Answer Sheet to the Written Exam

Financial Markets

June 2010

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 chapter 19, and perhaps Harris chapter 27 together with course information about the liquidity event on May 6, 2010.

(b) See for instance the explanation at the bottom of page 3 in Malinova and Park (2009). This is elaborated in the three paragraphs following their Proposition 3.

(c) Draw on Harris chapter 26.

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, mathematically specified 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) The aggregate demand in the market is the sum of aggregate price-contingent demand from the newswatchers, $F(1-\delta) - P_1$, and aggregate price-uncontingent demand from the speculators, $\sum_{i=1}^{n} d_i$. Aggregate supply is zero. Hence, in market equilibrium, $F(1-\delta) - P_1 + \sum_{i=1}^{n} d_i = 0$, and the result follows directly.

(b) Speculator i is risk-neutral and hence aims to maximize expected gains in the market. Speculator i knows that a unit of the asset has expected fundamental value F. Buying d_i units of the asset at price P_1 will thus result in a total expected gain of $(F - P_1) d_i$. Using the result from (a), we have

$$F - P_1 = F - F(1-\delta) - \sum_{i=1}^{n} d_i = \delta F - \sum_{j \neq i} d_j - d_i.$$

(c) We are considering a non-cooperative Nash equilibrium in market orders, so speculator i will take d_j as given for $j \neq i$. The speculator must choose d_i to maximise expected gains. According to (b), expected gains are $\left(\delta F - \sum_{j \neq i} d_j - d_i\right) d_i$. This is a quadratic function of d_i with a unique maximum characterized by the first order condition

$$0 = \delta F - \sum_{j \neq i} d_j - 2d_i.$$

As suggested in the question, then $d_i = \delta F - \sum_{j=1}^{n} d_j$. A Nash equilibrium consists of speculator demands $d_1, \ldots, d_n$ such that every d_i is optimal for i given d_j for $j \neq i$. We see now that in a Nash equilibrium, necessarily every speculator demands the same amount $\delta F - \sum_{j=1}^{n} d_j$. Since this is the same amount for all speculators, the first-order condition tells us that $d_i = \delta F - nd_i$, solved by the claimed value of d_i.

(d) As in (b), $F - P_1 = \delta F - \sum_{i=1}^{n} d_i = \delta F - nd_i = d_i$. It follows from the expression from (c) that $|d_i|$, and hence $|F - P_1|$ is decreasing in n. Summing the expected gains of all speculators gives, by (b), the expression $(F - P_1) \sum_{i=1}^{n} d_i$. The following expression can be found in many ways, but for instance using our pieces $F - P_1 = d_i$ and $\sum_{j=1}^{n} d_j = nd_i$, the aggregate expected gain is

$$nd_i^2 = \frac{n}{(n+1)^2} \delta^2 F^2.$$

The claim is that this is decreasing in n, i.e., that $n/(n+1)^2$ is decreasing in n, i.e., $(n+1)^2/n = n+2+1/n$ is increasing in n, which is true because its derivative is $1-(1/n)^2 > 0$ for every $n > 1$.

(e) The model presented here is essentially a model of Cournot competition among quantity-setting speculators with constant marginal costs. As is familiar from the Cournot model, the greater is the number of such speculators, the closer is the price P_1 to the efficient price F, and the closer is aggreate profits to zero. In presenting the crowded-trade model, Stein (2009) first arrives at our result from (d) that $F - P_1 = \delta F/(n+1)$, his (4). However, his main idea is to let speculators not directly observe F but only P_1, and to let speculators be uncertain about the size of the otherwise perfectly competitive speculator population. In his model it is these uncertainties that drive the mis-pricing, not the imperfect competition.

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 case-based 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.

A possible interpretation of the case at hand may be that the governments do not want speculators to convey accurate information to the markets so that it can be incorporated in the prices. In particular, governments may have an interest in keeping asset prices higher than at fundamental value. On the other hand, speculators might have the power to misprice assets and thereby force governments into problems. In effect, the asset price would affect fundamentals in a way that was not discussed within texts that we read in this course. The suggested ban on short-selling might be seen in relation to the latter effect rather than the former.

- The role played by speculative traders in the market is discussed in Harris chapter 10.
- Mis-pricing of assets is the topic of both Stein (2009) and Cespa and Vives (2009).
- A ban on insider trading is discussed in Harris chapter 29.