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Recovery Rates Determinants: Evidence from the Italian Leasing Market

by
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5.1 Introduction

This chapter analyses the variables affecting recovery rates on defaulted financial leases. Available empirical analyses on recovery rates are:

a. in a limited number;
b. more focused on bonds than on bank loans and pay no attention to the lending activity of other financial institutions,
c. highly simplified in terms of explanatory variables;
d. focused on time series analyses rather than on cross sectional evidence;
e. mainly based on U.S. markets data.

Financial leasing, also known as full pay-out leasing, is non-cancelable over a period which enables the lessor to amortize the invested capital and to get some profit: it is a financial facility. The legal title of ownership of the asset belongs to the leasing company for the entire leasing period, so that it represents a peculiar credit risk mitigation factor, intrinsic to this lending technique. Lessors are used to paying great importance to the risk profile of such physical «collateral» of their operations.

The separation of PD (probability of default) and LGD (loss given default) profiles is a long-standing principle of risk assessment in the leasing sector, where it is common to distinguish borrower-risk from asset-risk; as a consequence, top-down analyses of recovery rates based on a few variables tend to conflict with day-by-day management processes and there is a clear need for more detailed empirical analysis.

From the capital regulation point of view, while leasing markets represent a very important segment of the financial system in many developed countries (in Europe leasing finances about 10% of overall investments), in the Consultative Document of January 2001, which analytically describes The New Basel Capital Accord, leasing is cited only three times, incidentally and without any refer-

ence to its specificity[1]. Moreover, physical collaterals are taken into account in the Document for capital adequacy purposes in the Advanced Internal Rating Approach. They are not considered in both the Standardized Approach and in the Foundation IRB Approach, with the sole exception of residential and commercial property. Probably as a consequence of the numerous feed-backs received (e.g. ABN AMRO, 2001; De Laurentis and Geranio, 2001, French Banking Federation, 2001; Swedish Banker Association, 2001), in the Consultative Paper n. 3 of April 2002 leases other than those that expose the bank to residual value risk are accorded in the Foundation IRB Approach the same treatment as the loans collateralized by the same type of collateral, that is with the minimum LGD of 35% for commercial and residential real estates and of 40% for other physical collaterals (Basel Committee on Banking Supervision, 2003).

This study is based on data collected in a research edited by Alessandro Carretta and Giacomo De Laurentis for Assilea (the Italian Association of Leasing Companies). The empirical sample includes 1,118 leases written off by 6 primary Italian lessors in the year 2000. The analysis is performed in order to evaluate the foundations of leasing managerial practices concerning the asset-risk profile as well as to verify the sustainability of the Basel Committee position on leasing. The study analyses:

a. the absolute and relative (to other mitigation tools) contribution of the leased asset to recovery rates;
b. the factors affecting the level of recovery rates;
c. the relative contribution of variables in the explanation of the cross-sectional variability of asset-based recovery rates.

A comprehensive methodology for recovery performance assessment in leasing contracts is a by-product. The chapter is structured as follows. A review of the literature is presented in section 2. Section 3 outlines the research methodology. Section 4 specifies data sources and sample characteristics. Section 5 presents empirical results and section 6 draws the conclusions. Results concerning point *a* indicate that the bulk of recovery rates come from the leased assets sale to third parties or to lessees. In the real estate segment it leads to very high and stable recovery rates. Results also indicate that time lags on bank loans recoveries surveyed by the Bank of Italy are well above those on leasing. This confirms the lessors' long standing belief that the legal ownership of the asset allows the leasing industry to achieve recoveries faster than banks. Results concerning point *b* reveal that among the several factors affecting recovery rates, leasing market segments present very different means and distributions, real estate and automotive leasing being considerably more protective for lessors. Again, this result poses a serious question about the almost uniform treatment of automotive, equipment and real estate leases in The New Proposal on

[1] Basel Committee on Banking Supervision (2001), pages 1, 33, 76.

Capital Regulation, both in the standardized approach and in the foundation IRB approach, where LGD are set by Supervisory Authorities. A second factor is geography. PD and LGD are differently distributed in the country; in southern regions the probability of default is much higher according to generally available data, but leasing companies adopt a tougher credit policy in order to minimize exposures when default occurs (by rejecting lessees unable to pay for a relatively longer period prior to default and entering in contracts with more conservative rental structures). Results concerning point c) indicate that variables statistically significant for the explanation of the variability of recovery rates are: type of business, legal form of organization and geographical area of borrowers, asset type, leasing period, nominal amount of bank guaranty at leasing start with respect to original value, relevant repurchasing agreements, lessors and original value of the asset. The exposure at default is also an important variable; this confirms the need for an appropriate model to estimate EAD (exposure at default). The amount of bank guarantees, the length of the contracts, the amount of the original value and the presence of relevant repurchase agreements are positively related with recovery rates. On the contrary, the coefficient of gross outstanding at default shows a negative relationship with recovery rates. As for the form of organization, «corporations» have the strongest positive relationship with recovery rates. In addition, our model suggests that «sole proprietorships», «partnerships» and «other organizations» have a negative impact on recovery rates. As far as the asset type is concerned, «real estate» has a strong positive relationship with recovery rates. On the other hand, the two lowest negative coefficients are associated with «equipments for building industries» and «computers». Finally, as for the class of business, the three smallest negative coefficients are associated with «non metallic minerals and mineral products», «transport means», «religious institutions and families». The class of business which presents the highest level of recovery rate is «other industrial products». While all the coefficients signs are in line with expectations and all these variables, apart from one, are statistically significant (5% level) for the explanation of the differences in recovery rates, the large volatility of rates inside each level and the limited sample size for each level are reflected by the small value of the coefficient of R^2. This suggests results should be extended towards new and multiple directions.

5.2 A REVIEW OF THE LITERATURE

Available empirical analyses on recovery rates are relatively recent and in a limited number. In the late eighties and early nineties, first attempts to estimate recovery rates on bonds can be found in research focused on the profitability of the distressed debt market (Hradsky and Long, 1989; Altman, 1991; Ward and Griepentrog, 1993). By the mid-nineties the task to calculate recovery rates stratified by some variables becomes explicit, but the majority of studies still concern the bond market; sample size is often very small. Altman and Kishore (1996) analyse 696 bonds de-

faulted between 1971 and 1995 looking for relationships between recovery rates and debt seniority, borrowers' sectors of activity, original rating and size of the issue, bond age prior to default. Izvorsky (1997) uses a sample of 153 bonds defaulted after 1982 to study the impact of seniority, borrower's industry and type of reorganization on recovery rates. Carty and Hamilton (1999) examine 829 financial obligations (of which only 195 bank loans) to assess firm-level recovery rates, as well as the value of seniority and security in bankruptcy. Only after 6 years from a former study published in 1992, in 1998 Standard & Poor's started implementing a «loss data-base» mainly including defaulted bonds so as to be able to produce a large number of papers focusing on the role of seniority (Brand and Bahar, 1998), credit instruments, security and seniority (Van De Castle and Keisman, 1999), «debt cushion»[2] and other aspects (Standard & Poor's, 2000), structured financing securities (Standard & Poor's, 2002b). These studies generally find out that seniority, security, some issuers' specific profiles and types of reorganization attempted after default do matter. Data belong almost entirely to the U.S. market and prevailing long-term average rates for non-convertible bonds as a whole range between 42% and 44% in both Moody's and Standard & Poor's studies, while others have usually found a lower overall average (a summary is in Izvorsky, 1997). Hamilton, Stumpp, Cantor (2001) focus on convertible bonds characterised by a significantly lower recovery rate (29%). Among the relatively fewer studies analysing bank loans recoveries, many concern loans capable of being traded either through assignment or participating interest. In April 1995, Moody's announced their intention to rate such bank loans by using an extended approach of the bond-rating scheme and, since then, they have been presenting a large number of studies concerning recoveries on such bank loans. They should be divided into two groups according to the methodology applied to calculate recovery rates, that is either on the basis of the market price (where debt market valuation is usually considered one month after default as recovery proxies; recovery rates are then the ratio of post-default market values usually calculated to their par amounts), or on the basis of the actual payouts (where cash flows amount and timing are tracked in terms of recoveries and costs; here recovery rates are usually defined as the net present value of these items at the time of default on exposure at default). The former approach, typically adopted in studies concerning bonds, is also used for syndicated loans (Carty and Lieberman, 1996; Gupton, Gates and Carty, 2000). In both studies, respectively based on 58 and 121 observations, the mean loan value one month after default is about 70% for senior secured, with very high variability. Another version of this approach is named «ultimate recovery»; it is used by Standard & Poor's (2002a) and by Fitch (Grossman, Brennan and Vento, 1997): prices assumed are those at «emergence from default» of borrowers, and not one month after default, in order to minimize transitory impacts on prices. In these studies, average recovery rates on senior secured bank loans are over 80%. However, Moody's itself states that there is a significant difference between estimates implied by market pricing and estimates based on actual payouts (as uncertainty requires a risk premium that depresses market-based recovery rates) by quantifying the difference at about 8% of the average recovery rate estimate (Carty, Hamilton et al., 1998). In this research, the average recovery rate on 178 senior secured bank loans involved with the bankruptcies of large, public, U.S. corporations, is 87%, with a tremendous dispersion of recovery rates. Two studies focus on bank loans portfolios (Asarnow and Edwards, 1995; Eales and Bosworth, 1998).

[2] It is the relative amount of debt that is junior compared with the debt under examination.

Default definition is more in line with banking practice (reclassification of doubtful or nonaccrual regulatory classes, or other similar situations). Recoveries are actual payouts monitored until the complete write-off of the loan. Both studies outline a bimodal distribution of recovery rates. In the former study, the analysis is carried out on 831 commercial and industrial loans and 89 structured loans defaulted from 1970 to 1993 and issued by Citibank. Average recovery rates are respectively 35% and 13%. Focus is on the 24-year time series of recovery rates (indicating relative stability over time). Further segregations of defaulted loans are not present (in particular, it is not possible to identify which loans were secured at the time of origination); average loan outstanding at time of default ($6.3 million and $8.5 million for the two subsamples) indicates the large size of the sample. The latter study considers 5,782 small business loans and consumer loans issued by Westpac Banking Corporation in Australia. The average recovery rate is about 70% for the sample as a whole. The analysis of effectiveness for different types of security is hampered by the customer-based rather than loan-based approach to recovery rates estimation. So, even if no doubts exist that aggregate recovery rates on secured bank loans are higher than either those on senior secured bonds or those on unsecured and/or junior instruments, more detailed insights are scarce and models for predicting recovery rates are today based on highly aggregate explanatory variables (a summary of average rates by financial instrument and a predictive model are in Gupton and Stein, 2002). Besides, almost all of these studies are U.S. centered. For Mexican bonds and loans Fitch has provided a study on 70 defaulted bonds and loans (Kabance, 2001).

European markets are analysed in Hamilton, Cantor, West, Fowlie, 2002 (the sample includes 34 observations and refers to bonds) and in Bartlett (55 U.K. secured loans). In these studies, average recovery rates always appear to be lower than in the United States. It is clear that the existing literature has not yet overcome the following shortcomings: empirical evidence is limited and focused on bonds or syndicated loans; it relies on market price after default rather than on actual payouts; a few explanatory variables are tested and time-series analysis prevails over cross-sectional investigations, data belong almost entirely to U.S. markets. The fact that leasing was actually forgotten by the Basel Committee in the Consultative Document of 2001 pushed leasing companies and their associations to send numerous feed-backs and some empirical evidence during the 2001 consultative round on Basel 2. On the basis of a sample of over 6000 defaulted vehicle leases in U.K., a

Dutch based holding gives evidence that, even in the case of the less favorable default definition, the recovery rate is higher than 75%; it also argues that a particular market trend (due to European harmonization in car prices) makes this result very conservative (ABN AMRO Lease Holding, 2001). The French Association of Financial Institutions and the French Banking Federation summarize the results from the same research. In the real estate segment, on a sample of about 2000 leases defaulted between 1996 and 2000, the average recovery rate ranges from 65% to 79%; for equipment leases, there is less information on the sample but four institutions declare recovery rates between 45% and 92% according to different asset categories (Association Française Des Sociétés Financières, 2001; French Banking Federation, 2001). The Swedish Banker Association reports that it has recently made a study on leasing losses for the four major bank-owned leasing companies as compared to credit losses for their parent banks (mortgage credits excluded). Results indicate that leasing losses are constantly much lower than bank losses, averaging between 0.1% and 1.1% in the period from 1990 to 1999 (Swedish Banker Association, 2001). These responses to the Basel Committee provide empirical studies which are only summarized rather than fully presented with references to sample characteristics and research methodology. The response of the European Federation of Equipment Leasing Company Associations to the Basel Committee includes an empirical study encompassing 2,120 defaulted leases from 24 leasing companies belonging to ten countries (De Laurentis and Geranio, 2001). The sample mix allows drawing conclusions only on the Italian market, which represents 68% of overall contracts. Out of the 1,431 Italian contracts included in the research, 1,118 have been used in this research; the additional information required for a more detailed analysis to be performed is only available for these contracts. Recently, Schmit (2002, 2003) has given some further evidence on leasing recovery rates in more general works on the European leasing industry exposure to credit risk. This paper expands on the previous research, looking for the determinants of both cross-sectional averages and variability of recovery rates.

