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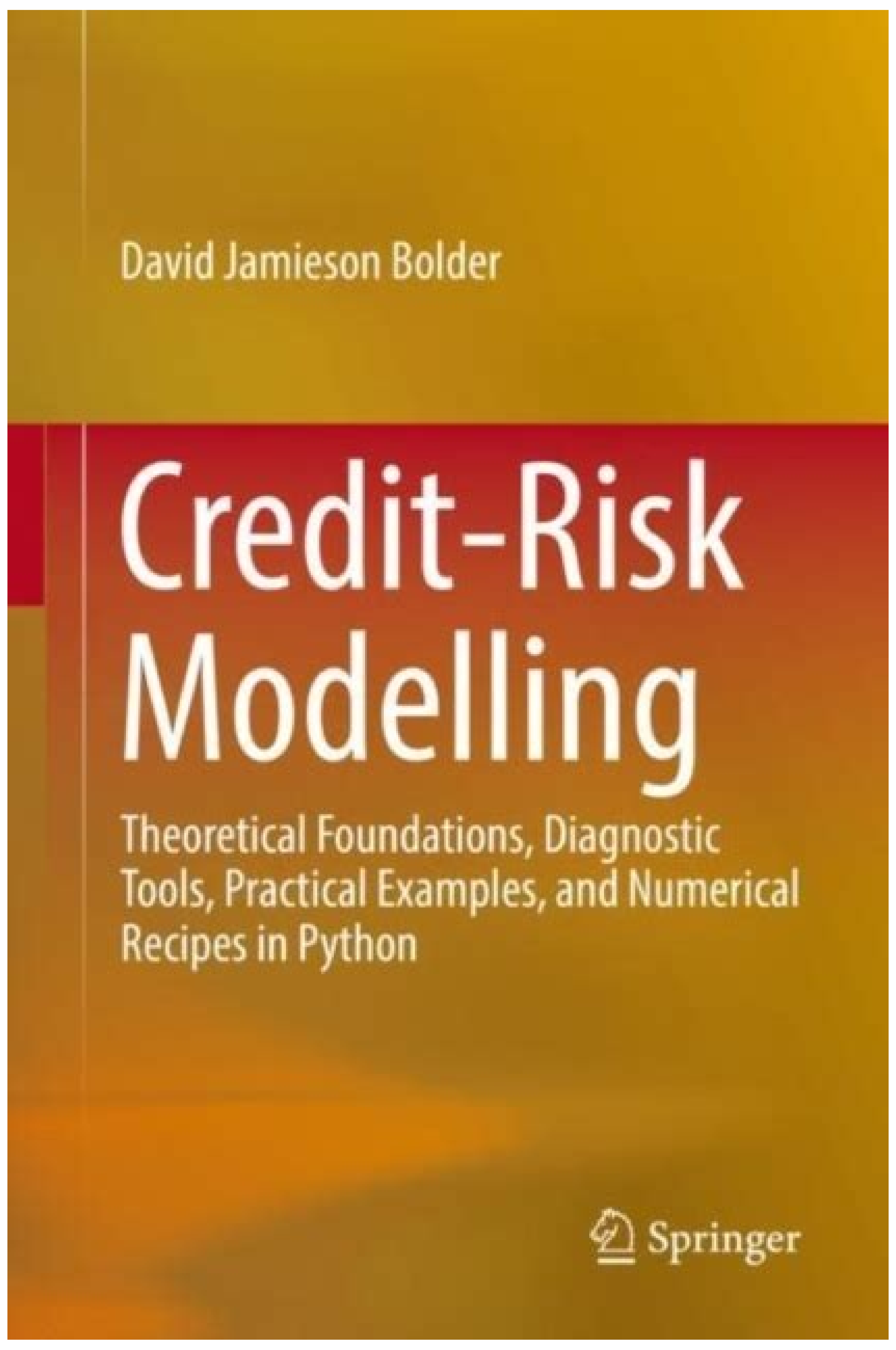

