

How Technical Analyses Affect the World Crude Oil Price

***: More Evidences from
Candle-stick Charting Method***

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Aims of this Paper

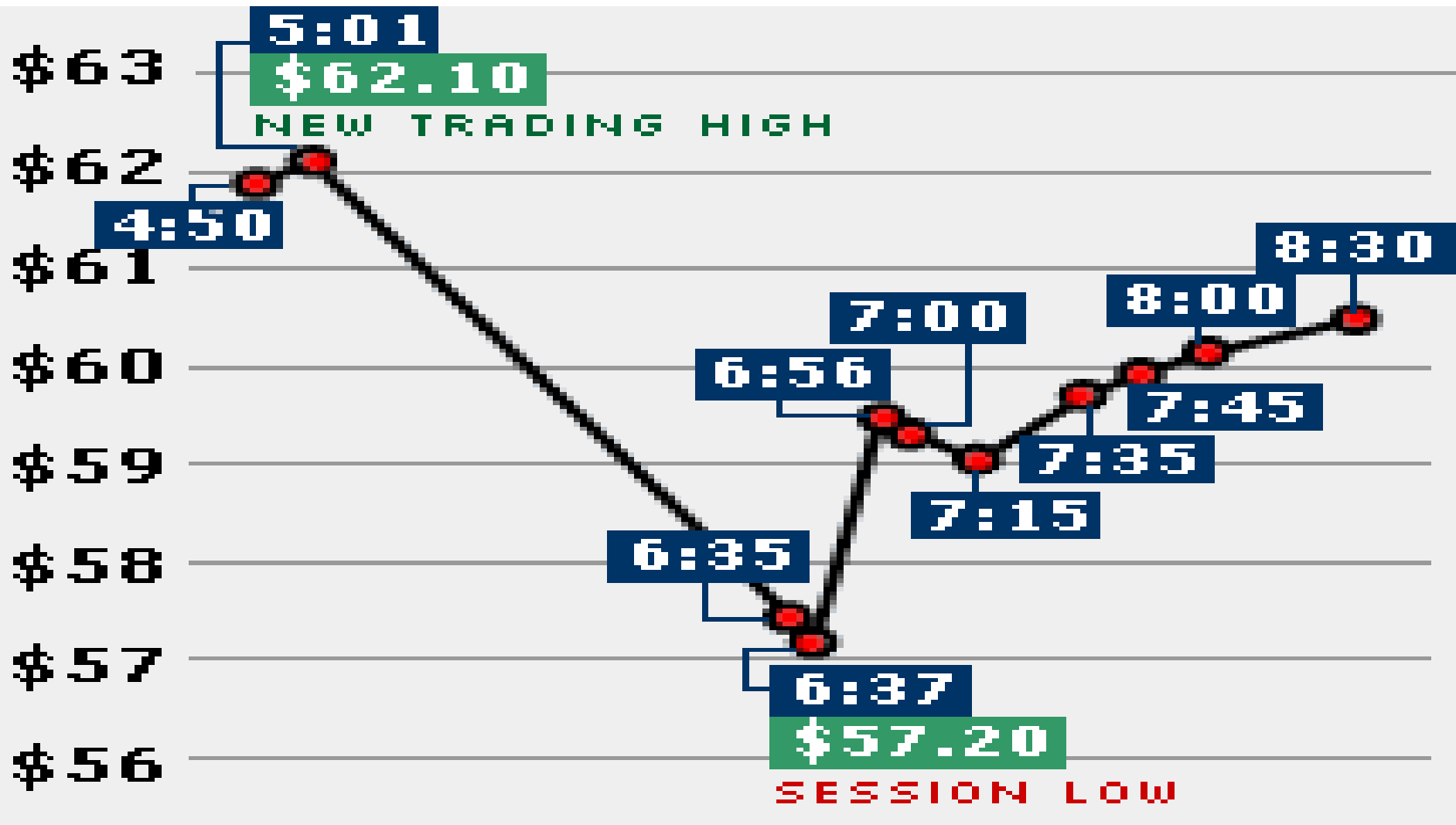
- 1/3 of current crude oil price is **BUBBLES**?
(OPEC, CERI (2004:\$20/\$50), Economists 1/3)
- How **BUBBLES** booms or collapses?
- **BUBBLES**:
a **buy/sell power** can't be explained by
Physical market(Demand/Supply)
but **others**(**hot money in/out**)?



Technical Analyses
/Candlestick Charting?

OIL'S WILD RIDE

Time (a.m., ET) Prices are premarket, electronic trading



Literature Reviews

Filter method (Mandelbrot, 1963; Alexander, 1964; Fama & Blume, 1966; Jensen & Benington, 1970).

