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APPENDICES

Appendix A. Hazard Rate Calculation

In this thesis, the hazard rate, h_i, is the probability of a negative innovation given a run of exactly i positive innovations. Using Equation (12), the relationship between hazard rates and unconditional run length probabilities is

$$h_i = 1 - \frac{S_i+1}{S_i}, \tag{A-1}$$

where $S_i \equiv 1\text{-}F_i$ is the "survivor function", or the probability that i periods have passed since the last negative innovation. This appendix describes an algorithm for calculating survivor function values, S_i, when prices contain bubbles. The form of the algorithm is dictated by the lack of temporal independence in total price innovations. Specifically, the probability of a positive innovation is not independent of the sign of the prior innovations because the bubble factor has memory back to the last crash. Consequently, run length probabilities are calculated based on all possible bubble factor ages and the probability of those ages,

$$S_i = \sum_{j=0}^{\infty} p_{i,j}\, q_j, \tag{A-2}$$

where $p_{i,j}$ is the probability that i periods have passed since the last negative innovation, given that the bubble is j periods old, and q_j is the probability that the bubble is j periods

old. A value of zero for i or j implies a negative innovation or bubble crash, respectively, in the current period. Thus, in order to calculate the hazard rates, values of p_{ij} and q_j must be found, substituted into (A-2), with the resulting survivor rates used in (A-1).

Values for q_j are relatively easy to calculate. Under the bubble process described in Equation (5), the probability of a crash, $1-\pi$, is independent of the size of the bubble so that

$$q_j = (1-\pi)\pi^j, \tag{A-3}$$

The values of the conditional run length probabilities, p_{ij}, are more difficult to calculate since they are dependent on both the binomial distribution of the bubble innovation, η, and the continuous distribution of the fundamental innovation, μ. Let η^D_j be the bubble innovation given a prior-period bubble age of j and a crash (D=1) or no crash (D=0) in the current period, and let F(.) be the assumed cumulative density function of the fundamental innovation. Then the bubble age conditioned probability that a single total innovation, $\epsilon \equiv \mu+\eta^D_j$, is negative is $F(-\eta^D_j)$. Using the bubble factor recursion relation in Equation (5), it can be shown that

$$\eta^0_j = (1-\pi)\,\frac{a_0 r}{1+r-\pi}\left(\left(\frac{1+r}{\pi}\right)^{j+1} - 1\right), \tag{A-4}$$

and

$$\eta^1_j = -\pi\,\frac{a_0 r}{1+r-\pi}\left(\left(\frac{1+r}{\pi}\right)^{j+1} - 1\right), \tag{A-5}$$

As noted, for $\pi > 1/2$ and all j, the negative innovation if the bubble crashes, η^1_j, is greater in absolute value than the positive innovation if it does not, η^0_j, and the mean bubble innovation is zero, $\pi\eta^0_j + (1-\pi)\eta^1_j = 0$. In addition, the magnitude of the positive and negative innovation increases with the bubble age, j.

The assumed distribution of the fundamental innovations, $F(.)$, may be any continuous distribution that can reasonably model fundamental innovations. Once $F(-\eta^0_j)$ and $F(-\eta^0_j)$ are estimated for all possible values of j, the conditional run length probabilities, $p_{i,j}$, can be determined using one of the following four equations (A-6) through (A-9). For $i = 0$ (a negative total innovation in the current period) and $j = 0$ (a crash in the current period),

$$p_{0,0} = \sum_{k=0}^{\infty} F(-\eta^1_k)\, q_k \quad , \tag{A-6}$$

which allows for all possible prior-period bubble ages. For $i = 0$ and $j > 0$ (no crash in the current period), the conditional run length probability is simply

$$p_{0,j} = F(-\eta^0_{j-1}) \quad . \tag{A-7}$$

The conditional run length probabilities for each $i > 0$ can be calculated based on the i-1 probabilities. For $i > 0$ (a positive innovation in the current period) and $j=0$,

$$\text{(A-8)} \qquad p_{i,0} = \sum_{k=0}^{\infty} (1-F(-\eta^{1}_{k}))\, p_{i-1,k}\; q_k \quad ,$$

which allows for all possible prior-period bubble ages. For $i > 0$ and $j > 0$, the conditional run length probability is

$$\text{(A-9)} \qquad p_{i,j} = (1-F(-\eta^{0}_{j-1}))\, p_{i-1,j-1} \quad .$$

Although the summation in (A-6) and (A-8) allow for infinite bubble factor ages, the bubble age probability, q_j , approaches zero so that the summation can be terminated at high values of j .