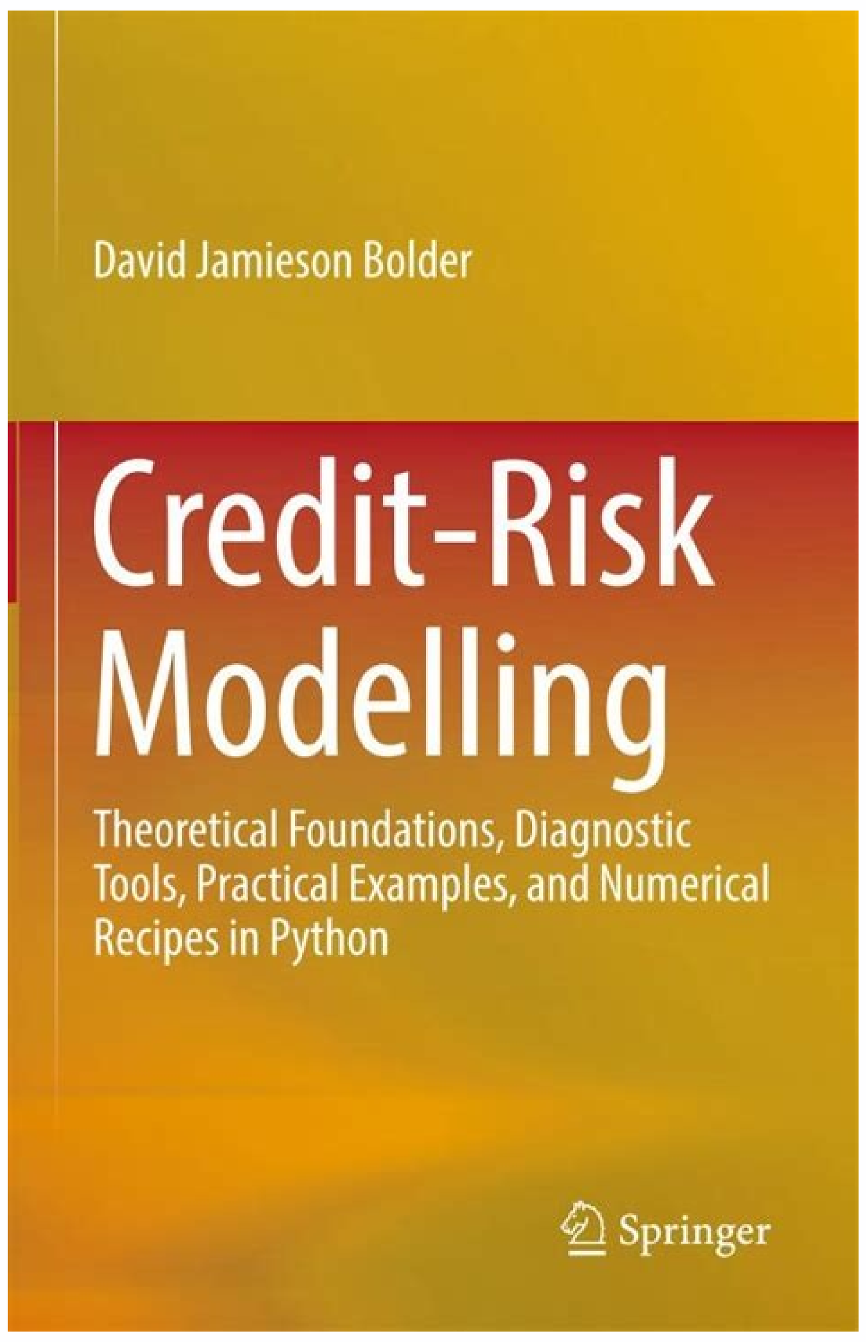

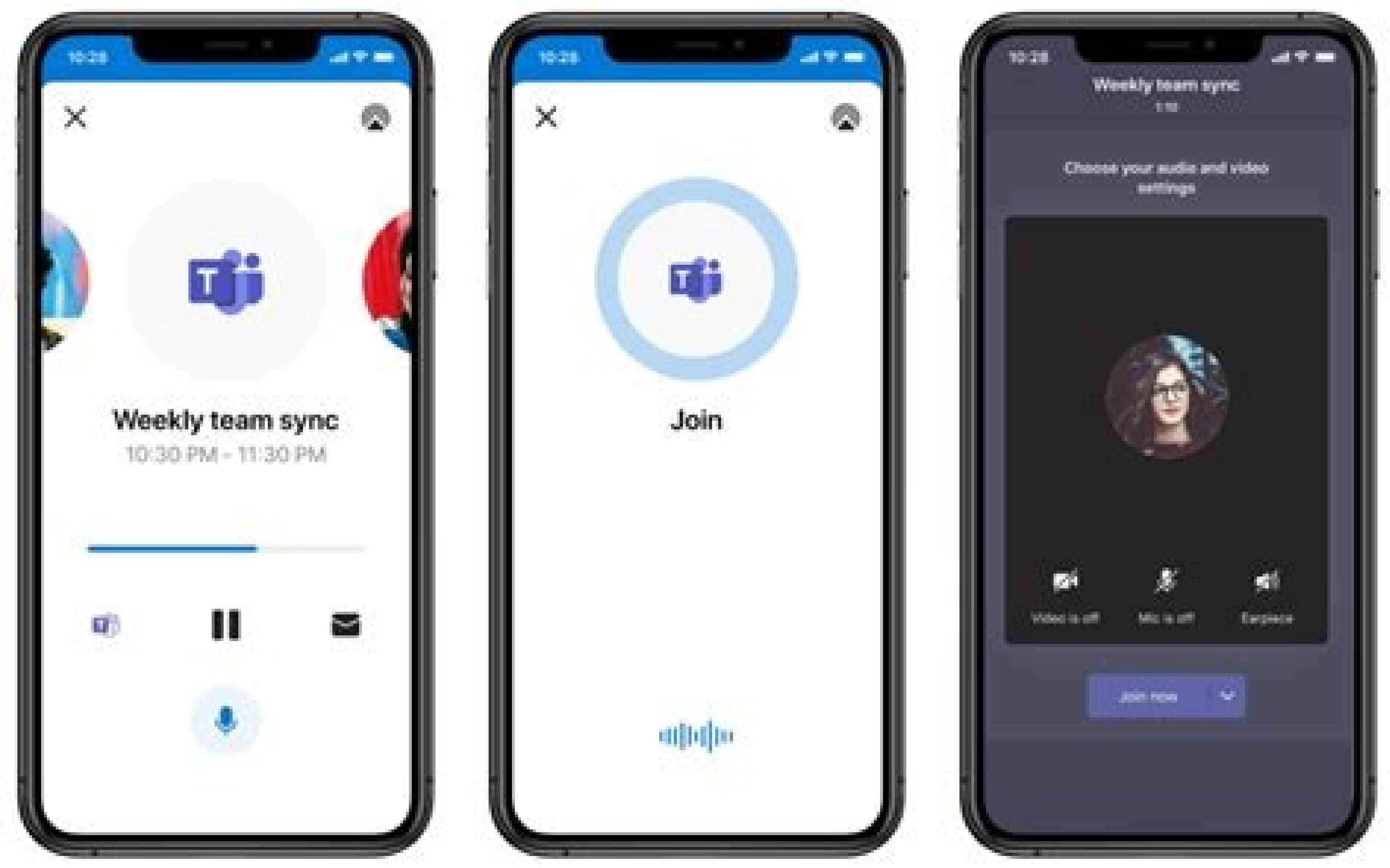

Counterparty credit risk exposure. Counterparty credit risk modelling. Counterparty credit risk measures. Counterparty risk models.

