because they have paid it off.

Based on this breakdown, the decline in the average PD of NFCs overall since early 2022 is mainly explained by the change in the composition of the stock of lending. Thus, over the period under review, firms with lower PDs have accounted for a growing share of the stock of lending, especially those with an existing credit relationship, but also, albeit to a lesser extent, those previously without one. Specifically, the change in the share of fixed firms has contributed to a decline in PD of 2.4 percentage points (pp) between early 2022 and 2024 Q3 (Chart 2). Working in the same direction are firms that paid off their bank debt (outgoing firms effect, -0.3 pp), which had a higher than average PD, and new borrowers (incoming firms effect, -0.2 pp), which have a lower PD than existing borrowers. These developments have offset the deterioration in the PD of the stock of loans that would have arisen had the debt and borrower structure remained unchanged (change in fixed firm PD, 1.1 pp).

Methodological annex

The change in average PD between t = 1 and t = 0 can be broken down into the following factors:

$$PD_1 - PD_0 \underbrace{= \underbrace{\left(PD_1^F - PD_0^F\right)}_{\text{Fixed firms}} + \underbrace{\left(PD_1 - PD_1^F\right)}_{\text{Incoming}} - \underbrace{\left(PD_0 - PD_0^F\right)}_{\text{Outgoing}}}_{\text{Change in the share of fixed firms + Change in fixed firm PD}}$$

where

— $PD_t = \Sigma_i\, PD_{it}\, w_{it}$ is the average PD in t, PD_{it} is the PD of firm i in period t and w_{it} is firm i's share of total loans in period t.

— $PD_t^F = \Sigma_{i \in F}\, PD_{it}\, w_{it}^F$ is the average PD in t of fixed firms F, $\Sigma_{i \in F}$ () is a summation solely for fixed firms and w_{it}^F is fixed firm i's share of total fixed firm loans in period t.

Therefore, the change in average PD between t = 0 and t = 1 can be broken down into four factors based on corporate dynamics:

1   "Change in fixed firm PD" is calculated as the weighted sum of the changes in PD for fixed firms in both periods (t = 0 and t = 1), weighted by their share of fixed firm debt in period t = 0.

   Change in fixed firm PD = $\Sigma_{i \in F}\, (PD_{i1} - PD_{i0})\, w_{i0}^F$ [1]

   where

   — $\Sigma_{i \in F}$ () is a summation only for fixed firms.

2   The contribution of "change in the share of fixed firms" is calculated as the weighted sum of the change in the shares of each firm, multiplied by the PD of each firm in t = 1.

   Change in the share of fixed firms = $\Sigma_{i \in F}\, (w_{i1}^F - w_{i0}^F)\, PD_{i1}$ [2]

   Note that $PD_1^F - PD_0^F = \Sigma_{i \in F}\, (PD_{i1}\, w_{i1}^F - PD_{i0}\, w_{i0}^F)$ and, therefore, $PD_1^F - PD_0^F = \Sigma_{i \in F}\, (PD_{i1} - PD_{i0})\, w_{i0}^F + \Sigma_{i \in F}\, (w_{i1}^F - w_{i0}^F)\, PD_{i1} = [1] + [2]$.

3   The contribution of "incoming firms effect" is equal to the difference between the average PD of incoming firms and that of fixed firms in t = 1, multiplied by the share of incoming firms' debt in total lending in t = 1.

   Incoming firms effect = $PD_1 - PD_1^F = (1 - \theta_1)\, (PD_1^E - PD_1^F)$ [3]

   where

   — $PD_1^E = \Sigma_{i \in E}\, PD_{i1}\, w_{i1}^E$ is the average PD in t = 1 of incoming firms E, $\Sigma_{i \in E}$ () is a summation only for incoming firms and w_{i1}^E is incoming firm i's share of total incoming firm loans.

   — θ_1 is the proportion of lending to fixed firms in t = 1. Therefore, $(1 - \theta_1)$ is the proportion of lending to incoming firms in t = 1.

4   The contribution of "outgoing firms effect" is calculated as the difference between the average PD of the firms that were only borrowers in t = 0 and the average PD of the fixed firms in the same period, weighted by outgoing firms' share of total bank lending in t = 0.

   Outgoing firms effect = $PD_0 - PD_0^F = (1 - \theta_0)\, (PD_0^S - PD_0^F)$ [4]

   where

   — $PD_0^S = \Sigma_{i \in S}\, PD_{i0}\, w_{i0}^S$ is the PD in t = 0 of outgoing firms S (those which no longer have bank debt in

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$t = 1$), $\Sigma_{i \in S}()$ is a summation only for outgoing firms and w_{i0}^S is outgoing firm i's share of total outgoing firm loans.

— θ_0 is the proportion of lending to fixed firms in $t = 0$. Therefore, $(1 - \theta_0)$ is the share of lending in $t = 0$ to firms that no longer have debt in $t = 1$.

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