Transaction cost Levy (1967a; 1967b)

Van Horne and Parker (1967); James(1968)

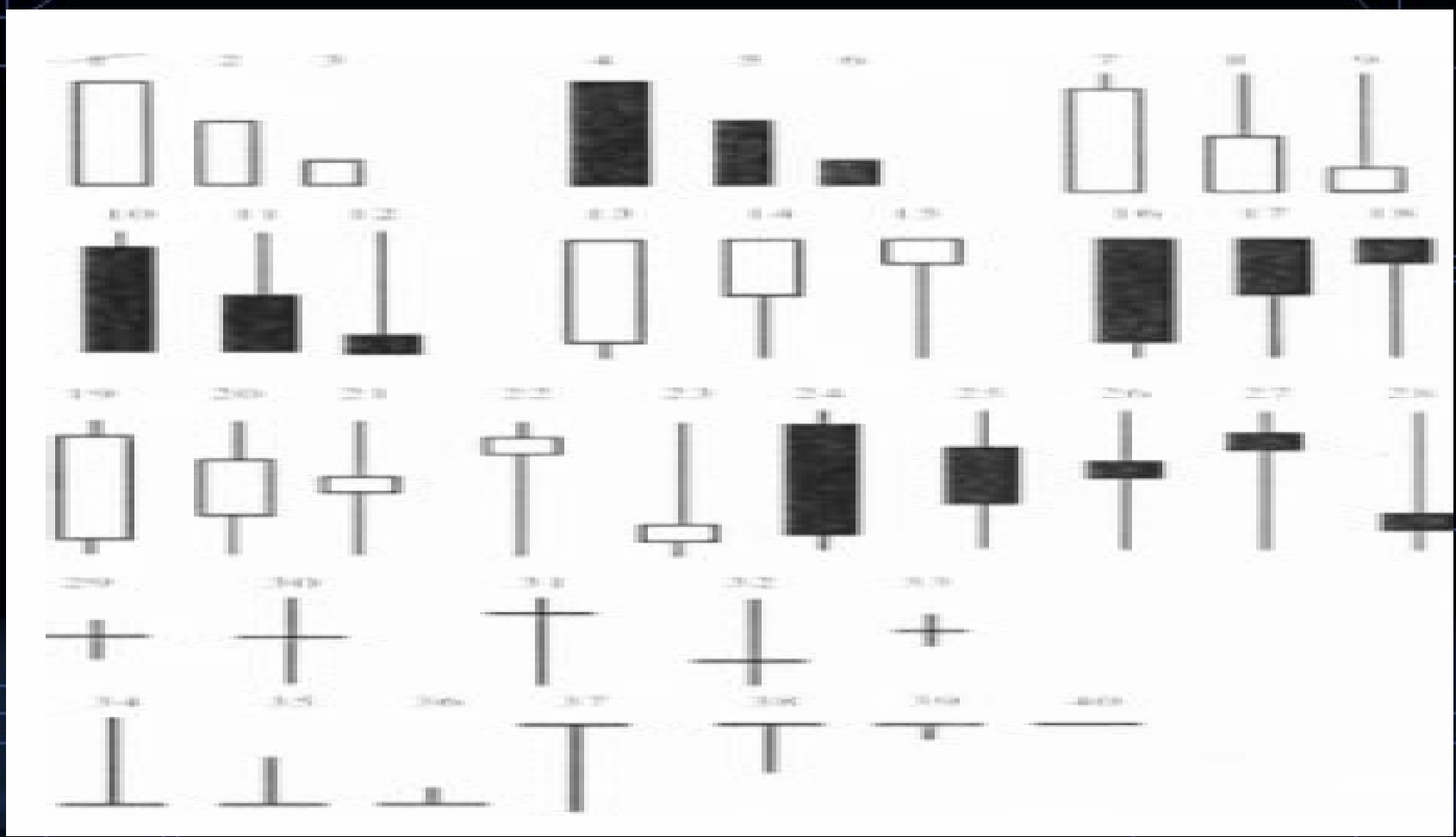
More (Bohan, 1981; Sweeney, 1988; Pruitt & White, 1988; Fama & French, 1988; Lo & MacKinaly,1988) (Jegadeesh,1990; Conard et al., 1991; Brock et al., 1992; Bessembinder & Chan,1995; Hudson et al., 1996; Bessembinder & Chan,1998; Brown et al., 1998; Lui & David Mole, 1998; Ratner &.Leal, 1999; Szakmary et al., 1999) (Coutts & Cheung, 2000; Gunasekarage & Power, 2001; Fang & Xu, 2003)