5.3 RESEARCH METHODOLOGY

A leasing contract is defined as defaulted when the leasing company has unilaterally rescinded the agreement because the lessee has not paid scheduled interest and/or principal. Default may not refer to any different form of interruption of the contract. Time of default is the date of unilateral resolution by the lessor. A leasing contract is defined as written off when it is cancelled from accounting books and no other efforts are made to recover the outstanding credit. Contracts are chosen by the single company starting from the most recently written-off and then progressively proceeding backward.

For each defaulted lease, 47 variables are identified *ex ante* as worthwhile to collect data on.

They are grouped into four areas[3]:

	Contractual and accounting profiles
PROV	Province of borrower incorporation
FORMGIUR	Borrower legal form of organization
SAE	105 sectors of activity
RAE	216 types of business
STDATE	Leasing start date (date of contract signature)
DURCON	Leasing period
FISDEPR	Fiscal depreciation rate
PURCHOP	Purchasing price set in purchasing option
IMPCANST	First rental amount
DDATE	Default date
DEBRES	Residual capital not yet expired at time of default (VAT excluded). Capital included in the purchasing option price is also considered as in the Italian market this price is always so low that it gives the lessee a clear incentive to purchase the asset when the leasing expires.
DEBSCAD	Overdue payments at default (rentals and other items)
MORE	Interest on arrears at default
SOCIETA	Leasing Company
CIN	Contract identification number within each lessor

	Work-out costs and recoveries
TCREB	Leased asset repossession costs
DTCREB	TCREB date
TCLEG	Legal costs (after default if legal costs before default are included in DEBSCAD)
DTCLEG	TCLEG date
IMP1526	Difference between recovery and fair compensation established by the Court in favor of the lessor as per art. 1526 of the Italian Civil Code (i.e. recovered amount given back to the lessee)
DIMP1526	IMP1526 date
FORO	Court of Justice place
TIMPREV	Outlay for revocation action in case of bankruptcy
DTIMPREV	TIMPREV date
TVNEG	Other negative cash flows
DTVNEG	TVNEG date
TRETR	Total recoveries from settlements with borrowers and/or guarantors, from insurances and from other sources (e.g. from formal buy-back agreement with asset suppliers)

[3] A total amount and a weighted date are calculated when payments or recoveries for a given item are split on several outflows or inflows.

Work-out costs and recoveries	
DTRETR	TRETR date
TRIVE	Total recovery from asset sale (VAT excluded) to third parties
DTRIVE	TRIVE date
WROFFDAT	Write-off date

Leased asset characteristics	
ORVALUE	Original asset value (VAT excluded)
BENE	New or second-hand asset
SEGMENT	Automotive, Equipment, Real Estate
CCBASS	Asset type according to the Italian Association of Leasing Companies Classification (39 classes)
CLADEPR	Two-year asset depreciation rate estimation (A = 0%-20%; B = 21%-30%; C = 31% – 40%; D = 41%-50%; E = 51%-60%; F = 61% – 80%; G = 81% – 100%)
TVALUE	Theoretical value, i.e. the market value at default for assets traded in well-structured markets where reference prices do exist

Guarantees and collaterals	
IMPPEGNI	Collateral market value at leasing start
RECPEGNI	Recoveries from collaterals foreclosure
DRECPEG	RECPEGNI date
IMPBANC	Bank guaranty nominal value at leasing start
RECBANC	Recoveries from bank guarantees
DRECBANC	RECBANC Date
IMPGIUR	Corporate guaranty nominal value at leasing start
GAPEGIU	Significant/Non-significant/absent corporate guaranty
PARIAC	Significant/Non-significant/absent formal buy-back agreement with asset supplier
FIDEIUSS	Significant/Non-significant/absent personal guaranty

On the basis of these 47 variables, a number of derivate variables are calculated to outline a specific aspect (e.g. time lags) or to solve classification problems (e.g. reduce CCBASS and RAE degree of detail so as to obtain more per-class observations)[4]:

CCBASS1	CCBASS 39 classes re-classification into 7 asset classes. Specifications follow.
CLAPROV	Italian provinces are re-classified into 3 areas: N = North (Valle d'Aosta; Piemonte; Lombardia; Trentino Alto Adige; Veneto; Friuli Venezia Giulia; Liguria; Emilia Romagna); C = Center (Toscana; Lazio; Umbria; Marche); M = South and Islands (Abruzzo; Campania; Molise; Basilicata; Puglia; Calabria; Sicilia; Sardegna)

[4] Intervals are open on the left and closed on the right.

BRARAE	RAE 216 classes re-classification into 25 classes of business. Specifications follow.
DEBRESR	DEBRES / ORVALUE
DEBSACDR	DEBSCAD / ORVALUE
DEFWRIC	DETOWRI classes: A = 0 – 23 months; B = 23 – 35 months; C = 35 – 50 months; D = over 50 months
DETOREC	Default to recovery lag, in months; VENTRANS is assumed as recovery
DETORET	Default to total net recovery lag, in months; all recoveries and costs are considered (for each lease, recovery lags are weighted by the amounts of different types of recovery)
DETOWRI	Default to write-off lag, in months
DURCONC	DURCON classes: A = 0 – 23 months; B = 23 – 35 months; C = 35 – 50 months; D = over 50 months
DVENTRANS	VENTRANS date
GROUTOVA	GROUTTO / ORVALUE
ICSO	IMPCANST / ORVALUE
ICSOC	ICSO classes: A = 0 – 5%; B = 5% – 10%; C = 10% – 30%; D = 30% – 50%; E = over 50%
IMPBANCC	IMPBANCR classes: A = 0 – 5%; B = 5% – 10%; C = 10% – 30%; D = 30% – 50%; E = over 50%
IMPBANCR	IMPBANC / ORVALUE
IMPCANOR	IMPCAN / ORVALUE × 100
MORER	MORE / ORVALUE
MORERC	MORE classes: A = 0 – 5%; B = 5% – 10%; C = 10% – 30%; D = 30% – 50%; E = over 50%
NETRECOV	GRORECOV – COSREC
ORVALUEX	ORVALUE classes: 0-13, 13-26, 26-52, > 52 (thousands of Euro)
ORVALUEW	ORVALUE / average ORVALUE of the segment
PURCHO	PURCHOP / ORVALUE
PURCHOC	PURCHO classes: A = 0 – 5%; B = 5% – 10%; C = 10% – 30%; D = 30% – 50%; E = over 50%
SAERI	105 SAE classes of activity (three digit code) aggregated into 32 SAERI classes of activity (two-digit code)
STATODE	Start date to default date interval, in months

Expressions of recovery rates are defined according to:

a. recovery sources;
b. weights;
c. time value;
d. caps.

This allows analyzing the impact of different variables on recovery rates. Nevertheless, all formulations have the same denominator, which represents the exposure at default: this is the gross outstanding at default (GROUTTO), which is

defined as the residual capital not yet expired at the time of default (VAT excluded), the overdue payments at default (rentals and other items) as well as one third of the interest on arrears at default (i.e. DEBRES + DEBSCAD + 1/3 MORE). Only one third of overdue interest at default is considered in order to exclude any income component from the denominator and, at the same time, to roughly take into account time value for overdue payments till the date of default. In order to differentiate recovery sources, three indicators are set for each defaulted contract.

RRNOMTOT is an undiscounted recovery rate that encompasses all sources of recovery net of all costs at the numerator. Specifically TOTRECOV – COSREC, where:

- TOTRECOV is the sum total of: *a.* recoveries from settlements with borrowers and/or non-bank guarantors, from insurances and from other sources (e.g. from formal buy-back agreements with asset suppliers); *b.* recoveries from asset sale (VAT excluded) to third parties; *c.* recoveries from the enforcement of collaterals and *d.* from the enforcement of bank guarantees (TRETR + TRIVE + RECPEGNI + RECBANC);
- COSREC is the total outlay of recovery procedures: leased asset repossession costs, legal costs, fair compensation set by the Court in favor of the lessee, outlay for revocation action in case of bankruptcy, other negative cash flows (TCREB + TCLEG + IMP1526 + TIMPREV + TNEG).

RRNOM, is in all respects equal to RRNOMTOT except that at the numerator TRIVE + TRETR are substituted by VENTRANS. This variable is equal to TRIVE + TETR if either of the two is zero, otherwise it is equal to TRIVE. In other words, if there are both settlements and asset sale, only the latter is considered. Therefore the numerator is assumed to be NETRECOV = GRORECOV – COSREC, where GRORECOV = VENTRANS + RECBANC + RECPEGNI. This recovery rate excludes recovery from settlements when the asset is sold to third parties, in order to focus exclusively on the amount recovered thanks to the asset or to specific collaterals and/or bank guarantees. RRNOMAS is even more restrictive, as its numerator is VENTRANS – COSREC: only recoveries connected with the asset are considered. This indicator underestimates the true rate because it is not possible to exclude from COSREC the costs relating to other forms of recovery here not examined.

The three recovery rates mentioned above are nominal, to say that cash flows are undiscounted. In order to take into account time value and to test its influence on recovery rates, two additional recovery rates are calculated by discounting RRNOMTOT numerator at 6% and 18% annual simple interest rates.

RRDI6TOT and RRDI18TOT discount the numerator on the basis of the time

intervals between recoveries from different sources and default. Since a preliminary analysis on collected data showed that in several cases dates had not been provided for costs, VENTRANS date has been used in such cases[5]. The adopted solution has led to conservative recovery rates because: *a.* when recoveries are absent, costs are not discounted; *b.* in the vast majority of cases in which both VENTRANS date and costs date are present, the preliminary analysis shows that the former nearly always follows the latter.

RRDI6GRO is in all respects equal to RRDI6TOT except for its being gross of recovery costs. A comparison between the two rates indicates the impact of all costs connected with recovery procedures.

RRINTERM is an «intermediate» discounted recovery rate, which will be used as dependent variable in regression analysis. It belongs to RRNOM family, because it considers VENTRANS at the numerator instead of TRIVE + TETR. The numerator is then discounted at 6% as long as the recovery rate does not exceed 100%; otherwise it is discounted at 18%. This indicator is used so as to exclusively focus on recoveries resulting from either leased assets or other explicit collaterals/guarantees as well as to account for the lessor's right provided for by the Italian law to take the whole amount recovered when this does not exceed the exposure at default capitalized by the interest rate on arrears.

Recovery rates and other performance indicators such as time lags (start to default, default to recovery, default to write-off) and exposure at default with respect to the original asset value are calculated for each defaulted contract. Average recovery rates and other average indicators are twofold: un-weighted (arithmetic mean) values and values weighted by exposures at default (EAD). As the latter lead to aggregate average recovery rates and loss rates comparable with those calculated on book values, they will be usually preferred. However, in order to estimate the confidence intervals of the mean and to perform hypothesis tests, it is necessary to take account of the actual rather than the apparent number of observations (defaulted contracts) when weights are used (euro amounts of exposures at default). In other words, if weights were interpreted as observations frequencies, the results thus obtained would be wrong. Therefore the «individual weighted recovery rate» (IWRR) has been calculated as individual recovery rate weighted in a particular way, that is by the ratio of the EAD of the leasing contract and the average EAD for the group of observations under analysis. IWRR is also equal to the individual recovery rate weighted by EAD in the usual way (by EAD of contract «i» on total EAD of the group) times the number of observations in the group.

Note that IWRR arithmetic average is the EAD-weighted average of recovery

[5] This also applies to DETORET, the default to total recovery (net of costs) lag.

rates[6] and IWRR and EAD-weighted recovery rates distribution shapes are identical. Furthermore, IWRR box-plot representation is more indicative than the use of either un-weighted recovery rates (which would give EAD no role and thus fail to show the relative contribution to EAD-weighted rates) or rates weighted in the usual way by the EAD of the observation on the overall EAD of the segment (which would indicate extremely low rates, far from the original un-weighted individual values). The choice made is a compromise with a strong mathematical meaning because IWRR arithmetic average is the EAD-weighted average of recovery rates and their distribution shapes are identical. All standard deviations, confidence intervals and box-plots relative to weighted recovery rates will be based on IWRR format, unless differently specified. Confidence intervals are set at 95%.