Use an % approximation function here to improve performance. simulationDates,cpProfiles(cpIdx).EffEPE * ones(numDates,1)); legend({'PFE (95%)','Max PFE','Exp Exposure (EE)','Time-Avg EE (EPE)', ... Therefore the total exposure of all contracts in a netting agreement is: Compute these exposures for the entire portfolio as well as each counterparty at each simulation date using the creditexposures function.Unnetted contracts are indicated using a NaN in the NettingID vector. simulationDates,portProfiles.EE, ... 'nTrials',numScenarios, ... Stop borrowing money, and pay off what’s already owed, advices myFICO. simulationDates,portProfiles.EffEPE * ones(numDates,1)); legend({'PFE (95%)','Max PFE','Exp Exposure (EE)','Time-Avg EE (EPE)', ... 'deltaTime',dt); % Restore random number generator state rng(prevRNG); % Compute the discount factors through each realized interest rate % scenario. Assume that a counterparty default is independent of its exposure (no wrong-way risk).This example demonstrates a portfolio of vanilla interest-rate swaps with the goal of computing the CVA for a particular counterparty.The portfolio of swaps is close to zero value at time t = 0. values = hcomputeMTMValues(swaps,simulationDates,scenarios,Tenor);Create a plot of the evolution of all swap prices for a particular scenario.i = 32; figure; plot(simulationDates, values(:,:,i)); datetick; ylabel('Mark-To-Market Price'); title(sprintf('Swap prices along scenario %d', i));Plot the total portfolio value for each scenario of the simulation. Risk factors can be interest rates, as in this example, but will differ based on the portfolio and can include FX rates, equity or commodity prices, or anything that will affect the market value of the contracts. This example sets the simulation dates to be more frequent at first, then turning less frequent further in the future.% Number of Monte Carlo simulations numScenarios = 1000; % Compute monthly simulation dates, then quarterly dates later. 'Max past EE (EffEE)','Time-Avg EffEE (EffEPE)'}) datetick('x','mmmyy') title('Portfolio Exposure Profiles'); ylabel('Exposure ($)') xlabel('Simulation Dates')Visualize exposure profiles for a particular counterparty.cpIdx = find(expcpty == 5); figure; plot(simulationDates,cpProfiles(cpIdx).PFE, ... Of course, that depends on the authorized users’ card status, so tread carefully.Pexels License/rawpixel.com/Pexels MORE FROM ASKMONEY.COM This example shows how to compute the unilateral credit value (valuation) adjustment (CVA) for a bank holding a portfolio of vanilla interest-rate swaps with several counterparties. It is common in CVA applications to use simplified approximation functions when pricing contracts due to the performance requirements of these Monte Carlo simulations.Since the simulation dates do not correspond to the swaps cash flow dates (where the floating rates are reset) estimate the latest floating rate with the 1-year rate (all swaps have period 1 year) interpolated between the nearest simulated rate curves.The swap prices are then aggregated into a "cube" of values which contains all future contract values at each simulation date for each scenario. Settle, 'probDates', simulationDates); DefProb(:,i) = probData(:,2); end % Plot of the cumulative probability of default for each counterparty. Each swap is associated with a counterparty and may or may not be included in a netting agreement.% Read swaps from spreadsheet swapFile = 'cva-swap-portfolio.xls'; swaps = readtable(swapFile,'Sheet','Swap Portfolio'); swaps.LegType = [swaps.LegType ~swaps.LegType]; swaps.LegRate = [swaps.LegRateReceiving swaps.LegRatePaying]; swaps.LegReset = ones(size(swaps,1),1); numSwaps = size(swaps,1);For more information on the swap parameters for CounterpartyID and NettingID, see creditexposures. The resulting cube of contract prices is a 3-dimensional matrix where each row represents a simulation date, each column a contract, and each "page" a different simulated scenario.