Candle-stick Charting

Method: reversal signal

- One candle lines patterns
(e.g. Hammers/Hanging men)
- Two candle lines patterns
(e.g. Shooting stars)
- Three candle lines patterns
(e.g. Two crows)
- Four candle lines patterns
(e.g. Concealing baby swallow)

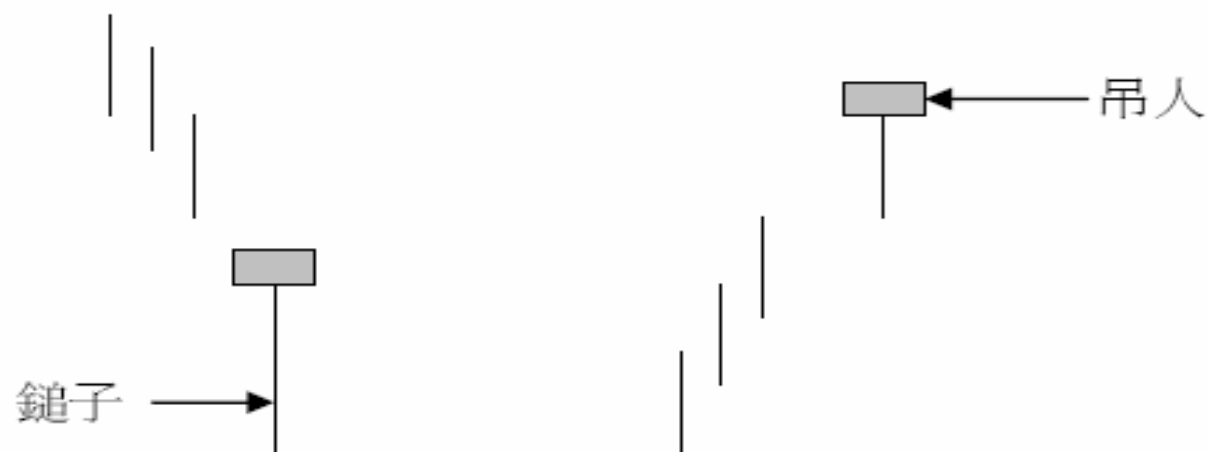
One Candle line



1. 鏈子與吊人(Hammer and Hanging Man)(*KanaZuchi/tonkachi and kubitsuri*)

「鏈子」與「吊人」兩者都留有很長的下影線，實體部份則很小。「鏈子」是出現在下降的趨勢中，而「吊人」則是出現在上升的趨勢中。其辨認的法則有：(1)下影線的長度通常要為實體的二至三倍，(2)實體的顏色並不重要，(3)「鏈子」的實體部份必須處在交易區間的下方，而「吊人」的實體部份必需處在交易區間的上方，(4)不應該有上影線。如圖 3-11 所示：

圖 3-11 鏈子與吊人



198809~198810



- □ 1
- □ 2
- □ 3
- □ 4

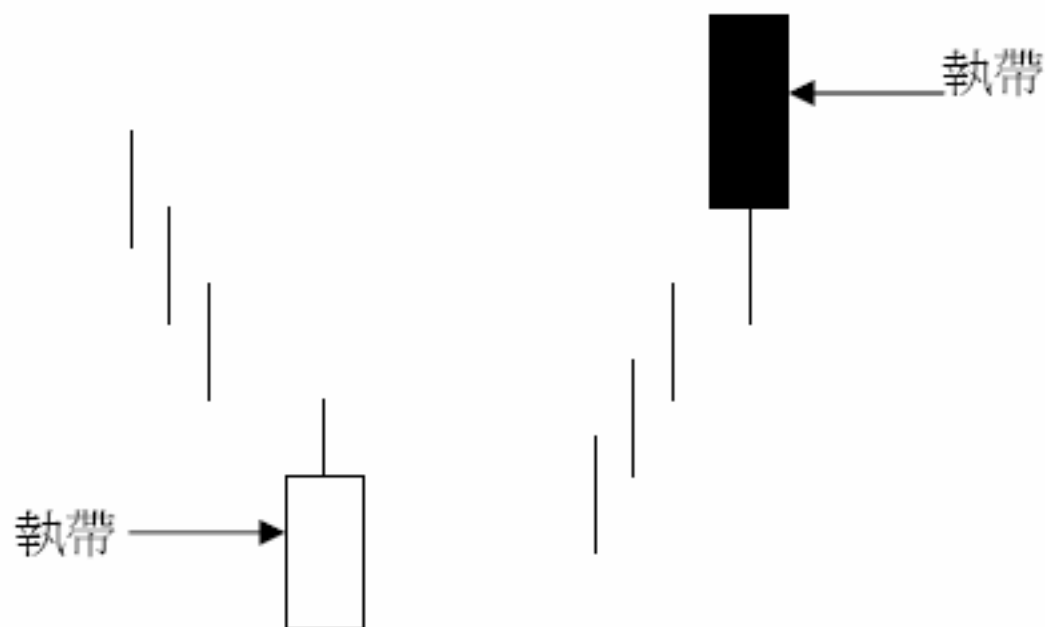
200011~200012



2. 執帶(Belt Hold)(Yorikiri)

