The AIFM Directive requires AIFM to compute the Leverage of the AIFs they manage under the Gross and the Commitment method. The methodologies to compute the Leverage under both approaches have been discussed widely; within this paper we do want to focus on the formulas to compute the exposures at the product level without considering the netting and hedging arrangements.

1. Introduction

Any AIFM managing leveraged AIF must assess the Leverage under the Gross and the Commitment method and makes available the result to the regulator. In order to compute the Leverage, the AIFM must compute the exposure of every AIF's position according the ESMA guidelines, for instance Derivatives must be converted into their underlying equivalent positions. Within this paper, one decided to focus on the exposure computations at the product level.

The first Section of this paper is devoted to introduce the AIFM requirements in terms of Leverage, the Second one is dedicated to the formulas to compute the exposure *per* product type.

2. The AIFMD Regulatory Leverage in a Nutshell

The Alternative Investment Fund Managers Directive N° 231/2013 and the ESMA consultation paper ESMA/2011/209 define the Leverage as:

> "*Any method by which an AIFM increases the exposure of an AIF it manages whether through borrowing of cash or securities, or leverage embedded in derivative positions or by any other means.*"

The leverage of the AIFM – both under the Gross and the Commitment method – is computed from the exposure of the Fund's assets and liabilities; the regulator distinguishes the Gross from the Commitment methods as:

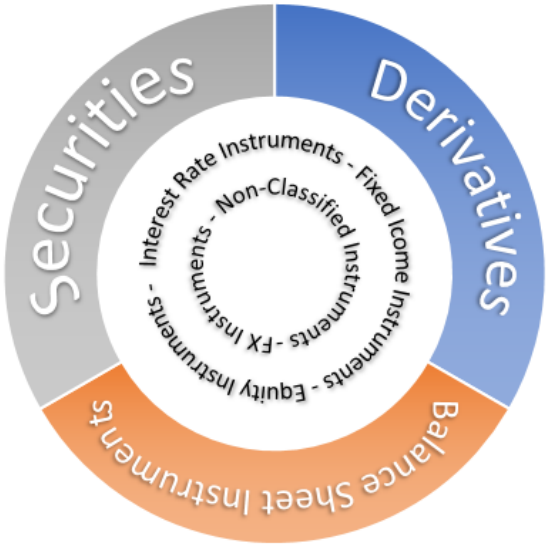
> "*The gross method gives the overall exposure of the AIF whereas the commitment method gives insight in the hedging and netting techniques used by the manager; therefore both methods shall be seen in conjunction.*"

Let us precise that the Leverage as defined by the regulator does not assess how much a Fund would lose if equities would drop to a zero value or if all credit-related instruments would default, then a kind of jump-to-default *scenario*, but well a hybrid approach where the exposure of each position is explained by its underlying equivalent position.

3. The Exposure *per* Product

Independently from the netting and hedging arrangements, the Duration netting rules or the specific methodology differentiating the Gross Leverage from the Commitment Leverage, measuring the Leverage is - based on the regulator expectations - all about assessing the exposure *per* product type. The below list summarizes the exposure computations expected by the regulator, please note that the list is non-exhaustive and that, considering the specificities required by the regulator, performing a simple mapping is not enough, and an in-depth analysis of the portfolio must be performed.

One decided to structure the classification into three main segments: Securities, Derivatives, and Balance Sheet Instruments.



Please find, on the next pages, the list *per* product type:

