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Understanding Operational Risk Capital Approximations: First and Second Orders

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We set the context for capital approximation within the framework of the Basel II / III regulatory capital accords. This is particularly topical as the Basel III accord is shortly due to take effect. In this regard, we provide a summary of the role of capital adequacy in the new accord, highlighting along the way the significant loss events that have been attributed to the Operational Risk class that was introduced in the Basel II and III accords. Then we provide a semi-tutorial discussion on the modelling aspects of capital estimation under a Loss Distributional Approach (LDA). Our emphasis is to focus on the important loss processes with regard to those that contribute most to capital, the so called high consequence, low frequency loss processes. This leads us to provide a tutorial overview of heavy tailed loss process modelling in OpRisk under Basel III, with discussion on the implications of such tail assumptions for the severity model in an LDA structure. This provides practitioners with a clear understanding of the features that they may wish to consider when developing OpRisk severity models in practice. From this discussion on heavy tailed severity models, we then develop an understanding of the impact such models have on the right tail asymptotics of the compound loss process and we provide detailed presentation of what are known as first and second order tail approximations for the resulting heavy tailed loss process. From this we develop a tutorial on three key families of risk measures and their equivalent second order asymptotic approximations: Value-at-Risk (Basel III industry standard); Expected Shortfall (ES) and the Spectral Risk Measure. These then form the capital approximations.

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