5.4 DATA SOURCES AND SAMPLE CHARACTERISTICS

The sample includes 1118 financial leasing operations, all written off in the year 2000. The range of dates in which leases were signed and in which they were defaulted is very wide for the three market segments (automotive AU, equipment EQ, real estate RE). See Fig. 5.1 and Fig. 5.2. Because of the data limited time-span, central tendency and variability measures of recovery rates should be interpreted as cross-sectional indicators and not as inter-temporal evidence. Data come from six lessors (Banca Agrileasing, Banca Italease SpA, Centroleasing SpA, Locafit SpA, Locat SpA, San Paolo Leasint), among the leading associates of ASSILEA (the Italian Leasing Companies Association). In the year 2000, the six lessors had a 27.5% market share by number and a 36.5% market share by value in terms of new leases in the Italian market. The distribution of the 1118 contracts by segment, lessor, number and value (thousands of Euros) is shown in Tab 5.1. Because of the lack of numbers and values regarding the defaulted leasing contracts in the market, Tab 5.2 reports the differences between the sample mix and the leases signed in the year 2000 (number of contracts) by the six lessors. Lessor B is clearly over-weighted in all segments. A number of tests show that recovery rates are not over-estimated because of Lessor B. Given the number of observations, CCBASS 39 asset classes have been reclassified into CCBASS1 7 classes as per Tab. 5.3. Only CCBASS1 class 49 is not sufficiently homogeneous.

The lower volatility of many CCBASS1 classes in Tab. 5.4 shows the gain in the mean significance of asset original values[7]. The Table also outlines that Italian financial leasing is retail in nature, even in the real estate segment. The same

[6] In fact, in any group «*j*» with N_j observations, $IWRR_i = RR_i \times [EAD_i / \Sigma (EAD_i / N_j)] = RR_i \times (EAD_i / \Sigma EAD_i) \times N_j$ and the arithmetic mean $\Sigma IWRR_i / N_j = \Sigma RR_i \times EAD_i / \Sigma EAD_i$, where *RRi* is any sort of above defined recovery rate relative to observation «*i*».

[7] The leasing market traditional three-group segmentation is used in the descriptive analysis, while CCBASS1 is adopted in the regression analysis.

FIGURE 5.1 **Start years of leases in the sample**

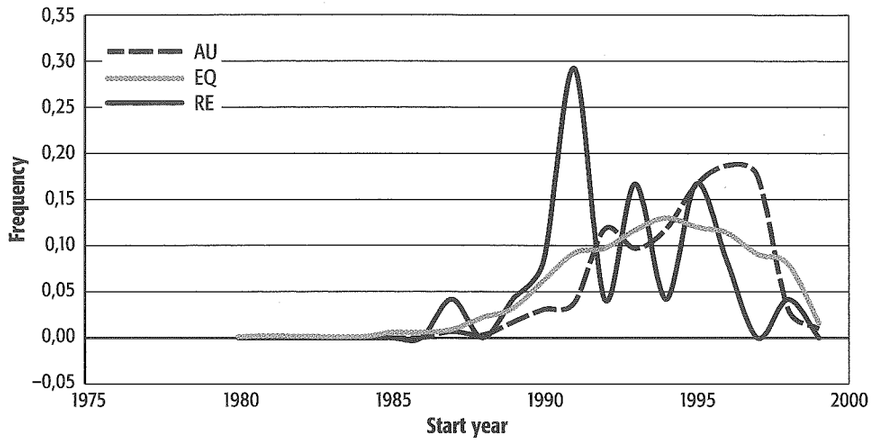
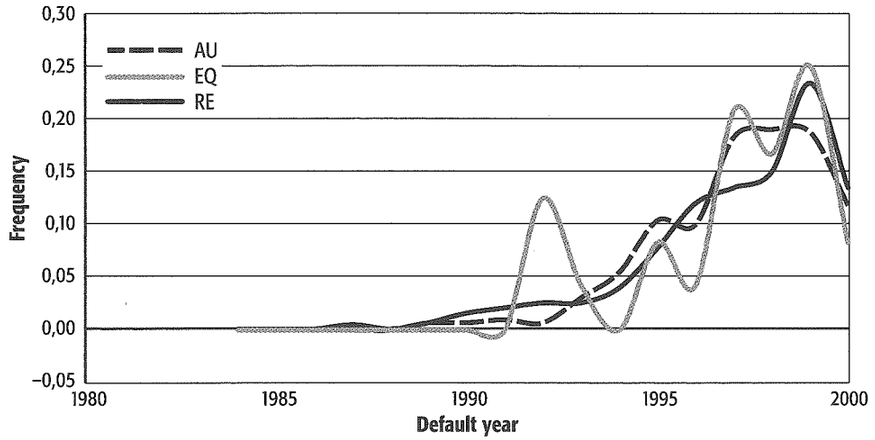


FIGURE 5.2 **Default years of leases in the sample**



picture can be drawn from the small average amount of exposures at default (GROUTTO or EAD) shown in Tab. 5.5, which undoubtedly affects the recovery procedures adopted by the lessors. Estimated asset depreciation rates in two years from leasing commencement are clustered into seven classes. Higher depreciation rates are estimated for equipments compared to both real estate and automotive assets, but the last two segments show a larger than expected variety of cases (Tab. 5.6). The geographical distribution of the sample is shown in Tab.

5.7. If benchmarked with the data available for the universe of the leasing market (the most comparable are the numbers of outstanding contract at year-end 2000), the sample appears to slightly overweight southern regions against central and northern ones (Assilea data for the market are: 65% north, 21% center, 14% south). It can be anticipated that again recovery rates are not over-estimated because of that. As for the sample mix by asset depreciation rates, geographical distribution, two-digit RAE re-classification of borrowers' business (Tab. 5.8) and borrowers' form of organization (Tab. 5.9), no comparable data are available in the universe of leases signed by Assilea associates; many combinations with market segments present a small number of observations (with consequences on the statistical significance of performance measurements).

TABLE 5.1 **The sample: number of contracts and total amount (thousands of Euro) by lessor**

	Automotive		Equipment		Real estate	
	Number	Amount	Number	Amount	Number	Amount
Lessor A	18	465	67	3409	3	155
Lessor B	111	2427	367	15339	9	1549
Lessor C	26	1033	19	723		0
Lessor D	8	258	63	3357	2	826
Lessor E	115	2324	239	13170	9	2272
Lessor F	11	413	50	2531	1	207
All six lessors	289	6921	805	38528	24	5010

TABLE 5.2 **Differences between sample mix and new leases in year 2000**

	Automotive		Equipment		Real estate	
	Number	Amount	Number	Amount	Number	Amount
Lessor A	−5%	−5%	−2%	−3%	−6%	−12%
Lessor B	24%	21%	20%	13%	20%	13%
Lessor C	−1%	2%	−13%	−8%	−6%	−5%
Lessor D	−5%	−4%	−4%	−3%	−5%	1%
Lessor E	−11%	−14%	0%	3%	2%	10%
Lessor F	−2%	0%	−1%	−2%	−5%	−6%
All six lessors	0%	0%	0%	0%	0%	0%

TABLE 5.3 **Reclassified Assilea asset classes**

CCBASS1 classes	CCBASS corresponding classes	Market segment	CCBASS1 classes content	Number of observations
17	17	EQ	Equipments for building industry	52
21	21	EQ	Computers	68
35	35	EQ	Equipments for retail and whole sale trade, and for hotel industry	128
49	11-16,18-20, 22-33, 49, 51,61-62, 90-91	EQ	All other equipments	557
61	61	AU	Cars	200
62	33,49,62,91	AU	Other vehicles	89
72	71,72,721,722	RE	Real estate	24

TABLE 5.4 **Mean and standard deviation of asset original values by segment and CCBASS1**

Market segment	CCBASS1 classes content	Number of observations	Average asset original value, Euro		Standard deviation of asset original value, Euro	
			Market segment	CCBASS1	Market segment	CCBASS1
EQ	Equipments for building industry	52	47.843	38.552	69.770	35.234
EQ	Computers	68		21.504		18.212
EQ	Equipments for trade, and for hotel industry	128		40.907		45.895
EQ	All other equipments	557		53.520		79.170
AU	Cars	200	23.790	18.204	21.111	13.579
AU	Other vehicles	89		36.341		28.484
RE	Real estate	24	209.698	209.698	153.055	153.055

TABLE 5.5 **Exposure at default by segment (Euro)**

	Mean	Percentile 05	Percentile 25	Percentile 75	Percentile 95
AU	12.511	350	2.468	15.281	49.523
EQ	28.271	988	5.845	33.064	94.815
RE	163.833	19.908	85.509	165.866	847.045

TABLE 5.6 **Sample mix by asset depreciation classes**

Count	A	B	C	D	E	F	G
AU	65	54	71	55	44		
EQ	16	68	98	97	103	296	127
RE	14	8	1	1			

A = 0%-20%; B = 21%-30%; C = 31% – 40%; D = 41%-50%; E = 51%-60%; F = 61% – 80%; G = 81% – 100%.

TABLE 5.7 **Sample mix by geographic area**

	Center			South and islands			North		
Segment	Count	Row%	Col%	Count	Row%	Col%	Count	Row%	Col%
AU	58	20,1%	27,0%	49	17,0%	18,5%	182	63,0%	28,5%
EQ	152	18,9%	70,7%	215	26,7%	81,1%	438	54,4%	68,7%
RE	5	20,8%	2,3%	1	4,2%	,4%	18	75,0%	2,8%

TABLE 5.8 **Sample mix by two-digit RAE (classes of business)**

	Count	AU	EQ	RE
51	Agriculture and fishing products	2	12	
52	Energy	1		
53	Metallic minerals and products	1	2	
54	Non-metallic minerals and mineral products	6	19	
55	Chemical products		20	
56	Metal products except machineries and vehicles	6	35	2
57	Agricultural and industrial machineries	9	34	
58	Office accounting and computing machines, optical instruments	2	20	
59	Electrical machineries and apparatus	3	12	1
60	Transport means	2	5	1
61	Food, beverage and tobacco products	6	40	
62	Textiles and leather products	9	80	1
63	Paper products and publishing	1	33	1
64	Rubber and plastic products	1	10	
65	Others industrial products	4	37	1
66	Construction	41	77	4
67	Services of commerce and repair	83	158	2
68	Services of hotels, restaurants, bars, canteens	8	50	3
69	Services of internal transports	26	11	
71	Services of water and air transports	4	12	
73	Services related to transports	69	134	8
ER	Religious institutions		2	
FC	Families	5	2	

TABLE 5.9 **Sample mix by borrower's form of organization (number of contracts)**

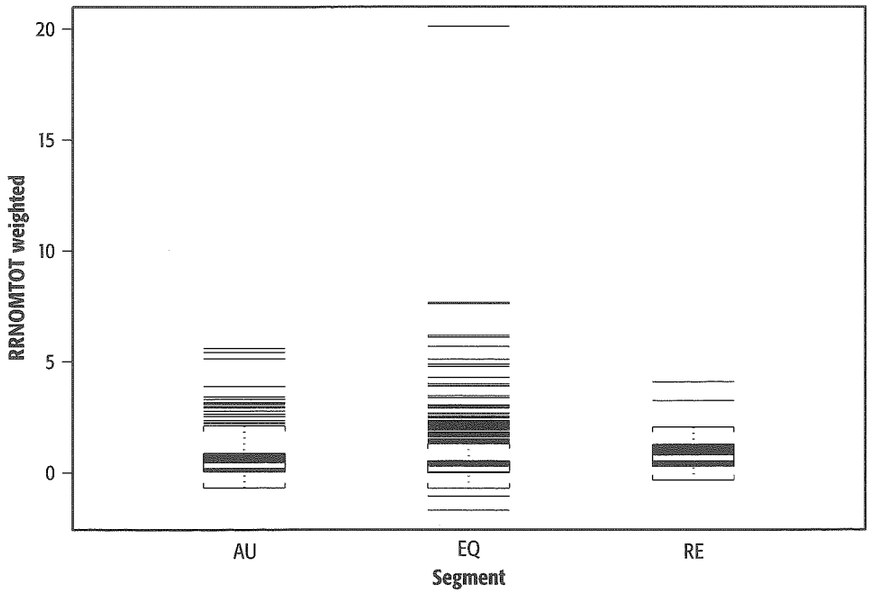
	A	DI	SAS	SNC	SPA	SRL
AU	15	100	23	39	12	100
EQ	17	291	72	120	45	260
RE	10	1	5	1	7	

DI sole proprietorships; SNC partnerships; SAS limited partnerships; SRL similar to limited liability companies; SPA corporations; A other entities.

