**1b**

Beta1, Beta2, and Beta3 are three latent dynamic factors. The factor loading for Beta1 corresponds to the long term/level of the yield curve; this is always a constant of 1 that does not decay to 0 in the limit. Beta1 itself, then, is the sensitivity to this factor loading of 1. The factor loading for Beta2 corresponds to the short term/slope, starting at 1 but decaying monotonically and quickly to 0. The factor loading for Beta3 corresponds to the medium term/curvature, starting at 0 (so not short-term), increasing, and then decaying to 0 (so not long-term). The Beta3 factor loading appears to achieve its maximum around the two- to three-year mark. Beta2 and Beta3 are the sensitivities to these factor loadings. Lambda determines the maturity at which the loading on the curvature is maximized, and governs the exponential decay rate of the model. The parameter Lambda governs the exponential decay rate; small values of Lambda produce slow decay and can better fit the curve at long maturities, while large values of Lambda produce fast decay and can better fit the curve at short maturities. Lambda also governs where the loading on Beta3 achieves its maximum. Diebold and Li advocate setting Lambda to maximize the loading on the medium-term factor, Beta3, at 30 months. They set Lambda to 0.0609. This also transforms the problem from a nonlinear fitting to a simple linear regression.

An increase in Beta1 increases all yields equally, as the loading is identical at all maturities, thereby changing the level of the yield curve. The short-term factor Beta2 is closely related to the yield curve slope, which Diebold and Li define as the ten-year yield minus the three-month yield. An increase in Beta2 increases short yields more than long yields, because the short rates load on Beta2 more heavily, thereby changing the slope of the yield curve. Note that the instantaneous yield depends on both the level and slope factors, because the yield at maturity t=0 is equal to Beta1+Beta2. The medium-term factor Beta3 is closely related to the yield curve curvature, which Diebold and Li define as twice the two-year yield minus the sum of the ten-year and three-month yields. An increase in Beta3 will have little effect on very short or very long yields, which load minimally on it, but will increase medium-term yields, which load more heavily on it, thereby increasing yield curve curvature. (Sources: Matlab and Diebold-Li 2005)

**1e**

The sensitivity to the Beta1 factor loading increases monotonically as we forecast farther into the future. Because the Beta1 factor loading corresponds to the long term/level of the yield curve, the long-term yield increases as Beta1 increases. Every point along the yield curve is thus shifted up by the same amount (Beta1). Our forecasted long-term yields, then, are higher as we look farther into the future, and the long-term yield factor loading contributes more to our forecasted yields for every maturity. The sensitivity to the Beta2 factor loading increases monotonically as we look farther into the future and becomes less negative (its absolute value decreases monotonically as Beta2 is always negative). The Beta2 factor loading corresponds to the short term/slope of the yield curve. An increase in Beta2 increases short yields more than long yields, because the short rates load on Beta2 more heavily, thereby changing the slope of the yield curve. As Beta2 becomes more negative, the slope (defined as the ten-year yield minus the three-month yield) increases. As Beta2 becomes less negative, the slope decreases. The change in Beta2 then means that our forecasted yield curve will be less steep as we forecast farther into the future. Instantaneous yields are a function of only Beta1 and Beta2, so our forecasted short-term yields increase as we look further into the future.

The sensitivity to the Beta3 factor loading decreases monotonically as we look farther into the future and becomes more negative (the absolute value increases monotonically as Beta3 is always negative). The Beta3 factor loading corresponds to the medium term/curvature of the yield curve. Beta3 has little effect on very short or very long yields, which load minimally on it, but will affect medium-term yields, which load more heavily on it, thereby impacting yield curve curvature. As Beta3 becomes more negative, the curve becomes increasingly concave up. As Beta3 becomes more positive, the curve becomes increasingly concave down. The change in forecasted Beta3’s then implies that our curve becomes more concave up as we forecast farther into the future. Medium-term yields are pulled down by this movement in Beta3.