Derivatives				
Product	Classification	Definition	Definition Source	Exposure Formula
Barrier Option	Equity Instruments	An option whose payoff depends on whether the path of the underlying asset has reached a barrier.	John C. Hull	Number of Contracts * Notional Contract Size * Market Value of Underlying Equity Share * Maximum Delta *Scenario*
Contract for Differences (CFD)	Equity Instruments	Contract where two parties agree to exchange the difference between the opening and closing prices of a financial instrument, including shares or commodities.	FT	Number of Underlying Assets * Market Value of Underlying Referenced Instrument
Equity Forward Option	Equity Instruments	A contract giving the right to the holder to buy or sell a forward at a predetermined delivery price on or before the expiration of the option.	Internal	Notional Contract Value * Market Value of Underlying Reference Forward * Delta
Equity Future	Equity Instruments	A contract that obligates the holder to buy or sell an equity at a predetermined delivery price on the expiration of the future.	Internal	Number of Contracts * Notional Contract Size * Market Value of the Underlying Equity Share
Equity Index Future	Equity Instruments	A contract that obligates the holder to buy or sell an index at a predetermined delivery price on the expiration of the future.	Internal	Number of Contracts * Notional Contract Size * Index Level
Equity Option	Equity Instruments	The right to buy or sell an equity at a predetermined price on or before the expiration of the option.	Internal	Number of Contracts * Notional Contract Size * Market Value of Underlying Reference Equity * Delta
Warrants and Rights	Equity / FI Instruments	The right to buy or sell an asset at a predetermined price before expiration.	Internal	Number of Shares/Bonds * Market Value of Underlying Referenced Instrument * Delta
Bond Future	Fixed Income Instruments	A contract that obligates the holder to buy or sell a bond at a predetermined delivery price on the expiration of the future.	Internal	Number of Contracts * Notional Contract Size * Market Price of the Cheapest-to-Deliver Reference Bond
Bond Option	Fixed Income Instruments	The right to buy or sell a bond at a predetermined price on or before the expiration of the option.	Internal	Notional Contract Value * Market Value of Underlying Reference Bond * Delta
Credit Future Option	Fixed Income Instruments	The right to buy or sell a future at a predetermined delivery price and on or before the expiration of the option.	Internal	Number of Contracts * Notional Contract Size * Market Value of Underlying Asset * Delta
Credit Index Future	Fixed Income Instruments	A contract that obligates the holder to buy or sell an index at a predetermined delivery price on the expiration of the future.	Internal	Number of Contracts * Notional Contract Size * Index Level
Optionable Bond, Warrants and Rights	Fixed Income Instruments	The right to buy or sell an asset at a predetermined price before expiration.	Internal	Market Value of Underlying Reference Asset(s)
Repurchase Agreement (REPO)	Fixed Income Instruments	A procedure for borrowing money by selling securities to a counterparty and agreeing to buy them back later at a slightly higher price.	John C. Hull	0 (but the Reinvestment of the Cash Collateral has an Exposure Depending on the Product Type)
Reverse Repurchase Agreement (Reverse REPO)	Fixed Income Instruments	A procedure for lending money by purchasing securities to a counterparty and agreeing to sell them back later at a slightly higher price.	John C. Hull	0 (the Exposure is for the Counterparty)
Securities Lending	Fixed Income Instruments	Agreement where one counterparty agrees to borrow a security from a security-lending counterparty for an agree fee (usual to cover short selling).	Internal	0 (but the Reinvestment of the Collateral has an Exposure Depending on the Product Type)
Treasury Future	Fixed Income Instruments	A contract that obligates the holder to buy or sell a Treasury bond at a predetermined delivery price on the expiration of the future.	Internal	Number of Contracts * Notional Contract Size * Market Price of the Treasury
Treasury Future Option	Fixed Income Instruments	The right to buy or sell a Treasury future at a predetermined price on or before the expiration of the option.	Internal	Notional Contract Value * Market Value of Underlying Reference Treasury Bond * Delta
FX Forward (Currency Forward)	FX Instruments	Contract to exchange one currency in another currency at a predetermined FX rate, and on a predetermined future date .	Internal	Notional Value in Currency Leg(s)
FX Future (Currency Future)	FX Instruments	Contract to exchange one currency in another currency at a predetermined FX rate, and on a predetermined future date .	Internal	Notional Value in Currency Leg(s)
FX Future Option	FX Instruments	Contract giving the right to exchange one currency in another currency at a predetermined future FX rate, and on or before a predetermined future date .	Internal	Notional Contract Value * Market Value of Underlying Reference Contract * Delta
FX Option	FX Instruments	Contract giving the right to exchange one currency in another currency at a predetermined FX rate, and on or before a predetermined future date .	Internal	Notional Value in Currency Leg(s) * Delta

