**Chapter 25 Solutions**

1. There are three long/short investment strategies to capture sources of equity risk premia.

The first approach, GEM2 factor structure, includes a World factor, countries, industries, and style factors. The specific style factors are volatility factor, momentum factor, size factor, value factor, growth and nonlinear size (NLS) factors. GEM2 model is considered to simply go long stocks with positive exposure to the factor, and to short those with negative exposure.

The pure factor strategy is to maintain unit exposure to the desired factor, while eliminating exposures to all other factors. A strength of this approach is that it allows the portfolio manager to surgically control the exposures. A limitation of this technique, however, is that it does not take risk into account.

The optimized factor strategy considered for capturing equity risk premia is to construct a portfolio that retains unit exposure to the desired factor, while minimizing risk.

1. The equity factor set in GEM2 includes a World factor, countries, industries, and styles factors.

The World factor represents the intercept term in the cross-sectional regression which is the dominant source of risk for a diversified long-only portfolio. Economically, it describes the aggregate up-and-down movement of the global equity market.

Country factors play a critical role in global equity risk modeling as the powerful indicator variables for explaining the cross section of global equity returns.

Industries are also important variables in explaining the sources of global equity return co-movement. The basic criteria used to guide industry factor selection are: (a) the groupings of industries into factors must be economically intuitive, (b) the industry factors should have a strong degree of statistical significance, (c) incorporating an additional industry factor should significantly increase the explanatory power of the model, and (d) thin industries (those with few assets) should be avoided.

Style factors are designed to capture investment style related to systematic risk. Some of the style factors are standardized on a global-relative basis, others on a country-relative basis. In GEM2 model, there are eight style factors: volatility factor, momentum factor, size factor, value factor, growth and nonlinear size (NLS) factors.

1. Simple factor portfolios have unit exposure to the particular factor, and nonzero exposure to other factors. Pure factor portfolios have unit exposure to the particular factor, and zero exposure to all other factors. The intuition behind optimized factor portfolios is straightforward: the portfolio maintains unit exposure to the particular factor but reduces the risk by acquiring exposures to other factors.
2. Economic indicators are descriptive and anticipatory time-series data used to analyze and forecast changing business conditions. Business cycles are recurrent sequences of expansions and contractions in aggregate economic activity. Leading Economic indicators (LEI), reach their turning points before the corresponding business cycle turns. The LEI can be made up of a weighted average of several components, such as yield spread, stock index levels, and money supply (M2), among others.

The LEI are closely correlated to the style factors in GEM2 model. For instance, the contemporaneous correlations between LEI and the Volatility and Leverage factors are quite strong. This says that when the LEI moves upward, high beta stocks tend to outperform low beta stocks, and high-leverage stocks outperform low-leverage stocks. The Size factor, on the other hand, is negatively correlated, which says that small-cap stocks tend to outperform large-cap stocks when the LEI moves upward.

1. This chapter discusses three alternative ways of crafting long/short investment strategies to capture sources of equity risk premia by using international equity data. The topic is related to chapter 22 entitled “International Diversification and Asset Pricing” demonstrated that the exchange risk and inflation risk will affect the return of international investment and, therefore, should be a major factor for analyzing international diversification. The size effect factor used in GEM2 factor structure are related to the previous chapters 9, 12, and 21 that discussed size effect are one of anomalies in the semi-strong efficient market in Basu’s (1977) and Banz’s (1981) findings. The liquidity, leverage, volatility factors in GEM2 model are related to Beaver et al. (BKS, 1970) in chapter 10 which use this factors can measure the beta by multiple regression approach. Therefore, these style factors in GEM2 factor structure are the important components to measure equity risk premia.