Answer Sheet to the Written Exam

Financial Markets

June 2009

In order to achieve the maximal grade 12 for the course, the student must excel in all three problems.

Problem 1:

This problem focuses on testing part 1 of the course's learning objectives, that the students show "The ability to readily explain and discuss key theoretical concepts and results from academic articles, as well as their interpretation." The maximal grade is given for an excellent presentation that demonstrates a high level of command of all aspects of the relevant material and containing no or only few minor weaknesses.

(a) Draw on Harris chapters 16, 20 and 28, as well as Brunnermeier and Pedersen (2009).

(b) Draw on Harris chapter 10 and the chapter from Vives (2008).

(c) Draw on Harris chapters 5 and 6, as well as Malinova and Park (2009).

Problem 2:

This problem focuses on testing part 2 of the course's learning objectives, that the students show "The ability to carefully derive and analyze results within an advanced, mathematicallyspecified theoretical model." The maximal grade is given for an excellent presentation that demonstrates a high level of command of all aspects of the relevant material and containing no or only few minor weaknesses.

(a) Refer to the Vives (2008) model. Informed traders have a private signal s_i and the price p as information to base the demand on. Noise trader demand is exogenous.

(b) Refer to the note of Sørensen (2009) on the Normal learning model. As $s_i = \theta + \varepsilon_i$, where $\varepsilon_i \sim N(0, 1/\tau_\epsilon)$, the Normal distribution of $\theta|p$ is updated to a normal with precision $\tau+\tau_\epsilon$ such that the posterior mean is the precision-weighted average $(\tau E[\theta|p] + \tau_\epsilon s_i) / (\tau + \tau_\epsilon)$. The final property follows from $p = (\tau p + \tau_\epsilon p) / (\tau + \tau_\epsilon)$.

(c) Using (b), with $\tau + \tau_\epsilon = 1/V[\theta|p, s_i]$ we see that

$$X_i(s_i, p) = \frac{E[\theta|p, s_i] - p}{\rho V[\theta|p, s_i]} = \frac{\tau(E[\theta|p] - p) + \tau_\epsilon(s_i - p)}{\rho}.$$

Combine this with $X_i(s_i, p) = a(s_i - p) - bp$ to first see that the coefficient on s_i must satisfy $a = \tau_\epsilon/\rho$. After seeing this, the other claim follows again from comparing what remains in the two expressions for $X_i(s_i, p)$.

(d) Vives discusses this bias on the top of page 121. It is a form of price over-reaction to news, or negative drift. The further is p below the prior mean $E[\theta] = 0$, the larger is the difference $E[\theta|p] - p$, saying that the price falls further below the value $E[\theta|p]$, to which the price can be expected to converge in the long run.

(e) The measure of the bias extent is rewritten as

$$\frac{b\rho}{\tau} = \frac{\tau_\theta}{\tau\left(1 + \tau_\epsilon \tau_u/\rho^2\right)}$$

The bias extent is increasing in the amount of noise trade $1/\tau_u$; this reflects the discussion in Vives that the bias is a result of risk aversion among the rational traders who take a risky asset position opposite to the realized u. The bias is therefore also increasing in risk aversion ρ and after-market risk $1/\tau$ — further, note from $\tau = \tau_\theta + a^2\tau_u$ and $a = \tau_\epsilon/\rho$ that $1/\tau$ itself is incresing in ρ. The bias extent is increasing in prior precision τ_θ and decreasing in signal precision τ_ϵ, since noise trade plays less of a role relative to informed trade under these circumstances.

Problem 3:

This problem focuses on testing part 3 of the course's learning objectives, that the students show "The ability to apply the most relevant theoretical apparatus to analyze a given, new casebased problem." The maximal grade is given for an excellent presentation that demonstrates a high level of command of all aspects of the relevant material and containing no or only few minor weaknesses.

Below are some suggested applications of the course literature to this case. It is important to note that these applications have shortcomings which should be discussed.

- Swensen's idea to trade against the market makes him a value trader as well as liquidity supplier; this should come with a profit as argued in Harris chapter 19.

- The description of Swensen's contrarian strategy is also consistent with the rational behavior predicted in the model of Vives (2008). In particular, if he is more risk tolerant than other traders, he may be the most willing to trade against the current.

- Swensen tries to profit from trading in illiquid markets. Brunnermeier and Pedersen (2009) suggest that this works well when there is ample funding liquidity, but can create problems when funding liquidity dries up.