Cap / Floor	Interest Rate Instruments	An instrument where the buyer will receive payments when the observed interest rates exceed a predetermined price.	Internal	Notional Value of the Contract
Credit-Default-Swap (CDS)	Interest Rate Instruments	An instrument that gives the holder the right to sell a bond for its face value in the event of a default by the issuer.	John C. Hull	**Protection Seller**: Max(Market Value Underlying Asset, Trade Notional) **Protection Buyer**: Market Value Underlying Asset
Credit-Default-Swap Basket (Basket CDS)	Interest Rate Instruments	Similar to a single name CDS, except that the underlying is a backet of entities.	Internal	**Protection Seller**: Max(Market Value Underlying Assets, Trade Notional) **Protection Buyer**: Market Value Underlying Asset
Cross-Currency Interest Rates Swap	Interest Rate Instruments	A swap where interest and principal of a loan in one currency are exchanged for interest and principal of an equally valued loan in another currency.	Internal	Notional Value in Currency Leg(s)
EuroDollar Future	Interest Rate Instruments	A future contract written on a EuroDollar deposit, *i.e.* a deposit in Dollar held in a Bank outside the U.S.	John C. Hull	Number of Contracts * Notional Contract Size * Market Price of the Theoretical Instrument Value
EuroDollar Future Option	Interest Rate Instruments	The right to buy or sell a EuroDollar future at a predetermined delivery price and on or before the expiration of the option.	Internal	Number of Contracts * Notional Contract Size * Market Value of Underlying Reference Contract * Delta
Forward Rate Agreement (FRA)	Interest Rate Instruments	Agreement that a certain interest rate will apply to a certain principal amount for a certain time period in the future.	John C. Hull	Notional Value
Interest Rate Future	Interest Rate Instruments	A contract where the buyer is obliged to pay a predetermined fixed interest rate and receive the variable rate on a predetermined date.	Internal	Number of Contracts * Notional Contract Size
Interest Rate Option	Interest Rate Instruments	An option where the buyer has the right to pay the fixed interest rate and receive the variable rate on or before the expiration of the option.	Internal	Number of Contracts * Notional Contract Size * Delta
Interest Rate Swap (IRS)	Interest Rate Instruments	An exchange of a fixed rate of interest on a certain notional principal for a floating rate of interest on the same notional principal.	John C. Hull	Market Value Underlying Asset or, Notional Value of the Fixed Leg
Municipal Market Data Rate Lock	Interest Rate Instruments	An agreement whereby an issuer who anticipates issuing bonds at a future date can effectively lock in a specified interest rate.	MSRB	Notional value
Swaption	Interest Rate Instruments	An option to enter into an interest rate swap where a specified fixed rate is exchange for floating.	John C. Hull	Swap Commitment Amount * Delta
Total-Return-Swap (TRS)	Interest Rate Instruments	A swap where the return of an asset such as a bond is exchanged for LIBOR plus spread. The return on the asset includes income such as coupons and the change in value of the asset.	John C. Hull	Cumulative Underlying Market Value of Underlying Assets
Variance Swap	Non-Classified Instruments	Forward contract on the future realised variance of an underlying asset.	Internal	$Variance\ Notional = \frac{Vega\ Notional}{2 * Strike}$ $Variance_t = \frac{t}{T} * Realised\ Volatility(0,t)^2 + \frac{T-t}{T} * Implied\ Volatility(t,T)^2$ **Without Volatility Cap**: Variance Notional * $Variance_t$ **With Volatility Cap**: Variance Notional * Min($Variance_t$, Volatility Cap^2)
Volatility Swap	Non-Classified Instruments	Forward contract on the future realised volatility of an underlying asset.	Internal	**Without Volatility Cap**: Vega Notional * $Volatility_t$ **With Volatility Cap**: Vega Notional * Min($Volatility_t$, Volatility Cap)

Securities				
Product	Classification	Definition	Definition Source	Exposure Formula
Equity	Equity Instruments	Stock representing an ownership interest.	Internal	Market Value of the Position
Asset-Backed Security (ABS)	Fixed Income Instruments	Security created from the cash-flows from bonds, mortgages, credit, card receivables, or other instruments.	John C. Hull	Market Value of the Position
Bond	Fixed Income Instruments	Debt instrument where the investor lends money to the borrower in exchange of an agreed remuneration (*i.e.* coupon).	Internal	Market Value of the Position
Collateralized Mortgage Obligation (CMO)	Fixed Income Instruments	Specific class of ABS divided into Risk and maturity buckets.	Internal	Market Value of the Position
Credit Linked Note	Fixed Income Instruments	A security allowing to transfer a specific credit risk to credit investors.	Internal	Market Value of Underlying Reference Asset(s)
Floating Rate Note	Fixed Income Instruments	Medium-term debt instrument with an interest rate that varies according to changes in a money market benchmark such as Treasury bill rates or the LIBOR.	FT	Market Value of Underlying Reference Asset(s)
Inflation-Protected Bond	Fixed Income Instruments	Bond guaranteeing a real return on your investment and not a nominal return.	Internal	Market Value of Underlying Reference Asset(s)
Mortgage-Backed Security (MBS)	Fixed Income Instruments	Specific type of ABS investing in a pool of Real-Estate loans.	Internal	Market Value of Underlying Reference Asset(s)
Convertible Bond	Non-Classified Instruments	A corporate bond that can be converted by the holder into a predetermined amount of the company's equity at certain times during its life.	John C. Hull	Number of Referenced Shares * Market Value of Underlying Reference Shares * Delta
Fund and SPV	Non-Classified Instruments	Share-class investment in Funds or other vehicles.	Internal	Look-through or Market Value
Partly Paid Securities	Non-Classified Instruments	Securities where partial payments have been made and the company is allowed to make future calls until the security is fully paid.	Internal	Number of Shares/Bonds * Market Value of Underlying Referenced Instruments

Balance Sheet Instruments				
Product	Classification	Definition	Definition Source	Exposure Formula
Borrowing	Fixed Income Instruments	Debt instrument where the investor lends money to the borrower in exchange of an agreed remuneration, it can be secured (by a pool of assets), or unsecured.	Internal	0 (but Reinvestments Have Exposure Depending on the Product Type)
Convertible Borrowing	Fixed Income Instruments	Borrowing giving the opportunity, under certain circonstances, to the borrower to convert the debt into another instrument.	Internal	Market Value of the Borrowing
Cash	Non-Classified Instruments	Cash accounts.	Internal	Market Value of Underlying Reference Asset(s)

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