5.5 EMPIRICAL RESULTS

Market segments – Weighted average recovery rates of financial leases are considerably different in the three market segments of automotive, equipment and eal estate (Tab. 5.10). Differences are considerable for real estate, in terms of av - erage (much higher than for other segments). As specified in the methodological section, variability and confidence measures for the mean as well as recovery rates values reported in box-plots are IWRR. Confidence intervals are set at 95%. The width of the confidence interval for the RE segment is much larger due to the much smaller number of units. Tab. 5.11 shows that the null hypothesis of equal

FIGURE 5.3 **Boxplots of RRNOMTOT weighted by EAD by market segment**



means among the 3 segments is rejected (the P-value based on the F-distribution is smaller than 1%). The result of the test can be highly influenced by outliers. In Fig. 5.3 there is one clear outlier in the EQ segment (observation unit number 261). If the outlier is removed, the upper 95% confidence interval for segment EQ becomes smaller than the lower confidence interval for the other two segments, thus signaling a large difference in the distributions of recovery rates. In addition, the significance of the test (Tab. 5.13) greatly increases and the null hypothesis of equal means can be rejected. The overall distribution of total recovery rates, weighted by exposures at default, can be appreciated by Tab. 5.14. Distributions of IWRR are identical, apart from the scale factor for each market segment. Density estimates for each market segment using a triangular window (left) and a Gaussian window (right) are shown in Fig. 5.4. Distributions have a positive asymmetry in each segment. In addition, for segment RE and, even if to a lower extent, for segment AU, it is possible to notice very modest signs of bimodality (two maxima). Tab. 5.14 and Fig. 5.4 also point out that both means and the entire distributions are quite different in the three segments, real estate and automotive being considerably more protective for lessors. This result is consistent with the empirical evidence indicating that the dispersion of recovery rates, measured by their standard deviation, tends to fall as average recovery rates rise (Carty, Hamilton et al., 1998).

Fig. 5.5 shows the qqplot of EQ segment against AU, given that RE distribution is clearly different from the others (note also that in more than 50% of weighted cases recovery rates are over 100% for real estate leases). The surveyed big differences in average recovery rates of different market segments induce to perform subsequent analyses across the three segments and pose a serious question about the apparent uniform treatment of automotive and equipment leases in the new proposal on capital regulation.

TABLE 5.10 **Average recovery rates by market segment, standard deviations and 95% confidence intervals**

EAD-weighted RRNOMTOT%	Average	Standard deviation	Lower Confidence Interval	Upper confidence interval
AU	65	90	55	76
EQ	48	111	40	56
RE	98	100	56	140

TABLE 5.11 **One Way Anova table for EAD-weighted RRNOMTOT by segment**

EAD-weighted RRNOMTOT %	Fvalue	Pvalue
SEGMENT	5.03	0.0066

TABLE 5.12 **Recovery rates by market segment (without unit 261)**

EAD-weighted RRNOMTOT %	Average	Standard deviation	Lower Confidence Interval	Upper confidence interval
AU	65	90	55	76
EQ	45	87	39	51
RE	98	100	56	140

TABLE 5.13 **One Way Anova table for EAD-weighted RRNOMTOT by segment (without unit 261)**

EAD-weighted RRNOMTOT %	Fvalue	Pvalue
SEGMENT	8.78	0.00016

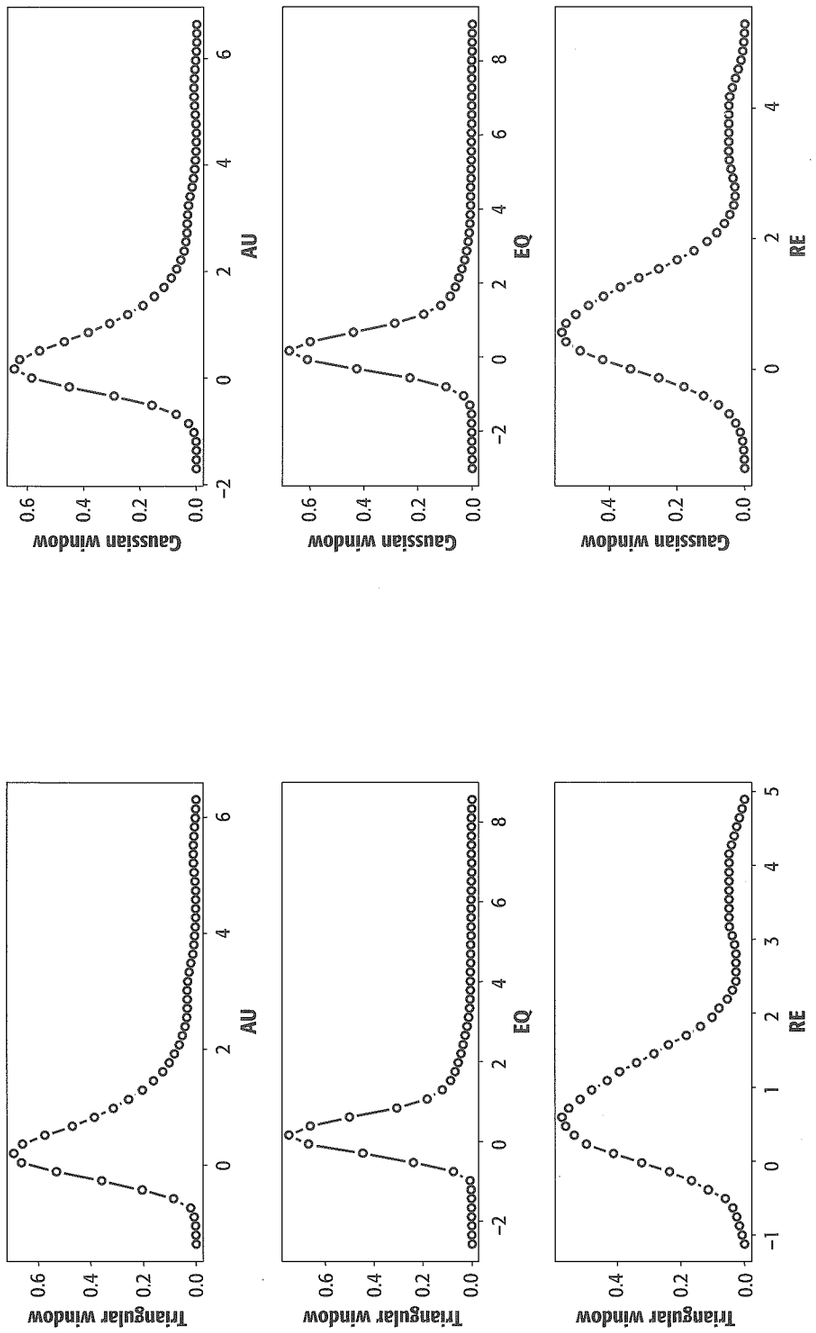


FIGURE 5.4 **Non parametric density estimate of WRNOMTOT for each market segment**

FIGURE 5.5 **QQnorm plot between market segments AU and EQ**

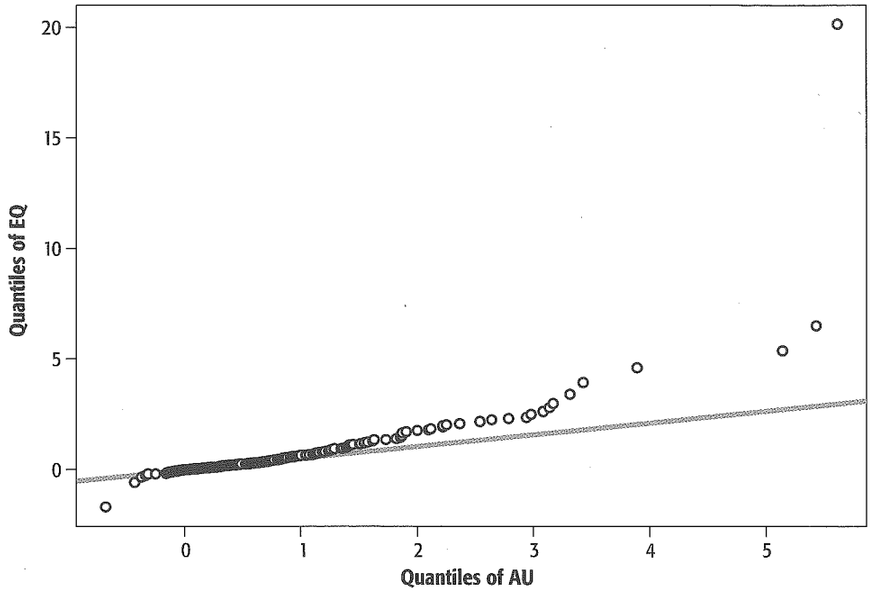


TABLE 5.14 **EAD-weighted RRNOMTOT distribution**

Percentiles	AU	EQ	RE
5	-,0313	-,0761	,3424
10	,0000	-,0306	,6949
25	,3478	,0515	,6949
50	,6285	,4638	1,0579
75	,9049	,7648	1,2693
90	1,1248	1,0311	1,5091
95	1,3245	1,1087	1,5187

Recovery sources – Recovery frequencies by source outline the critical role of the leased asset. In almost 80% of the cases there is some recovery related with the asset (Tab. 5.15). Considering the definitions of RRNOMTOT, RRNOM

and RRNOMAS provided in the paragraph devoted to research methodology, Tab. 5.16 shows that:

a. the bulk of recovery rates come from the leased assets sale to third parties or to lessees (the only sources of recovery included in RRNOMAS);
b. in real estate leasing practically the whole amount of recovery comes from the leased asset;
c. in the automotive and equipment segments the contribution of bank guarantees and collaterals is low but not trivial (difference between RRNOM and RRNOMAS);
d. in the automotive and, to a lower extent, in the equipment segment, the contribution of other sources of recovery not specifically related to asset sales, bank guarantees and collaterals, is important (difference between RRNOMTOT and RRNOM).

Standard deviations and 95% confidence intervals for RRNOM and RRNOMAS are presented in Tab. 5.17, Tab. 5.18, Tab. 5.19 and Tab. 5.20. Moving from RRNOMTOT to RRNOMAS, lower recovery rates bring about lower volatility to say that recoveries from leased assets are somewhat more stable than other recoveries.

This is particularly apparent in the automotive segment where a large second-hand market contributes most. Absolute values of standard deviations are always high, but in real estate variability is much lower for all recovery rates considered. Bivariate correlations between all pairs of recovery rate types are always significant at 0.01 level (two tails Pearson, Kendall's tau_b and Spearman's rho), both for EAD-weighted and for un-weighted data. This result confirms that the legal ownership of the leased asset, intrinsic to leasing operations, is a peculiar risk mitigation factor.

TABLE 5.15 **Frequencies of recovery by source**

Recovery source	Number of cases	Pct of leases
Settlement with borrowers	501	44,8%
Asset sales to third parties	621	55,5%
Both from settlements and third parties	232	20,8%
Asset related (VENTRANS)	890	79,6%
From any source	941	84,2%
From sources unrelated with the asset	51	4,6%

TABLE 5.16 **Weighted average recovery rates measures by recovery source**

EAD-weighted average %	RRNOMTOT	RRNOM	RRNOMAS
AU	65	49	44
EQ	48	39	35
RE	98	97	97

TABLE 5.17 **EAD-weighted recovery rates RRNOM for each market segment (without unit 261)**

EAD-weighted RRNOM %	Average	Standard deviation	Lower Confidence Interval	Upper confidence interval
AU	49	79	40	58
EQ	36	76	31	42
RE	97	99	55	139

TABLE 5.18 **One Way Anova table for EAD-weighted RRNOM by segment**

EAD-weighted RRNOM %	Fvalue	Pvalue
SEGMENT	9.26	0.0001

TABLE 5.19 **EAD-weighted recovery rates RRNOMAS for each market segment (without unit 261)**

EAD-weighted RRNOMAS %	Average	Standard deviation	Lower Confidence Interval	Upper confidence interval
AU	44	72	36	53
EQ	32	74	27	37
RE	97	99	54	138

TABLE 5.20 **One Way Anova table for EAD-weighted RRNOMAS for each market segment (without unit 261)**

EAD-weighted RRNOMAS %	Fvalue	Pvalue
SEGMENT	10.82	0.000022

Time value and a comparison with Bank of Italy 2000 analysis – Differences in recovery performance characterizing the three market segments decrease as discount rates rise. However, even in the extreme case of an 18% discount rate, they remain so large that the prior consideration on capital regulations being unable to recognize them remains unchanged (Tab. 5.21).