Appendix B. The History of Stock Exchange of Thailand

Development of The Thai Stock Market

The capital market in Thailand has a rather short history. As in most other developing countries, it arose mainly in response to the requirements of the fledging modern economy's efforts towards industrialization.

In Thailand, the capital market has undergone two distinct phases. The first phase was the privately owned stock exchange " Bangkok Stock Exchange" which lacked official support. The second phase was an establishment of the Stock Exchange of Thailand with official support, under proper supervision and regulation.

Establishment of the Bangkok Stock Exchange

In July 1962, a private group in the form of a limited partnership established an organized stock exchange. In the following year, the group changed itself into a limited company called the " Bangkok tock Exchange CO., Ltd. (BSE)".

Trading on the floor of the BSE was rather inactive with a yearly turnover value of only 160 and 114 million Baht (US$ 7,690,000 and US$ 5,480,000) in 1968 and 1969 respectively. Afterwards, trading values fell sharply to between 46 and 28 million Baht (US$ 2,210,000 and US$ 1,350,000) in 1970 and 1971 respectively. The turnover of

debentures in 1972 hit 87 million Baht (US$ 4,180,000) and stock turnover was only 26 million Baht (US$ 1,250,000). The BSE ceased its operation in the early 1970s.

The lack of understanding about the advantages of going public, deficiencies in capital market analysis among potential investors about securities and a lack of government support are major reasons that the BSE failed to become a successful securities market.

Establishment of the Stock Exchange of Thailand

The Second National Economic and Social Development Plan (1967-1971) broadly established the goal of forming an orderly securities market with the appropriate facilities and procedures for securities trading in order to encourage capital mobilization to finance economic growth.

In 1969, as recommended by the World Bank, the government acquired the services of Professor Sidney M. Robbins of Columbia University, a former Chief Economist of the United States Securities and Exchange Commission. In the same year, the Bank of Thailand formed the Working Group on Capital Market Development, which was assigned the task of putting the market into action. In 1970, Professor Robbins proposed a comprehensive report entitled " A Capital Market in Thailand". This report became a master plan for the development of Thai capital market.

Several studies showed that many problems would be encountered in recognizing BSE. Therefore, new securities exchange legislation was drafted. In 1972, the " Act for the Control of Commercial Undertakings Affecting Public Safety and Welfare" was modified to extend government control and regulation over the operation of finance and securities companies which until then had operated freely. The long awaited legislation, which established the new Securities Exchange of Thailand (SET) was enacted in May 1974. At the end of that year, the Revenue Code was revised to activate the investment of savings in the capital markets. On April 30, 1975, the SET started its first day of trading and the government has since then continues to support the SET. On January 1, 1991, its official name was change to "The Stock Exchange of Thailand".

In fact, the Fifth National Economic and Social Development Plan (1982-1986) was prescribed as a target for a wider distribution of shareownership to be achieved through the SET.

As a result of inadequacies or inconsistencies in the laws, problems concerning the SET arose. The government, consequently, amended the " Securities Exchange o f Thailand Act" in the September of 1984. On May 16, 1992, the SET Act was revoked by the Securities and Exchange Act, however, the SET is still a stock exchange with the following objectives:

1) Providing the service of being a center for the trading of listed securities as well as providing the system and method for the trading of securities in such center.

2) Undertaking any business relating to the Securities Exchange, which are the rendering of services relating to listed securities by acting as a clearing house, securities depository center, securities registrar, the rendering of services on securities data or similar business.

3) Undertaking any business other than (1) and (2) with the approval of the SEC.

BIOGRAPHY

Miss Wanida Ngienthi was born on February 1, 1977 in Sakonnakorn. She completed her Bachelor Degree in Business Administration, majoring in International business Management and minoring in Finance from Assumption University in 1998. After graduated, she has been working as a lecturer, Faculty of Business Administration, Assumption University. Then, she continued her Master Degree in International Economics and Finance, Faculty of Economics, Chulalongkorn University. At present, she is working as a lecturer at Assumption University.