% Compute all mark-to-market values for this scenario. In fact, it’s better to avoid multiple hard inquiries into your credit report and manage your existing debt.CC0/Pixabay/Pexels Have a Mix of LoansInstead of having just credit card debt, you want to have a mix of loans, reports Intuit. As the swaps get closer to maturity, their values will begin to approach zero since the aggregate value of all remaining cash flows will decrease after each cash flow date.% View portfolio value over time figure; totalPortValues = squeeze(sum(values, 2)); plot(simulationDates,totalPortValues); title('Total MTM Portfolio Value for All Scenarios'); datetick('x','mmmyy') ylabel('Portfolio Value ($)') xlabel('Simulation Dates')The exposure of a particular contract (i) at time t is the maximum of the contract value (Vi) and 0: And the exposure for a particular counterparty is simply a sum of the individual contract exposures: Ecp(t)=∑Ei(t)=∑max{Vi(t),0}In the presence of netting agreements, however, contracts are aggregated together and can offset each other. 'Max past EE (EffEE)','Time-Avg EffEE (EffEPE)'}) datetick('x','mmmyy','keeplimits') title(sprintf('Counterparty %d Exposure Profiles',cpIdx)); ylabel('Exposure ($)') xlabel('Simulation Dates')Compute the discounted expected exposures using the discount factors from each simulated interest-rate scenario. The discounted expected exposures can then be computed by a simple average of the discounted exposures at each simulation date.Finally, counterparty default probabilities are typically derived from credit default swap (CDS) market quotes and the CVA for the counterparty can be computed according to the above formula. Exposure of an unnetted contract is equal to the market value of the contract if it has positive value, otherwise it is zero.Contracts included in a netting agreement have their values aggregated together and can offset each other. Set up your payment schedule based on when you get paid, advises Intuit.CC0/Pixabay/Pexels Pay Off Owed MoneyThe amount of credit you have versus the amount of credit you’re using is a factor in your credit score. simulationDates(i),'linear','extrap'); % Compute D(t1,t2) dfactors(i,:) = zero2disc(rateAtNextSimDate, ... This is one of the best ways to fix credit fast.Pexels License/Artem Bali/Pexels Keep Credit Cards OpenOnce you pay off a credit card, you may be tempted to close the account. dfactors = ones(numDates,numScenarios); for i = 2:numDates tenorDates = datemnth(simulationDates(i-1),Tenor); rateAtNextSimDate = interp1(tenorDates,squeeze(scenarios(i-1,:,:)), ... Set up reminders on your phone or email so you don’t miss a payment.Pexels License/rawpixel.com/Pexels Change Your Payment DatesOne tip to help you make sure you can cover your payments on time is changing the dates your payments are due. CVA is the expected loss on an over-the-counter contract or portfolio of contracts due to counterparty default. The CVA formula is: CVA=(1-R)∫0TdiscEE(t)dPD(t)Where R is the recovery, discEE the discounted expected exposure at time t, and PD the default probability distribution.The expected exposure is computed by first simulating many future scenarios of risk factors for the given contract or portfolio. simulationDates = datemnth(Settle,0:12); simulationDates = [simulationDates datemnth(simulationDates(end),3:3:74)]'; numDates = numel(simulationDates);For each simulation date, compute previous floating reset date for each swap.floatDates = cfdates(Settle-360,swaps.Maturity,swaps.Period); swaps.FloatingResetDates = zeros(numSwaps,numDates); for i = numDates:-1:1 thisDate = simulationDates(i); floatDates(floatDates > thisDate) = 0; swaps.FloatingResetDates(:,i) = max(floatDates,[],2); endThe risk factor that is simulated to value the contracts is the zero curve. For more information on the swap parameters for Principal, Maturity, LegType, LegRate, LatestFloatingRate, Period, and LegReset, see swapbyzero.Settle = datenum('14-Dec-2007'); Tenor = [3 6 12 5*12 7*12 10*12 20*12 30*12]'; ZeroRates = [0.033 0.034 0.035 0.040 0.042 0.044 0.048 0.0475]'; ZeroDates = datemnth(Settle,Tenor); Compounding = 2; Basis = 0; RateSpec = intenvset('StartDates', Settle,'EndDates', ZeroDates, ... 