「執帶」即為「開盤實線」。多頭的執帶是發生於下降趨勢中的白色開盤實線，而空頭的執帶則是發生於上升途中的黑色實線。「執帶」的實體部份越長，則趨勢逆轉的勁道越強。其辨認的法則有：(1)白色的執帶開盤價即為最低價，並無下影線，(2)黑色的執帶開盤價即為最高價，並無下影線。如圖 3-12 所示：

圖 3-12 執帶



199211~199212



199101~199102

23.00

20.00
19.50
19.00
18.50
18.00
17.50
17.00



- □ 1
- □ 2
- □ 3
- □ 4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

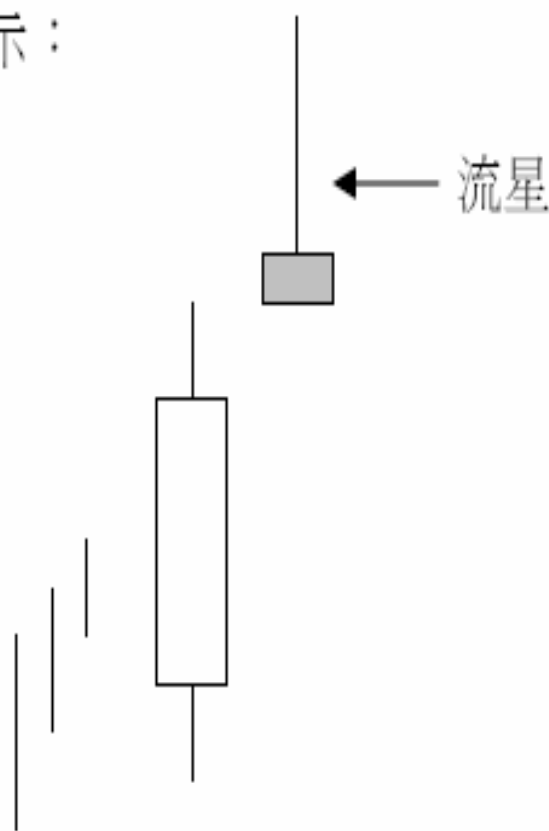
200406~200407



(2).流星(Shooting Star)(*nagare boshi*)

「流星」屬於漲勢的結束，其第一根線形須反映出趨勢，然而第二根線形的顏色並不重要。其辨認的法則有：(1)兩根線形實體之間需有跳空存在，(2)第二根線形在價格區間的上端附近須為一小實體，(3)上影線的長度須為實體的三倍，(4)幾乎沒有下影線。如圖 3-14 所示：