Moving from RRNOMTOT to RRDI6TOT and RRDI18TOT, lower recovery rates bring about lower volatility, somewhat balancing larger expected losses with smaller unexpected losses (Tab. 5.22). Decreases in average recovery rates are limited in the automotive and equipment segments, where recovery lags are short, while they turn out to be more considerable in real estate leasing. Tab. 5.23 shows very close lags for automotive and equipment leases (13-14 months) and much longer delays (almost threefold) for real estate. Recovery lags on the bank loans surveyed by the Bank of Italy are well below those on leasing, except for the case of enforcement and foreclosure actions and out-of-court settlements of bank loans compared with recoveries on real estate leases, whose time lags are similar or a little bit longer (Tab. 5.24)[8]. This is a confirmation of the lessors' long standing belief that the legal ownership of the equipment leads the leasing industry to achieve recoveries faster than banks. A survey on bank loans recovery rates is summarized in Bank of Italy's 2001a and 2001b, (Tab. 5.25)[9]. As far, the most comparable indicator here available is the total recovery rate, which is discounted at 6 per cent annual simple interest rate and weighted by exposures at default, shown in Tab. 5.21. Leasing recovery rates appear to be very protective, especially in the automotive and real estate segments. The degree of comparability between the Bank of Italy analysis and this survey is limited by three methodological differences:

a. discount rates adopted in the Bank of Italy study are yearly compounded quarterly rates on bank lending surveyed for specific periods from 1975 to date; during the eighties and nineties, they usually ranged between the 6% and the 18% boundaries here considered;
b. recovery rates provided by the Bank of Italy exclude legal expenses; a note in the study suggests that for banks who declared such expenses recovery rates were lower by 400 basis points;
c. finally, as recovery rates provided by the Bank of Italy appear to be unweighted means, the same perspective is assumed in Tab. 5.26: recovery rates are much higher as, ceteris paribus, lower recovery rates occur when exposures at default are larger (the relation is particularly strong in the automotive and real estate segments).

[8] For the U.S. market, Gupton, Gates and Carty (2000) estimate that the average length of time to default resolution by prepackaged Chapter 11 bankruptcy filings averages 1.07 years, while by traditional Chapter 11's it averages 1.62 years; secured loan claims are settled more quickly than unsecured loans: 1.3 versus 1.7 years.

[9] Evidence of 2000 survey related to leasing market is summarized in Bank of Italy 2001b. Leasing companies were required to give average recovery rates (and repossession to recovery lags) for aggregates of defaulted contracts but no data were requested in relation to single operations.

They indicated somewhat higher recovery rates in automotive (70% in 1998 and 68% in 1999) and real estate segments (from 90% to 100% according to years and commercial or residential real estates) compared with rates here obtained for RRDIS6TOT. For the equipment segment, recovery rates are 45% in every analysis and for every year.

Due to data collection process specificity and to the lack of other details, no further investigations on these differences are performed.

In any case, Bank of Italy evidences confirm that RRDIS6TOT is a conservative measure of recovery rates. The first Italian survey on bank loans recovery rates is provided in Generale and Gobbi (1996). Results are comparable to evidence in 2000 survey.

The degree of comparability of this survey with the Bank of Italy analysis is also limited by one of the greatest unsolved problem in empirical research and regulatory schemes involving different financial sectors: default definition. The broader the definition becomes, the higher the default and recovery rates. In the Bank of Italy analysis, if the broader default definition based on the regulatory class called «incagli e sofferenze» (substandard and doubtful loans) is used instead of that for the more specific regulatory class of «doubtful loans», recovery rates are over 85% rather than about 37%. The default definition here assumed appears to be in line with Basel 2 requirements.

TABLE 5.21 **Weighted average recovery rates by discount rate**

EAD-weighted average %	RRNOMTOT	RRDI6TOT	RRDI18TOT
AU	65	61	54
EQ	48	45	40
RE	98	84	65

TABLE 5.22 **Standard deviation of weighted recovery rates by discount rate**

EAD-weighted standard deviation %	RRNOMTOT	RRDI6TOT	RRDI18TOT
AU	79	66	52
EQ	52	48	45
RE	42	38	38

TABLE 5.23 **Default to recovery, default to repossession and repossession to recovery lags (months)**

Leasing segments	Lags		
	Default to recovery*	Default to repossession**	Repossession to recovery***
Automotive	14	11	2
Equipment	13	8	5
Commercial real estate	34	23	11
Residential real estate		22	12

* EAD-weighted average of recovery weighted dates.
** Difference between default to recovery and repossession to recovery lags.
*** Mean of data for years 1998 and 1999 obtained from Bank of Italy (2001a).

TABLE 5.24 **Recovery lags on bank loans by recovery procedure**

Procedures	Months
Out-of-court settlements	25
Bankruptcy procedures	82
Composition before bankruptcy	74
Enforcement and foreclosure actions on movables	34
Enforcement and foreclosure actions on real estates	76

SOURCE: Bank of Italy (2001b)

TABLE 5.25 **Bank loans recovery rates in 2000 survey by Bank of Italy (months)**

Procedures	Total*	Sub-sample with collaterals**
Out-of-court settlements	68	70
Bankruptcy procedures	27	50
Composition before bankruptcy	36	
Enforcement and foreclosure actions on real estate	57	
Enforcement and foreclosure actions on movables	44	

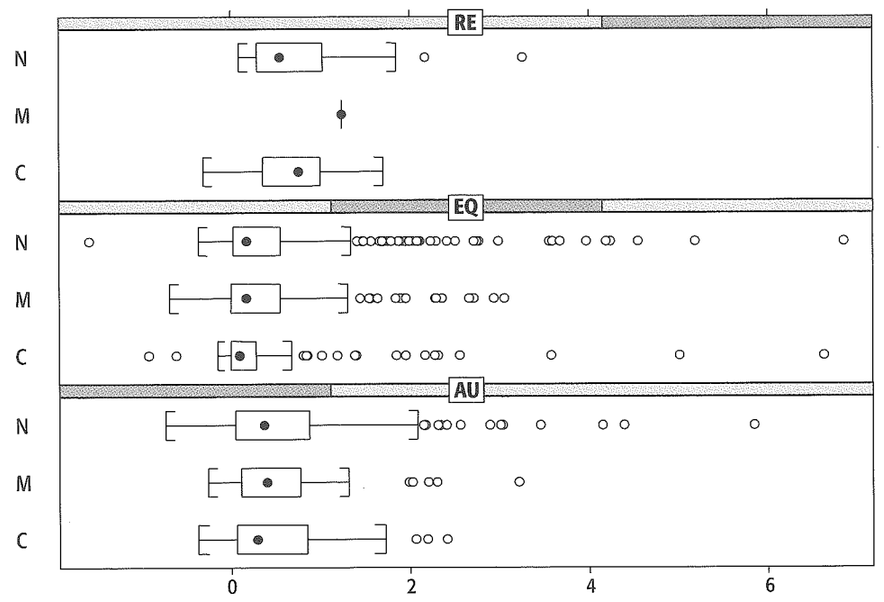
SOURCE: * Bank of Italy 2001a; ** Bank of Italy 2001b

TABLE 5.26 **Recovery rates by discount rate (means)**

Percentile	RRNOMTOT	RRDI6TOT	RRDI18TOT
AU	85	77	65
EQ	53	49	43
RE	101	90	74

Geographical area – The industry feeling is that courts' location impacts time lags and recovery rates. Our sample size allows performing an aggregate analysis distinguishing north, center, south and islands. For real estate, the number of observations is still too low (Tab. 5.27). Means are different in the three areas: the center always has the worst performance in terms of mean levels (Tab. 5.28), but enjoys a lower variability in the equipment segment (Fig. 5.6). The Anova test shows that there is a probability of about 15% of equal means for each level of CLAPROV when the market segment is taken into account (Tab. 5.29). So, there is slight evidence that risk from PD and LGD points of view is differently distributed in the country; the Bank of Italy reports on the past 15-year annual default rates, firstly published two

FIGURE 5.6 **Boxplots of RRDIS6TOT weighted for each market segment and each class of CLAPROV (without unit 261)**



years ago, give a clear picture of a steadily higher default risk moving from the north to the center and then down to the south (Bank of Italy, 2000). This evidence suggests that the correlation observed between recovery rates and default probabilities (Altman, Resti and Sironi, 2002) does not apply to cross-sectional segregations.

TABLE 5.27 **Geographical distribution of RRDIS6TOT (contracts)**

EAD weighted average %	C	M	N
AU	58	49	182
EQ	152	215	438
RE	5	1	18

TABLE 5.28 **Geographical distribution of RRDIS6TOT**

EAD weighted average %	C	M	N
AU	54	58	64
EQ	34	40	50
RE	70	124	85

TABLE 5.29 **Anova table for EAD-weighted RRDIS6TOT for each segment and each class of CLAPROV**

EAD-weighted RRNOM %	Fvalue	Pvalue
CLAPROV	1.86	0.156
SEGMENT	7.90	0.0004

Asset and borrower profiles – Asset new/second-hand profile has no significant correlations with RRDIS6TOT in each market segment (Tab. 5.30, Tab. 5.31), but sample size is very small (Tab. 5.32).

Also the form of business organization is not significant (Tab. 5.33): the main difference in the means regards market segments and is marginally due to the variable different levels. On the contrary, asset depreciation classes (Tab. 5.34) and borrowers' business sectors (Tab. 5.35) present P-values around 10%-15%, which are low but not low enough to say that the additional contribution of the variable to the explanation of the difference in the means is significant, once segments have been taken into account. The original asset value is a quantitative variable whose P-value shows the strong relation with recovery rates (Tab. 5.36).

TABLE 5.30 **EAD-weighted RRDIS6TOT for each segment by asset characteristic (new or second hand)**

EAD-weighted RRDIS6TOT %	SECOND HAND	NEW
AU	0.62	0.61
EQ	0.49	0.44
RE	1.14	0.83

TABLE 5.31 **Anova table for EAD-weighted RRDIS6TOT for each segment and asset characteristic (new or second hand)**

EAD weighted RRDIS6TOT %	Fvalue	Pvalue
BENE	0.11	0.74
SEGMENT	4.20	0.015

TABLE 5.32 **Distribution of contracts by asset characteristic (new or second hand)**

Count	SECOND HAND	NEW
AU	15	274
EQ	46	759
RE	1	23

TABLE 5.33 **Anova table for EAD-weighted RRDIS6TOT for each segment and each class of FORMGIUR**

EAD-weighted RRDIS6TOT %	Fvalue	Pvalue
FORMGIUR	0.37	0.87
SEGMENT	9.66	0

TABLE 5.34 **Anova table for EAD-weighted RRDIS6TOT for each segment and each class of CLADEPR**

EAD-weighted RRDIS6TOT %	Fvalue	Pvalue
CLADEPR	1.80	0.096
SEGMENT	7.23	0.0007

TABLE 5.35 **Anova table for EAD-weighted RRDIS6TOT for each segment and each class of BRARAE**

EAD-weighted RRDIS6TOT %	Fvalue	Pvalue
BRARAE	1.31	0.15
SEGMENT	8.78	0.0002

TABLE 5.36 **Anova table for EAD-weighted RRDIS6TOT for each segment and ORVALUE**

EAD weighted RRDIS6TOT %	Fvalue	Pvalue
ORVALUE	461.3	0
SEGMENT	33.20	0

Contract structures – Recovery rates depend on exposure at default, which in turn is heavily affected by:

a. the time elapsed from contract start to default and
b. contract structure.

The start-to-default lag (STATODE) is on the average 31 months for automotive, 40 months for equipment and 53 months for real estate (Tab. 5.37). Given the average leasing period of the three segments, time elapsed is longer (respectively 78%, 73% and 54% of leases maturities) compared with the widespread belief in the industry that problem leases show warning signs at a very early stage. This belief is supported by lessors' internal empirical analyses and by two general considerations concerning financial leasing:

a. unlike bond issues and many loans, leases imply neither any cash inflow for the borrower nor a temporary improvement of his liquidity position;
b. as time passes and reimbursement proceeds, the market value of the leased asset becomes higher than the residual debt and the borrower becomes a sort of hostage.