'Rates', ZeroRates,'Compounding',Compounding,'Basis',Basis); figure; plot(ZeroDates, ZeroRates, 'o-'); xlabel('Date'); datetick('keeplimits'); ylabel('Zero rate'); grid on; title('Yield Curve at Settle Date');You can vary the number of simulated interest-rate scenarios that you generate. figure; plot(simulationDates,DefProb) title('Default Probability Curve for Each Counterparty'); xlabel('Date'); grid on; ylabel('Cumulative Probability') datetick('x','mmmyy') ylabel('Probability of Default') xlabel('Simulation Dates')The Credit Value (Valuation) Adjustment (CVA) formula is: CVA=(1-R)∫0TdiscEE(t)dPD(t)Where R is the recovery, discEE the discounted expected exposure at time t, and PD the default probability distribution. Use the function cdsbootstrap to generate the cumulative probability of default at each simulation date.% Import CDS market information for each counterparty CDS = readtable(swapFile,'Sheet','CDS Spreads'); disp(CDS); Date cp1 cp2 cp3 cp4 cp5 _____________ ___ ___ ___ ___ ___ {'3/20/2008'} 140 85 115 170 140 {'3/20/2009'} 185 120 150 205 175 {'3/20/2010'} 215 170 195 245 210 {'3/20/2011'} 275 215 240 285 265 {'3/20/2012'} 340 255 290 320 310 CDSDates = datenum(CDS.Date); CDSSpreads = table2array(CDS(:,2:end)); ZeroData = [RateSpec.EndDates RateSpec.Rates]; % Calibrate default probabilities for each counterparty DefProb = zeros(length(simulationDates), size(CDSSpreads,2)); for i = 1:size(DefProb,2) probData = cdsbootstrap(ZeroData, [CDSDates CDSSpreads(:,i)], ... Some people think that checking their score will affect it, but that’s not the case, states myFICO.Pexels License/rawpixel.com/Pexels Dispute Wrong Information on Your Credit ReportIf you check your credit report and notice that there’s wrong information, take action to resolve it. So consider having credit cards, loans and utility bills.Pexels License/rawpixel.com/Pexels It Takes TimeWhile many people want to know how to fix credit quickly, sometimes it can take time. Some things can take months to show up on your credit report, claims CNN.Pexels License/Moose Photos/Pexels Become an Authorized UserIf you become an authorized user on someone else’s credit card, that can help boost your credit score, notes Intuit. Here are some tips to get you started.Make Payments on TimeConsistently making credit card and loan payments on time is one of the biggest factors of your credit score, notes myFICO. For this example, set the recovery rate at 40%.Recovery = 0.4; CVA = (1-Recovery) * sum(discEE(2:end,:) .* diff(DefProb)); for i = 1:numel(CVA) fprintf('CVA for counterparty %d = $%.2f\n',i,CVA(i)); endCVA for counterparty 1 = $2229.38 CVA for counterparty 2 = $2498.71 CVA for counterparty 3 = $918.96 CVA for counterparty 4 = $5521.83 CVA for counterparty 5 = $5883.77 figure; bar(CVA); title('CVA for each counterparty'); xlabel('Counterparty'); ylabel('CVA $'); grid on;Pykhtin, Michael, and Steven Zhu, A Guide to Modeling Counterparty Credit Risk, GARP, July/August 2007, issue 37, pp. 'NettingID',swaps.NettingID);Plot the total portfolio exposure for each scenario in our simulation. repmat(simulationDates(i),1,numScenarios),simulationDates(i-1),-1,3); end dfactors = cumprod(dfactors,1);Create a surface plot of the yield curve evolution for a particular scenario.i = 20; figure; surf(Tenor, simulationDates, scenarios(:,:,i)) axis tight datetick('y','mmmyy'); xlabel('Tenor (Months)'); ylabel('Observation Date'); zlabel('Rates'); ax = gca; ax.View = [-49 32]; title(sprintf('Scenario %d Yield Curve Evolution',i));For each scenario the swap portfolio is priced at each future simulation date. See the references for more details on computing exposure from mark-to-market contract values.