圖 3-14 流星



199009~199010



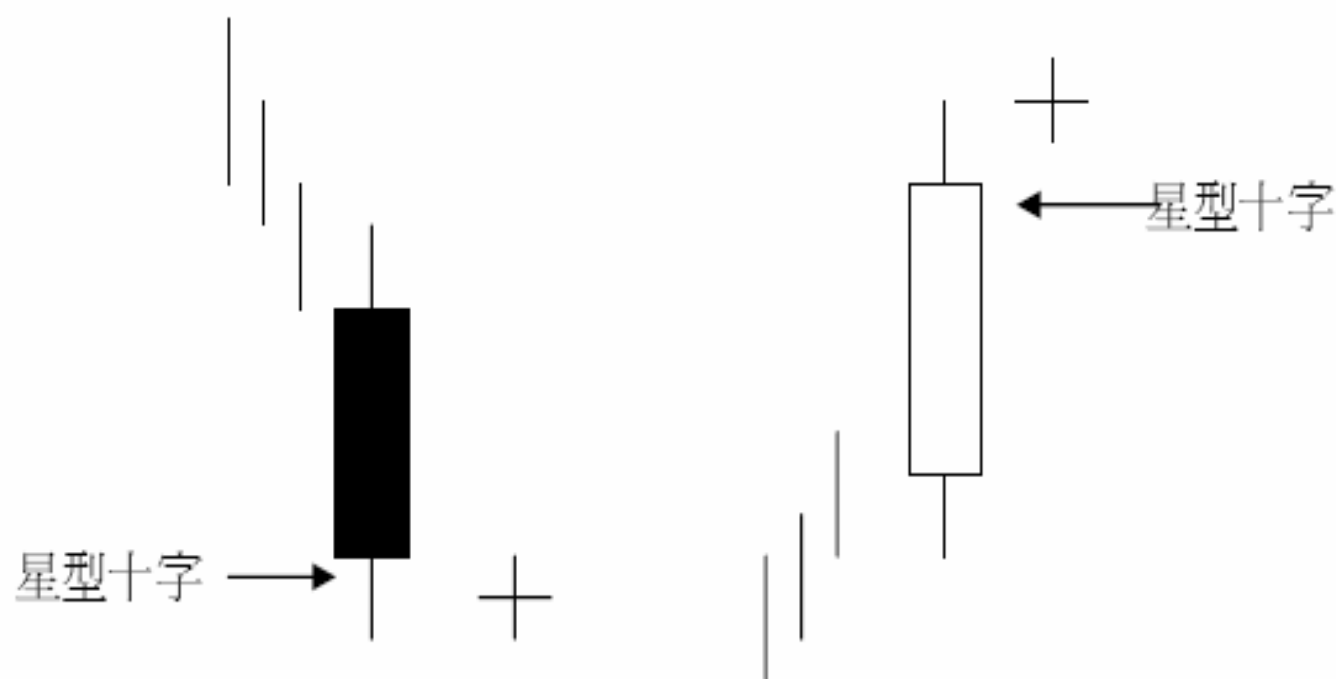
3.星型十字(Doji Star)(*doji bike*)

「星型十字」的出現代表著趨勢即將反轉。其第一根線形須反映出既有的趨勢，而第二根線形開盤價順勢跳空，且最後以開盤價作收。其辨認的法則有：

(1)第一根線形須為「長日」，(2)第二根線形順勢跳空，且為「十字」線形，(3)