A reasonable explanation of data in Tab. 5.37 comes from the adopted definition of default. It is aligned with the industry view, but the unilateral resolution of the contract certainly follows the initial outcome of reimbursement difficulties. Thanks to typical automotive and equipment leases structures (the first rental is much higher than the others or it represents a certain number of last rentals paid in advance; the purchasing option price is as low as one to five per cent of the asset value), the average exposure at default on original asset value (GROUTOVA) is well below the previous indicator of time elapsed on leasing period. In real estate leases, the expected low depreciation of the asset brings about less «protective» leasing structures and higher exposures at default in percentage of the original asset value. The geographical distribution of STATODE and GROUTOVA is an indirect confirmation of a tougher credit policy in southern regions (M) compared to central (C) and northern (N) ones, where, in fact, the start-to-default lag is longer while outstanding at default on asset original value is lower in all segments (Tab. 5.38 and Tab. 5.39)[10]. We shall conclude that, even if in southern regions the probability of default is much higher according to generally available data (Bank of Italy, 2000), leasing companies are rejecting lessees unable to pay for a long period prior to default and they enter contracts with more conservative rental structures.

TABLE 5.37 **Time elapsed before default and EAD on asset original value (means)**

Segment	Statode months	Leasing period months	Statode/leasing period	Exposure at default on asset original value
AU	31	40	78%	49%
EQ	40	55	73%	62%
RE	53	99	54%	81%

TABLE 5.38 **Start to default lags: geographical distribution (months)**

	C	M	N
AU	32	35	30
EQ	37	46	38
RE	44	36	57

TABLE 5.39 **Outstanding at default on asset original value: geographical distribution (means)**

Percentile	C	M	N
AU	,55	,43	,49
EQ	,66	,59	,62
RE	,81	,68	,82

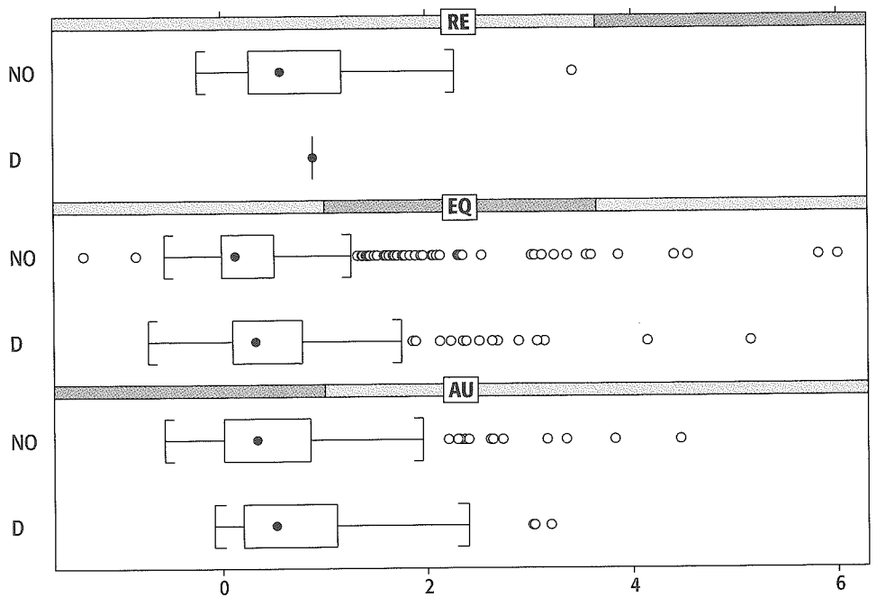
[10] The sole exception is STATODE for real estate, but for the south there is one observation only (see Tab. 3.7).

Collaterals and guarantees – As expected, collaterals to leasing operations are very rare (Tab. 5.40) and their contribution to average recovery rates is negligible (even because in our sample only 10 out of 17 cases present recovery from such a source).

Leasing contracts involve bank guarantees in a much larger number of cases (410, that is 37% of sampled contracts). Their distribution by market segment and size (relative to asset original value) is as follows (Tab. 5.41). Bank guarantees are included in almost the same percentage (34%, 38%) in automotive and equipment leases; only in 3 out of 24 cases they assist real estate operations. When available, they usually guarantee from 30% to 50% of asset original value. In 193 cases there is a recovery from bank guarantees. There is a large difference between bank guarantees obtained by lessors and recoveries from this safe source.

The probable explanation is that guaranty maturity expires before default; future analysis should survey the maturity profile. Tab. 5.43 shows the 193 cases distribution. In three cases there is recovery while no bank guarantees were indicated; probably they have been acquired after leasing was issued as the borrower's risk increased. Considering the number of observations and the relative size of bank guarantees, a reasonable comparison of recovery rates can be made between the no-guaranty case and class-D guarantees for automotive and equipment segments. Bank guarantees contribution to recovery rates is relevant (Fig. 5.7) with an average increase of 16 percentage points (Tab. 5.43) and statistically highly significant even when the segment is taken into account (Tab. 5.44).

FIGURE 5.7 **Boxplots of RRDIS6TOT weighted for each market segment and each class of IMPBANCC (without unit 261)**



For other forms of guaranty neither specific recovery indications nor guaranty nominal amounts were required; only if the guaranty was to be considered as valuable upon credit risk assessment prior to leasing issuing. In one out of five cases a personal guaranty is thought valuable; other guarantees are very rare (Tab. 5.45). Valuable personal guarantees are relatively more frequent in real estate and less common in the automotive segment (Tab. 5.46).

Average recovery rates appear strongly related to «valuable» personal guarantees (Tab. 5.47 and Fig. 5.8). In the automotive segment they remarkably contribute to the recovery rate increase, while in the equipment segment the same contribution is positive but small. For real estate leasing, the 8 cases with valuable personal guarantees present exceptionally low recovery rates for this segment. The average is determined by 1 of the 8 observations, whose recovery rate is –42%; this value is also the only negative recovery rate for the whole real estate segment. Statistical significance tests of means equality show a P-value of 12% (Tab. 5.48).

FIGURE 5.8 **Boxplots of RRDIS6TOT weighted for each market segment and each of the 2 classes of FIDEIUSS (without unit 261)**

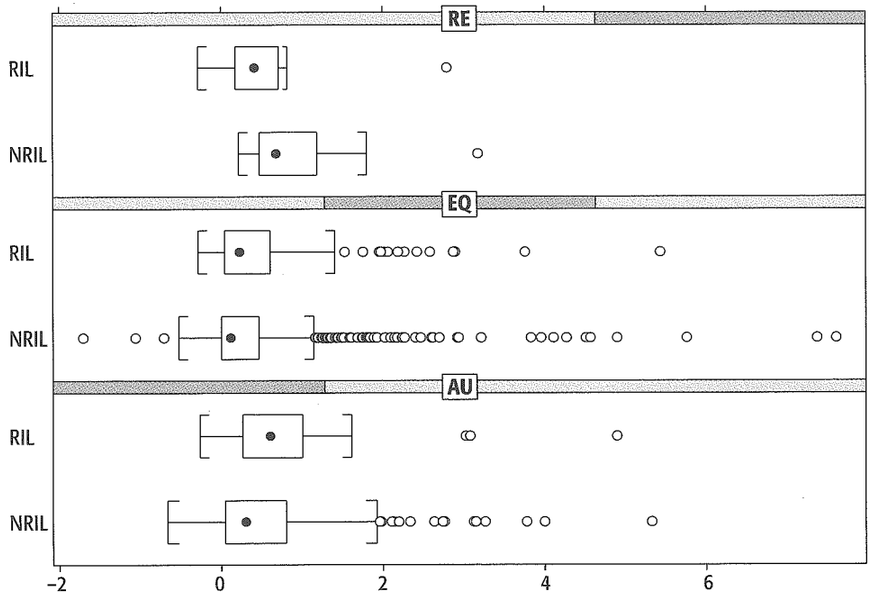


TABLE 5.40 **Absolute frequency of collaterals**

	No collateral	A	B	C
AU	287	1		1
EQ	792	7	4	2
RE	22	2		

Collateral value on asset original value: A = from 0 to 40%; B = from 40% to 80%; C = over 80%.

TABLE 5.41 **Absolute frequency of bank guarantees**

Count	No guaranty	A	C	D
AU	190	7		92
EQ	497	57	7	244
RE	21	2		1

Amount guaranteed on asset original value: A = from 0 to 5%; C = from 10% to 30%; D = from 30% to 50%.

TABLE 5.42 **Absolute frequency of recoveries from bank guarantees**

Count	No guaranty at start	C	D
AU	1		23
EQ	2	4	163

Amount guaranteed on asset original value: C = from 10% to 30%; D = from 30% to 50%.

TABLE 5.43 **Recovery rates by bank guarantee**

EAD-weighted RRDIS6TOT	No guaranty	D
AU	58	75
EQ	43	57
RE	84	90

Amount guaranteed on asset original value: D = from 30% to 50%.

TABLE 5.44 **Anova table for EAD-weighted RRDIS6TOT for each segment and each class of IMPBANCC**

EAD-weighted RRDIS6TOT %	Fvalue	Pvalue
IMPBANCC	11.70	0.0007
SEGMENT	8.87	0.0002

TABLE 5.45 **Other valuable guarantees**

Corporate guarantors	2%
Personal guarantors	21%
Repurchase agreements with the asset supplier	2%

TABLE 5.46 **Absolute frequency of valuable personal guarantees**

Count	NA	NRIL	RIL
AU	188	60	41
EQ	482	138	185
RE	9	7	8

NA no specification; NRIL non-valuable guaranty, RIL valuable guaranty.

TABLE 5.47 **Recovery rates and personal guarantees**

EAD-weighted RRDIS6TOT	NA	NRIL	RIL
AU	,60	,52	,80
EQ	,43	,45	,48
RE	,84	1,07	,64

TABLE 5.48 **Anova table for EAD-weighted RRDIS6TOT for each segment and each class of FIDEIUSS (2 levels)**

EAD-weighted RRDIS6TOT %	Fvalue	Pvalue
FIDEIUSS	1.63	0.12
SEGMENT	10.85	0.0004

Costs and workout behaviors – Recovery procedure costs expressed as percentages of exposures at default range from 6.1% in equipment leasing to 7.6% in automotive leasing, while real estate remains in the middle (Tab. 5.49). The bulk of them are legal costs in the automotive and equipment segments and «other negative cash flows» for real estate (probably related to asset maintenance during resale procedures). Repossession costs are high for the automotive: the asset natural mobility tends to be a problem rather than an advantage. Outlay for revocation action in case of bankruptcy impacts recoveries in the three segments, especially in real estate. The impact of such costs on EAD is significant; no relative valuation can be provided as no comparable surveys are available. Even if a systematic comparison with the Bank of Italy's results is difficult because of the different research and reporting framework[11], a synthetic comparison can be achieved by considering a note in the study suggesting that gross recovery rates decrease by 4 percentage points because of such costs.

As gross recovery rates provided by the Italian Bank Supervisory Authority are un-weighted means, it is necessary to compare the un-discounted rrdis6tot of Tab. 5.26 with rrdis6gro, which is in all respects equal to the former rate except for its being gross of costs. The impact of costs is always higher than the estimates provided by the Bank of Italy. Results should be interpreted in the light of the following two elements:

a. here only «direct costs» for individual defaulted leases are considered and therefore general costs of workout offices are not included; even if leasing companies more often than banks rely on external legal firms for prosecuting defaulted borrowers, this point should produce lower costs in this survey than in the Bank of Italy's;
b. the cost definition is broader than the Bank of Italy's, as it encompasses the outlay for revocation action in case of bankruptcy and fair compensation set by courts in favor of lessees according to art. 1526 of the Civil Code.

A look at Tab. 5.49, however, shows that these items cannot fully explain the difference and thus leads us to conclude that such difference depends on the structural differences either between banks' and lessors' approaches or between bank loans and leasing contracts. As for the different approaches, the frequency distribution of recovery rates by sign has been calculated (Tab. 5.51). Many conclusions can be drawn:

1. in real estate leasing the frequency of positive (and very high) recovery rates is almost 100%;

[11] According to the Bank of Italy's (2001b) survey, internal personnel labor costs account for about 1% of operating costs for the sampled banks, while outside professional services represent 1.3% of the same costs; the ratio of both recovery costs on the stock of doubtful loans is about 1.2%.