[exposures, expcpty] = creditexposures(values,swaps.CounterpartyID, ... For this example, you model the interest-rate term structure using the one-factor Hull-White model. The discount factor for a given valuation date in a given scenario is the product of the incremental discount factors from one simulation date to the next, along with the interest-rate path of that scenario.% Get discounted exposures per counterparty, for each scenario discExp = zeros(size(exposures)); for i = 1:numScenarios discExp(:,:,i) = bsxfun(@times,dfactors(:,i),exposures(:,:,i)); end % Discounted expected exposure discProfiles = exposureprofiles(simulationDates,discExp, ... simulationDates,portProfiles.EPE * ones(numDates,1), ... This is a model of the short rate and is defined as: wheredr: Change in the short rate after a small change in time, dta: Mean reversion rateσ: Volatility of the short ratedz: A Weiner process (a standard normal process)θ(t): Drift function defined as: θ(t)=Ft(0,t)+aF(0,t)+σ22a(1-e-2at)F(0,t): Instantaneous forward rate at time tFt(0,t): Partial derivative of F with respect to timeOnce you have simulated a path of the short rate, generate a full yield curve at each simulation date using the formula: R(t,T)=-1(T-t)lnA(t,T)+1(T-t)B(t,T)r(t) lnA(t,T)=lnP(0,T)P(0,t)+B(t,T)F(0,t)-14a3σ2(e-aT-e-at)2(e2at-1) R(t,T): Zero rate at time t for a period of T-tP(t,T): Price of a zero coupon bond at time t that pays one dollar at time TEach scenario contains the full term structure moving forward through time, modeled at each of our selected simulation dates.Refer to the Calibrating Hull-White Model Using Market Data example in the Financial Instruments Toolbox™ Users' Guide for more details on Hull-White one-factor model calibration.Alpha = 0.2; Sigma = 0.015; hw1 = HullWhite1F(RateSpec,Alpha,Sigma);For each scenario, simulate the future interest-rate curve at each valuation date using the Hull-White one-factor interest-rate model.% Use reproducible random number generator (vary the seed to produce % different random scenarios). This assumes the exposure is independent of default (no wrong-way risk), and it also assumes that the exposures were obtained using risk-neutral probabilities.Approximate the integral with a finite sum over the valuation dates as: CVA(approx)=(1-R)∑i=2ndiscEE(ti)(PD(ti)-PD(ti-1))where t_1 is today's date, t_2, ...,t_n the future valuation dates.Assume that the CDS information corresponds to the counterparty with index cpIdx. The CVA for a particular counterparty is defined as the sum over all points in time of the discounted expected exposure at each moment multiplied by the probability that the counterparty defaults at that moment, all multiplied by 1 minus the recovery rate. Consistent credit fix reviews will help you stay on top of your score.Pexels License/bruce mars/Pexels Think Twice Before Opening New AccountsAccording to Experian, opening a bunch of accounts won’t help your credit score. simulationDates,portProfiles.EffEE, ... Prices are computed using a price approximation function, hswapapprox. Similar to the plot of contract values, the exposures for each scenario will approach zero as the swaps mature.