# Discrete Quadratic Programming Optimisation Engine for Portfolio Analytics System (PAS)

Client: UBS Investment Research (formerly known as UBS Warburg)

Project Scope: UBS deals with wealth management, investment banking, asset management and retail & commercial banking. We provide continued research and development support for the optimisation engine, which is at the heart of UBS Portfolio Analytics System, PAS. The robustness as well as computational speed of FortMP [Quadratic-Mixed Integer Programming (QMIP)] solver engine has been exploited here so as to attain the optimum solution within a short stipulated elapsed processing time.
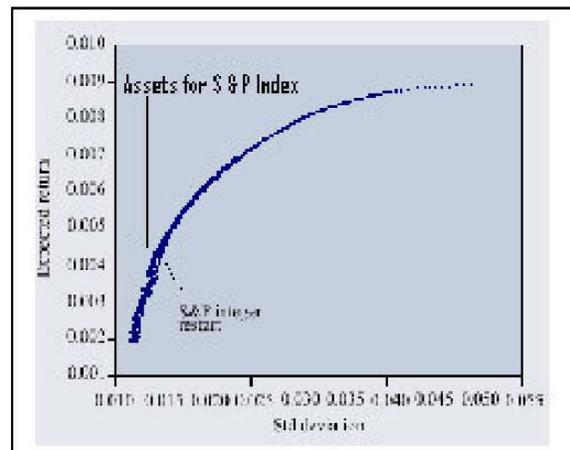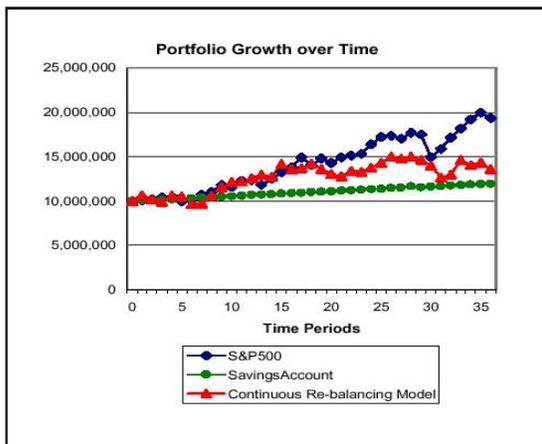
Project Achievement: PAS system creates Enhanced index funds which are equity funds with less than 2.5% ex ante tracking error to their benchmarks; these are designed using quantitative strategies to increase their expected returns. Recently, OptiRisk Systems supplied new Cutting edge QMIP optimiser. This has considerably accelerated the PAS optimisation engine. For the first time, a constraint may now be placed upon the maximum number of trades as an alternative to the maximum number of stocks in the portfolio. The integer-programming algorithm used to impose holding thresholds and the maximum number of stocks has been substantially enhanced. Many aspects of the new integer programming heuristics are under control so that the algorithm can be fine-tuned for difficult problems. When the optimiser is running, information from both the PAS system optimiser UBS_OPT and the FortMP library is written to the 'Portfolio Optimisation' window of the optimiser program itself. Better rebalancing of stocks along with an enhanced controlling capacity of the constraints together with high speed processing is achieved through this system.

Client Feedback: Mr A Scowcroft continues to request many enhancements of the discrete optimisation engine. By making the discrete quadratic solver engine both robust and continually improving its processing speed PAS remains the leading and best of breed product.

References
G Mitra, T Kyriakis, C Lucas, A Review of Portfolio Planning: Models and Systems, (2003) an invited chapter, pp1 -39 in Advances in Portfolio Construction and Implementation, S E Satchell, A E Scrowcroft (Eds.), Butterworth & Heinemann, Oxford.

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