2. positive recovery frequencies are similar in automotive and equipment segments; in the former, however, the recovery, if any, is full (in terms of arithmetic mean) or very high (in terms of weighted average);
3. the risk of incurring very negative recovery rates is not trivial in automotive leasing, but lessors are able to parameterize their efforts to the size of exposures at default (frequencies and negative rates levels are much lower if EAD-weighted).

Total recoveries from settlements with borrowers and/or guarantors, from insurances and other sources such as formal buy-back agreement with asset suppliers (TRETR) are faster than recoveries from asset sale to third parties (Tab. 5.52). The evidence resembles the shorter delay in out-of-court settlements surveyed by the Bank of Italy. Recoveries from bank guarantees are immediate. The comparison between EAD-weighted and recovery-weighted averages shows that in the equipment segment it takes longer to obtain large rather than small recoveries; in the other segments this situation is not apparent. The default-to – write-off lag does not impact recovery rates but it is indicative of workout and accounting approaches implemented by leasing companies. On average, this lag is about 36-40 months for the three segments (Tab. 5.53). The default-to-write-off lag is similar for southern and central regions (39 and 41 months respectively), only slightly longer than in the north.

TABLE 5.49 **Costs of recovery procedures**

EAD-weighted average	Segment		
	AU	EQ	RE
Leased asset repossession costs	1,3%	0,6%	0,0%
Legal costs	4,9%	3,7%	1,3%
Fair compensation set by courts in favor of lessees as per art. 1526 of Civil Code	0,0%	0,6%	0,3%
Outlay for revocation action in case of bankruptcy	0,4%	0,4%	0,8%
Other negative cash flow	0,9%	0,8%	4,4%
Total costs	7,6%	6,1%	6,8%

TABLE 5.50 **Recovery rates by discount rate (means)**

Percentile	RRDIS6GRO	RRDI6TOT
AU	1,08	77
EQ	,59	49
RE	1,00	90

TABLE 5.51 **Recovery rates by sign**

	Un-weighted row%			EAD-weighted row%			Un-weighted RRDI6TOT%			EAD-weighted RRDI6TOT%		
	Negative	Zero	Positive	Negative	Zero	Positive	Negative	Zero	Positive	Negative	Zero	Positive
AU	13,1	6,9	79,9	8,7	6,6	84,6	−1,35	,00	1,19	−,16	,00	,73
EQ	14,7	8,4	76,9	14,7	5,3	80,0	−,21	,00	,68	−,11	,00	,58
RE	4,2		95,8	2,3		97,7	−,42		,96	−,42		,87

TABLE 5.52 **Recovery lags from default (months)**

EAD-weighted averages	Segment			Group Total
	AU	EQ	RE	
TRETR from default	7	7	1	**7**
Recovery from asset sale (to third parties) from default	16	10	34	**14**
Recovery from collaterals from default	0	0	0	**0**
Recovery from bank guarantees from default	1	1	0	**1**
Recoveries-weighted average lag from default	14	13	34	**16**

TABLE 5.53 **Default to write-off lags: geographical distribution (EAD-weighted averages, months)**

EAD w	C	M	N	Group Total
AU	27	58	29	**36**
EQ	38	42	35	**37**
RE	67	7	36	**40**

Leasing company – Privacy reasons prevent individual lessors' average recovery rates from being clearly shown, but it is worth noticing that there are large differences in the recovery rates achieved by the different leasing companies (Tab 5.54 and Fig 5.9).

Statistical tests show an approximate 16% probability of equal means for each company when the market segment is taken into account (Tab. 5.55). As soon as the size of the dataset allows it, the determinants of these differences in recovery rates will be investigated.

FIGURE 5.9 **Boxplot of RRDIS6TOT weighted for each market segment and each lessor (without unit 261)**

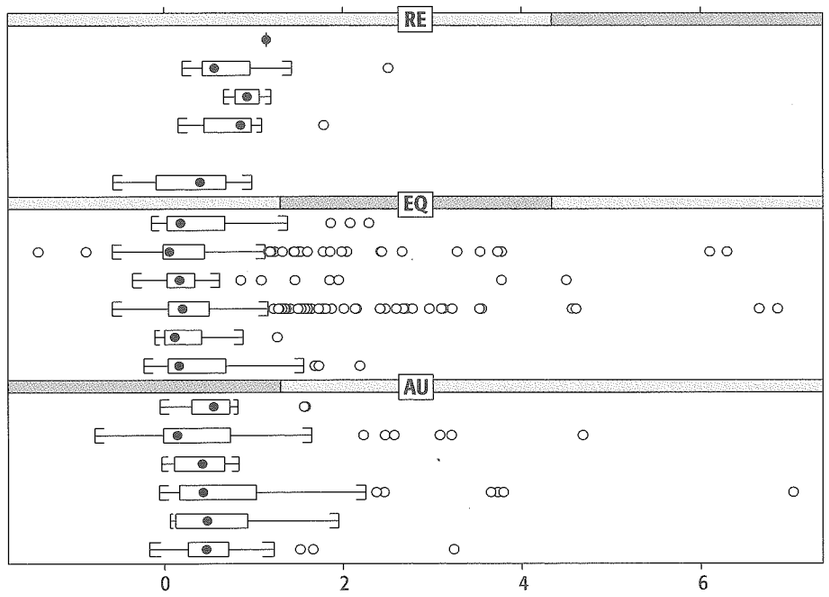


TABLE 5.54 **Recovery rates and lessors***

EAD-weighted RRDIS6TOT	AU	EQ	RE
Lessor	40	39	93
Lessor	46	38	86
Lessor	62	43	114
Lessor	64	29	
Lessor	68	43	27
Lessor	77	54	81

* Lessors are ordered according to recovery performance in automotive segment.

TABLE 5.55 **Anova table for each market segment and each lessor (without unit 261)**

EAD-weighted RRDIS6TOT %	Fvalue	Pvalue
SOCIET	1.60	0.157
SEGMENT	7.23	0

Multiple regression analysis – In regression analysis recovery rates have not been weighted by EAD, as it is not known in an ex ante perspective and as the original asset value is considered a potential explanatory variable.

RRINTERM is used as dependent variable in order to concentrate exclusively on recoveries resulting from the leased assets or from other explicit collaterals/guarantees as well as to consider the lessor's right provided for by the Italian law to take the whole amount recovered if it doesn't exceed the exposure at default capitalized by the interest rate on arrears. Anyway, its correlation with other recovery rate concepts is not lower than 90%, with a statistical significance of 99% (Tab. 5.56).

Fig. 5.10 shows that RRINTERM is characterized by a series of atypical values especially in the AU segment. Since the presence of outliers can seriously affect the results of the statistical analysis (e.g. Atkinson and Riani, 2000) and the purpose of a model consists in trying to explain the variability of the central section of the data, units presenting a RRINTERM value smaller than –1 or greater than 2 will not be considered.

The variables considered, a priori, as potentially useful for the explanation of the variability of RRINTERM are:

BENE	New or second-hand asset
BRARAE	RAE 216 business classes re-classification into 25 classes. Specifications follow.
CCBASS1	CCBASS 39 classes re-classification into 7 asset classes. Specifications follow.
CLADEPR	Two-year asset depreciation rate estimation (A = 0%-20%; B = 21%-30%; C = 31% – 40%; D = 41%-50%; E = 51%-60%; F = 61% – 80%; G = 81% – 100%)
CLAPROV	Italian provinces are re-classified into 3 areas: N = North (Valle d'Aosta; Piemonte; Lombardia; Trentino Alto Adige; Veneto; Friuli Venezia Giulia; Liguria; Emilia Romagna); C = Center (Toscana; Lazio; Umbria; Marche); M = South and Islands (Abruzzo; Campania; Molise; Basilicata; Puglia; Calabria; Sicilia; Sardegna)
DURCON	Leasing period
FIDEIUSS	Significant/Non-significant/absent personal guaranty
FORMGIUR	Borrowers legal form of organization
GAPEGIU	Significant/Non-significant/absent corporate guaranty
GROUTTO	or EAD, residual capital not yet expired at time of default (VAT excluded), overdue payments at default (rentals and other items) and one third of interest on arrears at default
ICSO	IMPCANST / ORVALUE
IMPBANCR	IMPBANC / ORVALUE
IMPCANOR	IMPCAN / ORVALUE * 100
IMPPEGNI	Collateral market value at leasing start

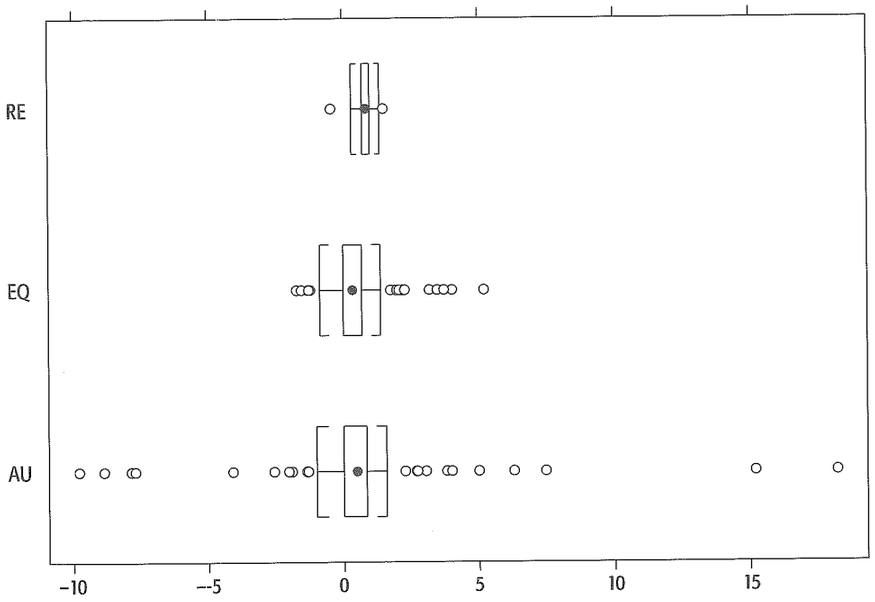
ORVALUE	Original asset value (VAT excluded, thousands of Euro)
ORVALUEX	Classes of ORVALUE: 0-13, 13-26, 26-52, > 52 (thousands of Euro)
ORVALUEW	Original asset value divided by the average of the segment
PARIAC	Significant/Non-significant/absent formal buy-back agreement with asset supplier
SAERI	105 SAE classes of activity (three digit code) aggregated into 32 SAERI classes of activity (two-digit code)
SOCIETA	Leasing Company
STATODE	Start date to default date interval, in months

TABLE 5.56 **Pearson's correlation coefficients among recovery rates**

		RRNOMTOT	RRNOM	RRNOMAS	RRDI6TOT	RRDI18TO	RRINTERM	RRDI6GRO
	Pearson Correlation							
RRNOMTOT	Sig. (2-tailed)							
	N							
	Pearson Correlation	,945*						
RRNOM	Sig. (2-tailed)	,000						
	N	1118						
	Pearson Correlation	,892*	,942*					
RRNOMAS	Sig. (2-tailed)	,000	,000					
	N	1118	1118					
	Pearson Correlation	,993*	,935*	,893*				
RRDI6TOT	Sig. (2-tailed)	,000	,000	,000				
	N	1118	1118	1118				
	Pearson Correlation	,943*	,880*	,855*	,976*			
RRDI18TO	Sig. (2-tailed)	,000	,000	,000	,000			
	N	1118	1118	1118	1118			
	Pearson Correlation	,899*	,953*	,925*	,918*	,920*		
RRINTERM	Sig. (2-tailed)	,000	,000	,000	,000	,000		
	N	1118	1118	1118	1118	1118		
	Pearson Correlation	,876*	,801*	,743*	,876*	,840*	,730*	
RRDI6GRO	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	
	N	1118	1118	1118	1118	1118	1118	

* Correlation is significant at the 0.01 level (2-tailed).

FIGURE 5.10 **Boxplot of RRINTERM for each segment**



After the stepwise automatic variable selection procedure, the covariates which have been included in the final regression model are the following 10: BRARAE, CCBASS1, CLAPROV, DURCON, FORMGIUR, IMPBANCR, PARIAC, SOCIET, GROUTTO, ORVALUE. The coefficients in the final regression model for each level of the qualitative as well as quantitative variables are given in Tab. 5.57.

