Down payment and indebtedness ratios: how French banks limit their mortgage risks

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French banks habitually use indebtedness ratios when they grant mortgages to households. In France, this policy is not driven by regulatory constraints but allows banks to avoid excessive risk-taking. This issue of Rue de la Banque *assesses the effectiveness of these down payment and indebtedness ratios as tools to contain portfolio credit risk.*

Prudential limits on loan-to-value ratios (LTV, or the ratio of a loan to the value of an asset purchased), and on the debt-service-to-income ratios (DSTI, or the ratio of borrowers' debt repayments to disposable income) contribute to financial stability by keeping credit supply and house price growth in check. According to recent studies (ECB, 2014), some countries, such as Sweden, the Netherlands, New Zealand, Hong Kong and Singapore, which have put in place such limits since the 2008-2009 crisis, appear to have achieved positive results.

Such caps are also likely to influence banks' risk management. Preventing excessive risk-taking on housing loans and the concentration of these risks on weaker borrowers limits, in the event of a macroeconomic shock on borrowers' income and house prices, the increase in "unexpected losses", i.e. extreme losses that exceed current provisions. From the lenders' perspective, this *Rue de la Banque* analyses the effectiveness of DSTI and LTV caps in mitigating bank risk.

In France, strictly speaking, there are no regulatory caps on DSTI and LTV. Nevertheless, French banks use an implicit rule whereby debt repayments must not exceed a third of the borrower's disposable income. In France, like in many other countries, we observed an easing of credit standards in the 2000s and up to the crisis. However, contrary to that which was observed in other countries, this easing, which occurred against the backdrop of rising

house prices, was not accompanied by a spectacular increase in mortgage defaults, as stressed by the IMF (2013). Could banks, thanks to their management of LTV and DSTI ratios at the loan's origination, prevent greater losses in the event of a shock and thus ensure their own stability?

To answer this question, we determine whether risks are concentrated among groups of borrowers characterised by high LTV and DSTI ratios by using a methodology consisting in measuring the economic capital required to cover the unexpected losses (Dietsch and Welter-Nicol, 2014). The study is therefore based on applying this methodology to a database of around 850,000 individual housing loans taken out in the 2000s, covering the entire spectrum of mortgage borrowers, ranging from the least to the most creditworthy. The database provides information not only about the characteristics of the loans (amount, maturity, type of interest rate, type of loans, regulated or not, LTV and DSTI ratios) but also about those of the borrowers (age, marital status, profession, rating) and allows us to identify default events (overdue payments of at least three months under Basel II). The study focuses on housing loans financing main residence ownership (excluding revolving loans, loans for home improvements and loans for rental investment).

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1 At the time this study was carried out. Mr Dietsch is also a professor at Strasbourg University.

The easing of credit standards did not lead to a rise in borrower defaults

With the spectacular increase in lending and household indebtedness, against the backdrop of rising house prices, LTV and DSTI ratios at the loan's origination went up in the 2000s. For instance, the average LTV ratio rose from 76% at the start of the 2000s to around 81% at the time of the crisis, before stabilising at this level after the crisis. For its part, the average DSTI ratio rose sharply between the start of the 2000s and the crisis, from 27.8% to 31.6%, before falling subsequently (ACPR, 2015). Consequently, household debt burdens tended to increase sharply up to 2008, before stabilising.

However, despite the easing of credit standards, the default rate on home loans did not rocket during the crisis, even though it rose sharply for the least creditworthy borrowers at that date (see Chart).

Banks use a combination of two ratios

Table 1 presents the average characteristics of loans according to the values of the LTV and DSTI ratios. It shows the interactions between the two ratios.

In the highest LTV tranche, the average DSTI ratio decreases, with the share of borrowers with the highest levels of DSTI being the lowest. Symmetrically, in the highest DSTI tranche, the proportion of borrowers with a LTV ratio of over 100% is lower only in the second last tranche. Consequently, the DSTI ratio, the amount, the maturity and the proportion of variable-rate loans tend

Average annual default rates during the 2000s by risk class

(%)

Source : Authors' calculations.

to increase in line with the level of LTV when the latter remains below 100%, before decreasing significantly in the LTV tranche above 100%.

Thus, lenders seem to assign high LTV values only if they can ensure low DSTI values and the same observation applies to DSTI ratio values, since in the highest DSTI tranche, the average level of the LTV ratio tends to be lower. Borrowers in the LTV and DSTI tranches close to the respective thresholds of 100 and 33% appear to face greater credit constraints.

An analysis of the borrowers individual characteristics on the basis of whether they belong to high tranches of both LTV and DSTI ratios shows that borrowers in the higher tranches of these ratios differ from the others in terms of their age (less young), their marital status (in a couple), their personal savings (hold financial assets) and their socio-professional categories (executives or independent professions), all characteristics that reflect the lower financial constraints, even if the prices of the properties purchased are higher.

The combination of LTV and DSTI ratios allows banks to contain portfolio credit risk

In order to determine the effectiveness of caps in containing portfolio credit risk, the study assesses the amount of the total economic capital[1] required to cover "unexpected losses", then assigns this amount to the portfolio segments defined using the LTV and DSTI tranches.

