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<th>Month of first price observation</th>
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<td>24</td>
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Table 1
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<th></th>
<th>6 Month</th>
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<th>15 Month</th>
<th>18 Month</th>
<th>21 Month</th>
<th>24 Month</th>
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<td>0.09</td>
<td>0.04</td>
<td>0.02</td>
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<td>116</td>
<td>85</td>
<td>67</td>
<td>54</td>
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<td>15</td>
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</table>

**Mean Hedging Errors**

**Table 2a**

This table reports the means of the monthly errors in hedging a forward commitment of one barrel of oil deliverable at a fixed future maturity, under different strategies, over the period May 1985 to December 1994 or subperiods for which futures price data were available. S&R: Stack and Roll strategy; E&C: minimum variance hedge of Edwards and Canter (tailed strategies adjust the hedge for the time value of money). BRE_{2,4,6} (BRE_{2,4}): strategy derived from Brennan model of futures prices implemented using 2 and 3 month (2 and 6 month) maturity futures contracts. G&S_{2,4} (G&S_{2,4,6}): strategy derived from Gibson and Schwartz model of futures prices implemented using 2 and 3 month (2 and 6 month) maturity futures contracts.
<table>
<thead>
<tr>
<th></th>
<th>6 Month</th>
<th>9 Month</th>
<th>12 Month</th>
<th>15 Month</th>
<th>18 Month</th>
<th>21 Month</th>
<th>24 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;R</td>
<td>0.70</td>
<td>0.99</td>
<td>1.30</td>
<td>1.44</td>
<td>1.66</td>
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<td>S&amp;R_{ratio}</td>
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<td>0.90</td>
<td>1.16</td>
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<td>1.43</td>
<td>0.81</td>
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<tr>
<td>E&amp;C</td>
<td>0.44</td>
<td>0.65</td>
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<td>1.14</td>
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<tr>
<td>E&amp;C_{ratio}</td>
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<td>0.60</td>
<td>0.79</td>
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<td>0.97</td>
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<td>BRE_{1/5}</td>
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<td>G&amp;S_{1/5}</td>
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<td>0.61</td>
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<td>116</td>
<td>85</td>
<td>67</td>
<td>54</td>
<td>17</td>
<td>15</td>
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</tbody>
</table>

**Standard Deviation of Monthly Hedging Errors**

**Table 2b**

This table reports the standard deviations of the monthly errors in hedging a forward commitment of one barrel of oil deliverable at a fixed future maturity, under different strategies, over the period May 1985 to December 1994 or subperiods for which futures price data were available. See note to Table 1a.
Legends

Figure 1: Monthly Rollover Gains for the 2 month NYMEX Light Oil Futures Contract, March 1983 - December 1994.
The figure shows the time series of the month-end differences between the prices of the nearby futures contract and the 2 month contract.

Figure 2: Monthly Rollover Gains for the 3 month NYMEX Light Oil Futures Contract, March 1983 - December 1994.
The figure shows the time series of the month-end differences between the prices of the nearby futures contract and the 3 month contract.

Figure 3: Term Structure of Oil Futures Prices.

Figure 4: Time Series of Speed of Adjustment Estimates.
The figure shows estimated values of $\alpha$, the speed of adjustment parameter for the Brennan model, and $\delta$, the speed of adjustment parameter for the Gibson-Schwartz model.
The estimates are derived from monthly convenience yield estimates from March 1983 up to date, using the exact discrete form corresponding to the diffusion process.

Figure 5a: Cumulated Hedge Errors: 12 month Hedge
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 12 month commitment using Stack and Roll (S&R) and Edwards and Canter (E&C) hedges.

Figure 5b: Cumulative Hedge Errors: 12 month Hedge.
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 12 month commitment using Brennan (BRE) and Gibson and Schwartz (G&R) hedges.

Figure 5c: Cumulative Hedge Errors: 12 month Hedge.
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 12 month commitment using Stack and Roll (S&R) and Gibson and Schwartz (G&R) hedges.

Figure 5d: Cumulated Hedge Errors: 18 month Hedge
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 18 month commitment using Stack and Roll (S&R) and Edwards and Canter (E&C) hedges.

Figure 5e: Cumulative Hedge Errors: 18 month Hedge.
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 18 month commitment using Brennan (BRE) and Gibson and Schwartz (G&R) hedges.

Figure 5f: Cumulative Hedge Errors: 18 month Hedge.
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 18 month commitment using Stack and Roll (S&R) and Gibson and Schwartz (G&R) hedges.

Figure 5g: Cumulated Hedge Errors: 24 month Hedge
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 24 month commitment using Stack and Roll (S&R) and Edwards and Canter (E&C) hedges.

Figure 5h: Cumulative Hedge Errors: 24 month Hedge.
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 24 month commitment using Brennan (BRE) and Gibson and Schwartz (G&R) hedges.

Figure 5i: Cumulative Hedge Errors: 24 month Hedge.
The figure shows the cumulated monthly errors in dollars from hedging a fixed maturity 24 month commitment using Stack and Roll (S&R) and Gibson and Schwartz (G&R) hedges.

Figure 6a: Hedge Ratios for the Edwards and Canter 12 month hedge.
The figure shows the estimated number of 2 month futures contracts to be held long to hedge a 12 month fixed maturity commitment using the Edwards and Canter tailed hedge.

Figure 6b: Hedge Ratios for the Brennan and Gibson and Schwartz 12 month hedge.
The figure shows the estimated number of 2 and 6 month futures contracts to be held in order to hedge a 12 month fixed maturity commitment using the Brennan (BRE) and Gibson and Schwartz (G&S) models.

Figure 7: Spot and Futures Prices of Oil, second half of 1990.
The figure shows the spot and futures prices of the NYMEX Light Oil contract, month ends June-December, 1990.
Monthly Rollover Gains for 3 month
Oil Futures Contract 1983-1994

Figure 1

Figure 2
Oil Futures Prices by Maturity
Selected Dates 1983 - 1993

Figure 3
Estimated Speeds of Adjustment:
Brennan and G&S Models

Figure 4
Cumulative Errors -12 month hedge
Stack & Roll and Edwards & Carter

Figure 5a
Cumulative Errors -12 month hedge
Brennan and Gibson & Schwartz

Figure 5b
Cumulative Errors -12 month hedge
Stack & Roll and Gibson & Schwartz

Figure 5c
Cumulative Errors -18 month hedge
Stack & Roll and Edwards & Carter

Figure 5d
Cumulative Errors -18 month hedge
Brennan and Gibson & Schwartz

Figure 5e
Cumulative Errors -18 month hedge
Stack & Roll and Gibson & Schwartz

Figure 5f
Cumulative Errors - 24 month hedge
Brennan and Gibson & Schwartz

Figure 5h
Cumulative Errors - 24 month hedge
Stack & Roll and Gibson & Schwartz

Figure 5i
Positions in the 2 month contract for
12 month hedge: Edwards and Canter

Figure 6a
Figure 6b

Positions in the 2 & 6 month contracts for 12 month hedge: Brennan and G&S

\[ \text{Diagram showing positions over time with different symbols for G&S:2, G&S:6, BRE:2, BRE:6}} \]
Spot and Futures Prices of Oil:
second half of 1990

Figure 7