「十字」的影線不要太長。如圖 3-15 所示：

圖 3-15 星型十字



198707~198708



198809~198810

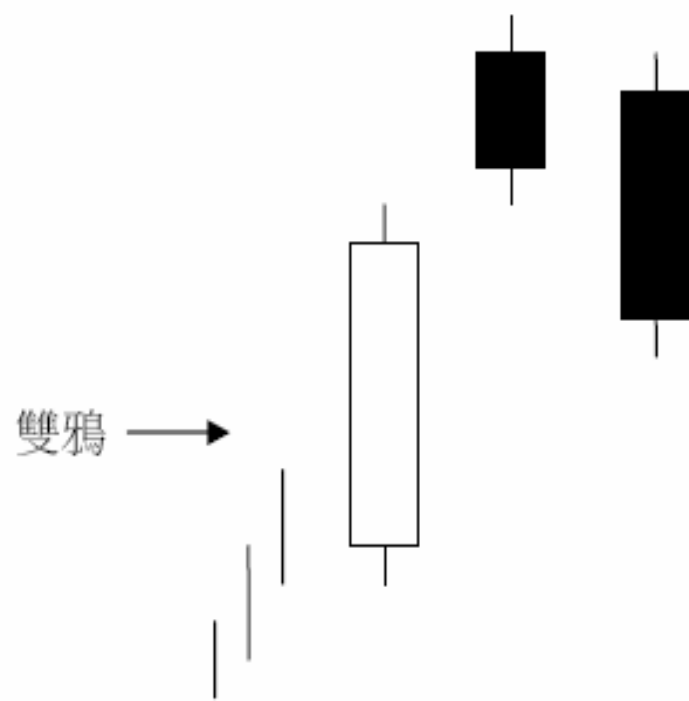


- □ 1
- □ 2
- □ 3
- □ 4

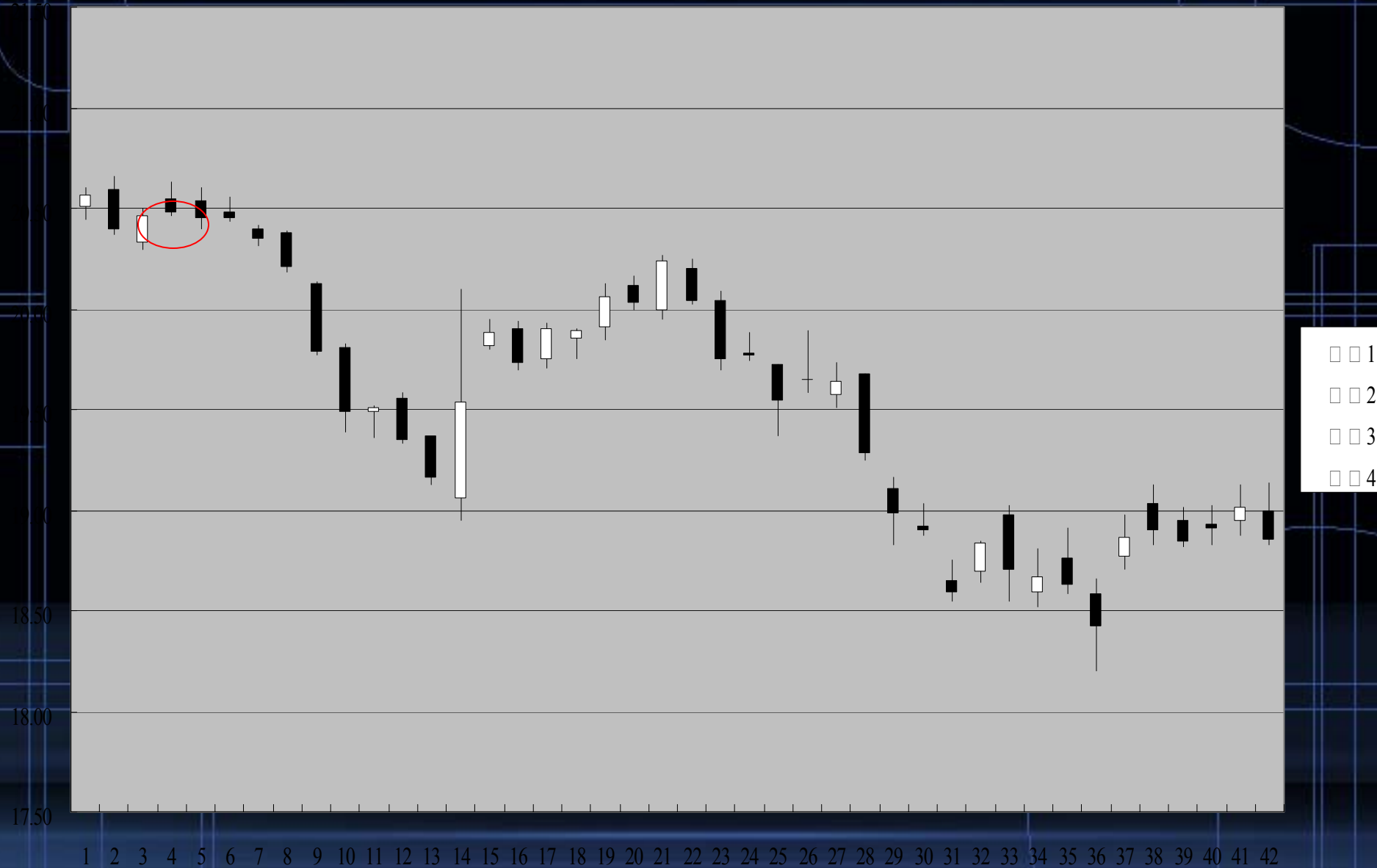
4.雙鴉(Two Crows)(*niwa garasu*)

「雙鴉」是屬於頭部反轉型態，第一根線型須反映出趨勢，而第二根、第三根線型則須與第一根線形顏色相反。其判斷的準則有：(1)上升趨勢中先出先一根白長線，(2)第二根線形出現向上缺口，(3)第三根線形的開盤價須位在第二根線形的實體內，而收盤價須位在第一根線形的實體內。如圖 3-27 所示：

圖 3-27 雙鴉



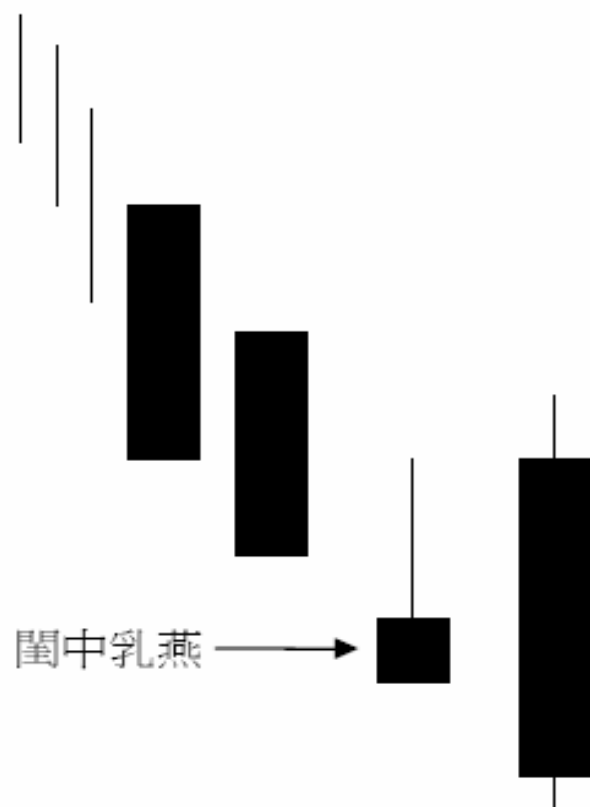
199305~199306



2. 閨中乳燕(Concealing Baby Swallow)(*kotsubame tsutsumi*)