TABLE 5.57 **Coefficients of quantitative variables**

General intercept	0.29
GROUTTO	-0.0015
ORVALUE	0.0015
DURCON	0.0025
IMPBANCR	0.32

As usual, the estimated coefficients show the signs of the relationship with recovery rates. For example, the coefficients of IMPBANCR, DURCON and

ORVALUE show that the size of bank guarantees, the length of contracts and the amount of the original value are positively related with recovery rates. On the contrary, the coefficient of GROUTTO shows a negative relationship with recovery rates. For example, the coefficient 0.0015 for ORVALUE points out that a 1000 Euro increase in ORVALUE (when all the other explanatory variables remain unvaried) corresponds to a 0.0015 increase in the recovery rate. As for the qualitative variables, the coefficients for the different levels are provided along with the level true average and the level number of units (from Tab. 5.58 to Tab. 5.62).

TABLE 5.58 **CLAPROV (Geographical area of borrowers)**

Levels	Coefficients	Average of the level	Number of units in the level
C	-0.03	0.32	208
M	-0.01	0.38	260
N	0.04	0.43	616

TABLE 5.59 **FORMGIUR (form of organization of borrowers)**

Levels	Coefficients	Average of the level	Number of units in the level
A	-0.07	0.28	28
DI	-0.05	0.36	388
SAS	0.04	0.43	92
SNC	-0.03	0.39	158
SPA	0.09	0.45	57
SRL	0.02	0.43	361

TABLE 5.60 **CCBASS1 (asset type)**

Levels	Coefficients	Average of the level	Number of units in the level
17	-0.12	0.26	51
21	-0.18	0.28	67
35	-0.09	0.39	127
49	-0.06	0.38	547
61	0.06	0.47	186
62	0.09	0.42	82
72	0.29	0.81	24

TABLE 5.61 **BRARAE (business class of borrowers)**

Levels	Coefficients	Average of the level	Number of units in the level
11	0.07	0.30	1
51	0.04	0.43	12
52	0.21	0.62	1
53	0.08	0.46	3
54	−0.15	0.30	22
55	0.06	0.42	17
56	−0.10	0.36	42
57	−0.04	0.32	42
58	0.01	0.37	21
59	−0.04	0.41	15
60	−0.28	0.26	8
61	−0.03	0.36	45
62	0.05	0.42	89
63	−0.14	0.29	35
64	0.06	0.43	11
65	0.21	0.63	42
66	0.03	0.43	121
67	−0.10	0.34	239
68	−0.02	0.45	60
69	0.11	0.48	34
71	0.13	0.52	15
73	0.01	0.41	202
FC	−0.15	0.14	7

TABLE 5.62 **PARIAC (buy-back agreements with asset suppliers)**

Levels	Coefficients	Average of the level	Number of units in the level
NRIL	−0.098	0.39	1062
RIL	0.098	0.56	22

As far as variable CLAPROV is concerned, as expected, levels C and M show negative coefficients, while level N shows a positive relation with the recovery rate. Note that the different values for variable CLAPROV in level N and M reflect exactly the (un-weighted) difference in the respective means.

As for variable FORMGIUR, SPA (i.e. the corporation) is, as expected, the form of organization with the strongest positive relationship with recovery rates. In fact, SPA shows the highest average among the different levels. SAS and SRL have a positive coefficient too. On the other hand, our model suggests that sole proprietorships (DI), partnerships (SNC) and other organizations (A) have a negative impact on recovery rates. As far as the asset type (CCBASS1) is concerned, it is interesting to notice that level 72 (real estate) has by far the highest positive coefficient. In this variable the two lowest negative coefficients are associated with levels 17 and 21 («equipments for building industries» and «computers»).

The two levels have true averages of respectively 0.26 and 0.28 (the smallest for this variable). As for the type of business (BRARAE), the 3 smallest negative coefficients are associated with levels 54, 60 and FC («non metallic minerals and mineral products» «transport means», «religious institutions and families»). In fact, on the average, lessors were able to recover only 14% of the original value of the asset when dealing with firms belonging to level FC. Finally, for PARIAC variable, the model points out that the presence of relevant buy-back agreements with asset supplier, on the average, increases the recovery rate by 0.20 (the difference in true averages, 0.56-0.39, is equal to 0.17). It is interesting to notice that though the differences in the coefficients tend to approximately reflect the difference in the averages of the corresponding levels, sometimes they are quite different.

For example, in the case of BRARAE, the lowest coefficient is associated with level 60, while the lowest average is for level FC. This phenomenon can be easily explained by observing the different number of units falling inside each level and remembering that this is a multivariate regression model which considers different phenomena simultaneously.

The coefficients associated with every covariate must be interpreted as the relationship with the recovery rate after taking into account the values of all the other variables in the model. In conclusion, all coefficients are perfectly consistent with expectations and generally reflect the differences in the averages. This implies that the model, on the average, provides estimates which are in line with the averages of the different variable combinations. However, as we have seen in the box-plots in the previous sections, each level is characterized by considerable variability.

The high volatility inside each level in this model is reflected by the low value of R^2 coefficient (0.20). This value shows that although these variables are 5% significant (apart from that of 5.5%) for the explanation of the differences in the recovery rates expressed by RRINTERM (Tab. 5.63), a considerable proportion of variability (80%) still remains unexplained. If a weighted regression is performed by using ORVALUE as weight, R^2 final value will be greater than 0.3.

TABLE 5.63 **Type III Sum of Squares of the final model**

	Df	Sum of Sq	Mean Sq	F Value	Pr (F)
BRARAE	22	7.0125	0.318752	2.18086	0.00132004
CCBASS1	6	7.1351	1.189177	8.13620	0.00000001
CLAPROV	2	0.9842	0.492080	3.36675	0.03487881
DURCON	1	0.5503	0.550263	3.76483	0.05261177
FORMGIUR	5	1.7074	0.341472	2.33631	0.04017692
IMPBANCR	1	1.8654	1.865449	12.76316	0.00036974
PARIAC	1	0.7408	0.740789	5.06838	0.02457465
SOCIET	5	2.3555	0.471090	3.22314	0.00680157
GROUTTO	1	2.4434	2.443440	16.71770	0.00004673
ORVALUE	1	3.9867	3.986703	27.27650	0.00000021

Given that contracts with R^2 highest value are mainly found in real estate, it is clear that in this case the regression plane tries to explain the differences in the recovery rates of the RE segment. Finally, R^2 value depends considerably on the sample size and on the number of outliers the researcher is willing to remove. The removal of a larger proportion of atypical values obviously leads to better R^2 values, but it may produce over-fitting. In this analysis only the units with recovery rates very far from the bulk of the data have been removed. Another aspect which is worth mentioning is that the design is strongly unbalanced owing to the highly different number of units in each level. Sometimes the very small number associated with certain levels make the estimated coefficients very unstable. On the other hand, this phenomenon may have led us to find certain variables as non significant.

To better explain this problem let us consider, for example, the RRINTERM average of the units with and without IMPBANCR. If all the units are used, the values will be respectively 0.53 and 0.37 (without the outliers for RRINTERM, they will become 0.54 and 0.33).

The difference in the two means, if tested, turns out to be significant. However, if IMPBANCR is divided into classes and the average for each class is represented, the –0.39 average negative recovery rate for class 0.38-0.39 is clearly due to the small number of units falling inside this class. In short, the request for information about each level of the explanatory variables in our dataset could not be fulfilled due to the small amount of data under analysis. However, a larger number of data will enable us to retest certain variables and thus gain additional insights about the impact of each level.

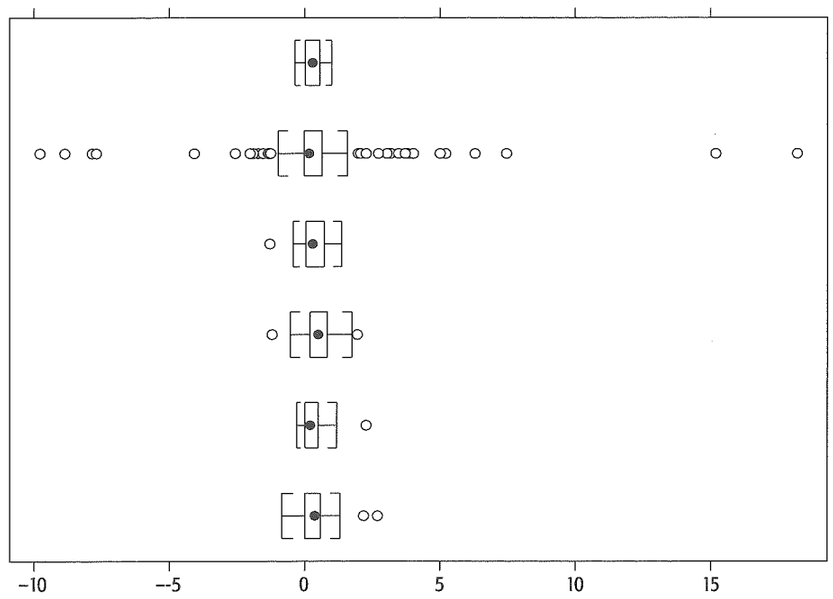
In addition, the lack of data has forced us to dichotomize (relevant / not relevant) pure quantitative variables such as the amount of personal guarantees (IMPPEGNI).

A final note of caution concerns the way in which data have been collected by the different lessors (data coming from one lessor show a far higher dispersion compared with those provided by other lessors).

Fig. 5.11 clearly shows the data collection process has not been homogeneous among the different lessors. In the future, the presence of a larger number of data will make it necessary to check this additional source of variation. Thanks to such additional data, it will be possible to construct sub-models related to some particular lessors, to retest the significance of the variables and study the presence of possible interactions between qualitative variables. A further field or research might be the explanation of recovery rates variability by introducing non-linear effects or the explanation of the differences in recovery rates from the point of view of discriminant analysis.

Besides, the presence of data collected over the years will allow the stability of the suggested model to be tested and the inter-temporal volatility of recovery rates to be studied. In fact, in studies based on the market price of defaulted instruments, predictability over time is questioned (Fridson, Garman and Okashima, 2000; Fridson, 2000).

FIGURE 5.11 **RRINTERM distribution for the six lessors**



5.6 CONCLUSIONS

Results concerning the absolute and relative (to other mitigation tools) contribution of the leased asset to recovery rates indicate that the bulk of recovery rates come from the leased assets sale to third parties or to lessees. In the real estate segment it leads to very high and stable recovery rates. Time lags on the bank loans recoveries surveyed by the Bank of Italy are well above those on leasing: this evidence confirms the lessors' long standing belief that the legal ownership of the asset leads the leasing industry to obtain recoveries faster than banks. Leasing recovery rates appear to fully deserve the new treatment outlined in the Consultative Paper of April 2003 (Basel Committee on Banking Supervision, 2003). Recovery rates in real estate leases are much more protective than those on bank loans collateralized by real estates. Results concerning the factors possibly affecting the level of recovery rates show that many are statistically highly significant. Among them, leasing market segments present very different means and distributions, real estate and automotive leasing being considerably more protective for lessors. Again, this result poses a serious question about the almost uniform treatment of automotive and equipment leases in The New Basel Capital Accord, both in the standardized approach and in the foundation IRB approach, where LGD are set by Supervisory Authorities. A second factor is geography. PD and LGD are differently distributed in the country; in the southern regions the probability of default is much higher according to generally available data, but leasing companies adopt a tougher credit policy in order to minimize exposures when default occurs by rejecting lessees unable to pay for a relatively longer period prior to default and entering contracts with more conservative rentals structures.

Results concerning the relative contribution of variables to the explanation of the cross sectional variability of asset-based recovery rates indicate that variables providing a significant role are: type of business, legal form of organization and geographical area of borrowers, asset type, leasing period, nominal amount of bank guaranty at leasing start with respect to original value, relevant repurchasing agreements, lessors and original value of the asset. The exposure at default also is an important variable; this confirms the necessity of an appropriate model for estimating EAD.

The amount of bank guarantees, the length of the contracts, the amount of the original value and the presence of relevant repurchase agreements, are positively related with recovery rates. On the contrary, the coefficient of gross outstanding at default shows a negative relationship with recovery rates. As far as the form of organization is concerned, the «corporation» is the one with the strongest positive relationship with the recovery rate. In addition, our model suggests that «sole proprietorships», «partnerships» and «other organizations» have a negative impact on recovery rates. As for the asset type, «real estate» as expected shows higher recovery rates. On the other hand, the two lowest negative coefficients are associated with «equipments for building industries» and «computers». While all the coefficients signs are consistent with expectations and all the variables, apart from one, are statistically significant at 5% level for the explanation of the differences in recovery rates, the large volatility of rates inside each level and the limited sample size for each level are reflected by the small value of R^2 coefficient. This suggests results should be extended towards new and multiple directions.

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