Borrowers in the different tranches are therefore assumed to be subject to risk factors specific to their tranche and not to a single macroeconomic factor. If the borrowers – in particular those in the high tranches of the ratios – share a high sensitivity to these factors, the adverse realisations of the latter are likely to generate risk concentration effects within the tranche. For their part, the correlations between the factors specific to the different tranches may increase concentration effects or, conversely, foster portfolio diversification effects if the factors are weakly or negatively correlated.

Table 2 summarises the results of these estimates in the form of capital requirement ratios (as a ratio of outstanding loans) associated with the different tranches. The first column gives the results of the "multifactor" economic

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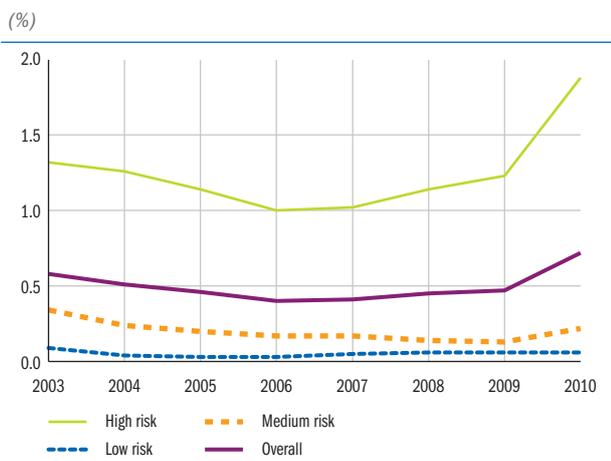
1 *Economic capital is defined as the difference between the extreme losses measured at the 99.9% threshold (or value-at-risk) and the average losses covered by provisions.*

T1 Average characteristics of loan according to their LTV and DSTI ratios

(ratios and share in %, amount in euros and maturity in years)

	LTV ratio	DSTI ratio	Amount	Maturity	Share of fixed rate	Share in population
LTV < 70%	43.89	20.21	70 264	16.0	75.0	37.4
70% ≤ LTV < 95%	80.90	25.78	94 523	19.4	62.8	35.0
95% ≤ LTV < 100%	98.25	29.83	133 734	23.6	41.1	8.7
100% ≤ LTV	103.83	27.69	116 426	21.1	65.3	18.9
DSTI ≤ 25%	62.40	12.94	66 054	16.7	76.4	41.9
25% < DSTI ≤ 33%	79.59	29.41	106 097	20.2	53.6	44.5
33% < DSTI ≤ 36%	84.70	34.19	129 045	22.2	67.7	7.6
36% < DSTI	81.82	44.46	138 749	18.9	82.0	5.9

Source : Bank data and authors' calculations.

model assigning one factor to each tranche. The second column presents those of the standard "single factor' model that assumes that all borrowers are subject to a general single factor and lastly, the third shows those of the regulatory capital model (based on the Basel II IRB approach). First, the results of the multifactor model (first column) show that the risk is indeed the lowest in the lowest tranches of the ratios and they confirm that the relationship between changes in risk and the LTV and DSTI ratios is not monotonic. The capital ratio associated with the tranches over the thresholds is lower than that of the tranches close to (but below) the same thresholds. It is therefore the latter that contributes the most to the future potential portfolio losses. The portfolio risk therefore appears to be well contained by banks when they recognise ratio values above the implicit thresholds.

Second, the risk measured by the "multifactor" model is always lower than that measured by the "single-factor" model, as the latter does not take account of the risk reduction possibilities associated with the two factors:

a low sensitivity common to the risk of the borrowers in each tranche (low correlations between borrowers) and diversification possibilities linked to the (low) correlations between tranches. The comparison of the capital ratios on each line shows that due to these factors, the capital required is much lower in the case of the "multifactor" model. Consequently, the total portfolio risk measured on each "total" line by the average of the ratios of the tranches weighted by their share in the portfolio is considerably lower if we take account of the borrowers' heterogeneity.

Lastly, regulatory capital requirements (Column 3) easily allow unexpected losses to be absorbed, irrespective of LTV and DSTI levels.

All in all, in the absence of any regulatory constraint, banks appear to be able to effectively use LTV and DSTI ratios to avoid excessive risk-taking. Knowledge of customers and the risk factors associated with their characteristics make it possible to maintain portfolio credit risk at a sustainable level.

T2 Comparison of annual capital ratios by par LTV and DSTI tranche

(%)

	Economic capital ratio Multifactor model	Economic capital ratio Single factor model	Regulatory capital ratio Basel 2 IRB approach	Share of borrowers in the whole portfolio
LTV < 70%	0.06	0.72	1.33	37.4
70% ≤ LTV < 95%	0.21	0.74	1.81	35.0
95% ≤ LTV < 100%	0.50	1.38	2.48	8.7
100% ≤ LTV	0.36	1.23	2.02	18.9
Total	**0.21**			**100.0**
DTI ≤ 25%	0.09	0.89	1.91	41.9
25% < DTI ≤ 33%	0.28	1.04	2.42	44.5
33% < DTI ≤ 36%	0.29	1.13	2.32	7.6
36% < DTI	0.25	0.95	1.47	6.0
Total	**0.20**			**100.0**

Source : Bank data and authors' calculations.

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