「閨中乳燕」是由四根陰陽線形所組成，是一個空頭反轉的訊號。其辨認的準則有：(1)第一根與第二根線形均為反映趨勢的「黑色實線」，(2)第三根線形顏色需為黑色，且與第二根線形之間存在著跳空，並且有很長的上影線，(4)第四根線形顏色仍為黑色，且須完全吞嚥第三根線形。如圖 3-39 所示：

圖 3-39 閨中乳燕



199409~199410



Steps for Empirical Tests

- Focusing on the **reversal analysis**
- Defining the date of price reverse
- **OLS Analyses/Ordered Logit**

Dependent Variables:dummy variable

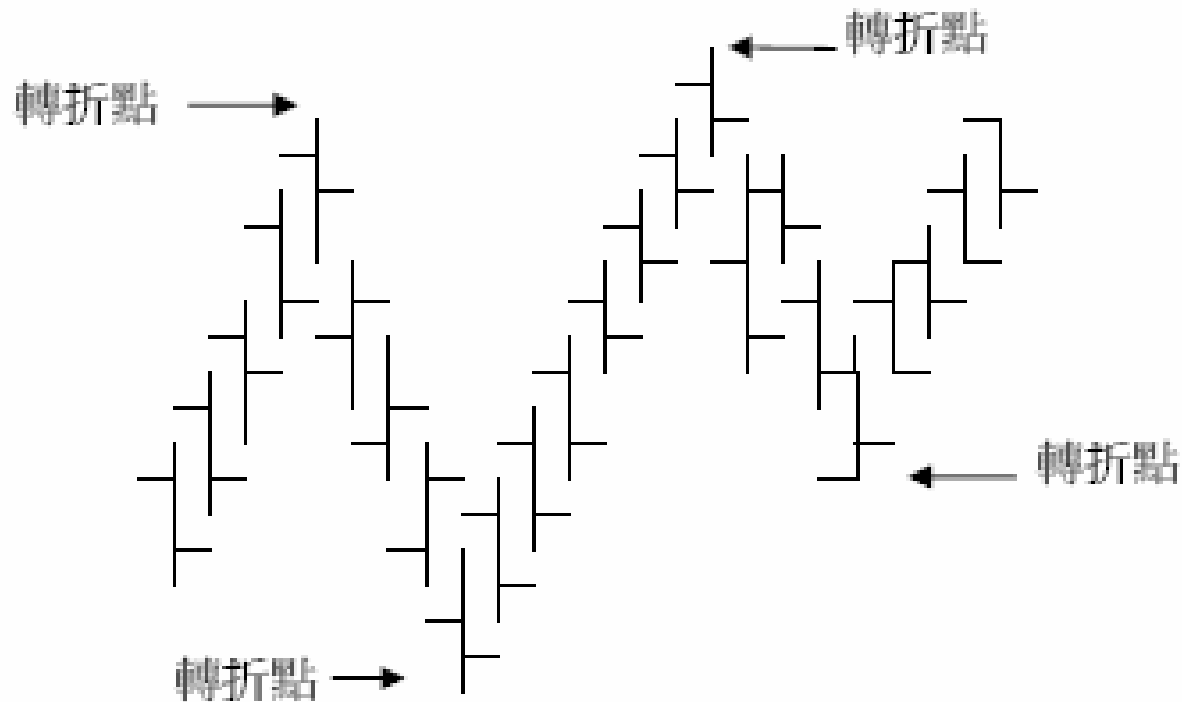
0:no reverse in an observe date

1: bullish reverse in an observe date

2:bearish reverse

Pattern Name	Independent Variable Name	Pattern Name	Independent Variable Name
Hanging Man	hang2	Two Crows	twcr2
Engulfing	engu2	Upside Gap Two Crows	gadr2
Harami	hara2	Meeting Lines	meet2
Harami cross	hacr2	Belt Hold	belt2
Shooting Star	star2	Advance Block	adbl2
Dark Cloud Cover	clou2	Deliberation	deli2
Doji Star	doji2	Three Black Crows	thcr2
Evening Star	even2	Breakaway	brea2
Evening Doji Star	evdo2		