% View portfolio exposure over time figure; totalPortExposure = squeeze(sum(exposures,2)); plot(simulationDates,totalPortExposure); title('Portfolio Exposure for All Scenarios'); datetick('x','mmmyy') ylabel('Exposure ($)') xlabel('Simulation Dates')Several exposure profiles are useful when analyzing the potential future exposure of a bank to a counterparty. simulationDates,portProfiles.MPFE * ones(numDates,1), ... Here you can compute several (non-discounted) exposure profiles per counterparty, as well as, for the entire portfolio.PFE (Potential Future Exposure): A high percentile (95%) of the distribution of exposures at any particular future date (also called Peak Exposure (PE))MPFE (Maximum Potential Future Exposure): The maximum PFE across all datesEE : (Expected Exposure): The mean (average) of the distribution of exposures at each dateEPE (Expected Positive Exposure): Weighted average over time of the expected exposureEffEE (Effective Expected Exposure): The maximum expected exposure at any time, t, or previous time EffEPE (Effective Expected Positive Exposure): The weighted average of the effective expected exposureFor further definitions, see for example the Basel II document in references.% Compute entire portfolio exposure portExposures = sum(exposures,2); % Compute exposure profiles for each counterparty and entire portfolio cpProfiles = exposureprofiles(simulationDates,exposures); portProfiles = exposureprofiles(simulationDates,portExposures);Visualize the exposure profiles, first for the entire portfolio, then for a particular counterparty.% Visualize portfolio exposure profiles figure; plot(simulationDates,portProfiles.PFE, ... 16-22.Pykhtin, Michael, and Dan Rosen, Pricing Counterparty Risk at the Trade Level and CVA, 2010.Basel II: page 256. simulationDates,cpProfiles(cpIdx).EE, ... Dispute any errors promptly, advises Experian. Once a sufficient set of scenarios has been simulated, the contract or portfolio can be priced on a series of future dates for each scenario. prevRNG = rng(0, 'twister'); dt = diff(yearfrac(Settle,simulationDates,1)); nPeriods = numel(dt); scenarios = hw1.simTermStructs(nPeriods, ... 'ProfileSpec','EE');Plot the discounted expected exposures for the aggregate portfolio as well as for each counterparty.% Aggregate the discounted EE for each counterparty into a matrix discEE = [discProfiles.EE]; % Portfolio discounted EE figure; plot(simulationDates,sum(discEE,2)) datetick('x','mmmyy','keeplimits') title('Discounted Expected Exposure for Portfolio'); ylabel('Discounted Exposure ($)') xlabel('Simulation Dates') % Counterparty discounted EE figure; plot(simulationDates,discEE) datetick('x','mmmyy','keeplimits') title('Discounted Expected Exposure for Each Counterparty'); ylabel('Discounted Exposure ($)') xlabel('Simulation Dates')The default probability for a given counterparty is implied by the current market spreads of the counterparty's CDS. simulationDates,cpProfiles(cpIdx).EPE * ones(numDates,1), ... simulationDates,cpProfiles(cpIdx).MPFE * ones(numDates,1), ... As each scenario moves forward in time, the values of the contracts move up or down depending on how the modeled interest-rate term structure changes. The computed CVA is the present market value of our credit exposure to counterparty cpIdx. simulationDates,cpProfiles(cpIdx).EffEE, ... The result is a matrix, or "cube", of contract values.These prices are converted into exposures after taking into account collateral agreements that the bank might have in place as well as netting agreements, as in this example, where the values of several contracts may offset each other, lowering their total exposure.The contract values for each scenario are discounted to compute the discounted exposures. However, in order to keep your credit score higher, you should actually keep the credit card open, says myFICO.CC0/Negative Space/Pexels Keep an Eye on Your Credit ReportIn order to know how you’re doing, keep an eye on your credit report. See Alsocdsbootstrap | cdsprice | cdsspread | cdsrpv01 Related ExamplesFirst-to-Default SwapsCredit Default Swap Option More About External WebsitesPricing and Valuation of Credit Default Swaps (4 min 22 sec) CC0/Pixabay/Pexels Whether you’re interested in quick fixes or are looking for long-term solutions, working to improve your credit is a good idea.

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