Defining the date of price reverse (turning points)



Bullish Reversal Signals	Appearance	Appearance Frequency
	Frequency	In Different Years
Hammer	23	1987(2)* □ 1988(1) □ 1989(2) □ 1990(4) □ 1991(3) □ 1992(1) □ 1994(2) □ 1995(2) □ 1996(3) □ 1997(1) □ 1998(1) □ 2003(1) □
Engulfing	28	1986(2) □ 1987(2) □ 1989(1) □ 1991(2) □ 1992(1) □ 1993(2) □ 1994(3) □ 1995(1) □ 1996(2) □ 1998(2) □ 1999(1) □ 2000(4) □ 2001(2) □ 2002(3) □
Harami	53	1986(1) □ 1989(3) □ 1990(1) □ 1991(3) □ 1992(2) □ 1993(4) □ 1994(4) □ 1995(4) □ 1996(6) □ 1997(4) □ 1998(5) □ 1999(2) □ 2000(6) □ 2001(5) □ 2002(2) □ 2004(1) □
Harami Cross	9	1989(1) □ 1990(1) □ 1992(1) □ 1993(1) □ 1995(1) □ 1997(1) □ 2000(1) □ 2001(1) □ 2004(1) □
Inverted Hammer	11	1988(2) □ 1990(1) □ 1991(1) □ 1993(1) □ 1998(3) □ 2001(1) □ 2002(1) □ 2004(1) □
Piercing Line	19	1986(1) □ 1987(1) □ 1988(1) □ 1989(2) □ 1990(2) □ 1991(2) □ 1993(2) □ 1994(2) □ 1999(2) □ 2002(1) □ 2003(3) □
Doji Star	2	1987(1) □ 1995(1) □
Morning Star	22	1986(1) □ 1988(2) □ 1989(2) □ 1990(2) □ 1992(2) □ 1993(2) □ 1998(1) □ 1999(1) □ 2001(2) □ 2002(2) □ 2003(5) □
Morning Doji Star	1	1992(1) □
Abandoned Bady	0	Nbne
Tri Star	0	Nbne
Meeting Line	3	1988(1) □ 1994(1) □ 1997(1) □

Data and Data sources

- WTI (West Texas Intermediate)
- 4546 samples for the
high, low, open and close
daily WTI futures price
- from July 1st, 1986 to August 31, 2004
- Data Sources: NYMEX

Econometric Methods

- Model

$$I_t = \alpha + \beta_1 \text{hamm1}_t + \beta_2 \text{hang2}_t + \beta_3 \text{engul}_t + \beta_4 \text{engu2}_t + \beta_5 \text{haral}_{t+1} + \\ \beta_6 \text{hara2}_{t+1} + \beta_7 \text{hacr1}_{t+1} + \beta_8 \text{hacr2}_{t+1} + \beta_9 \text{inhal}_t + \beta_{10} \text{star2}_t + \beta_{11} \text{pier1}_t \\ + \beta_{12} \text{clou2}_t + \beta_{13} \text{doji1}_t + \beta_{14} \text{doji2}_t + \beta_{15} \text{mom1}_{t+1} + \beta_{16} \text{even2}_{t+1} + \\ \beta_{17} \text{modol}_{t+1} + \beta_{18} \text{evdo2}_{t+1} + \beta_{19} \text{gadr2}_t + \beta_{20} \text{meet1}_t + \beta_{21} \text{meet2}_t + \\ \beta_{22} \text{belt1}_t + \beta_{23} \text{belt2}_t + \beta_{24} \text{thr1}_{t+1} + \beta_{25} \text{thwh1}_{t+2} + \beta_{26} \text{adbl2}_t + \\ \beta_{27} \text{deli2}_t + \beta_{28} \text{thcr2}_{t+2} + \beta_{29} \text{breal}_t + \beta_{30} \text{brea2}_t + \beta_{31} \text{twcr2}_{t+1} + \\ \beta_{32} \text{sots1}_t + \beta_{33} \text{cobs1}_t + \beta_{34} \text{homel}_{t+1} + \beta_{35} \text{mlowl}_t + \varepsilon_t, \quad t=1, \dots, T$$

Empirical Results

-
- More Results
considering the structural change
price rising period
- Explanatory Power

Conclusions

- WTI price \$70.85 per barrel (Aug 31)
- Main reasons: **shortage of excess capacity**
/manipulation of market players
- Most candle line patterns can explain the reversal signals well (3/10).
 - 3 owing to **events**
- Candle line patterns **better explain the bullish** reversals than the bearish reversals.
- More suitable for short run (less 7 days)
- Explanatory power of our model is only 30%