Striking Oil: Another Puzzle

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October 2003

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JEL classification code: G1

Introduction

Oil prices did not fluctuate much before 1973. A few large US oil companies known as the "Seven sisters", through price and production controls, stabilized the price during much of the twentieth century. Only when the Yom Kippur War started on October 6, 1973 the control of the crude oil price passed from the United States to OPEC and oil prices started to behave like prices of other commodities (see figure 1).

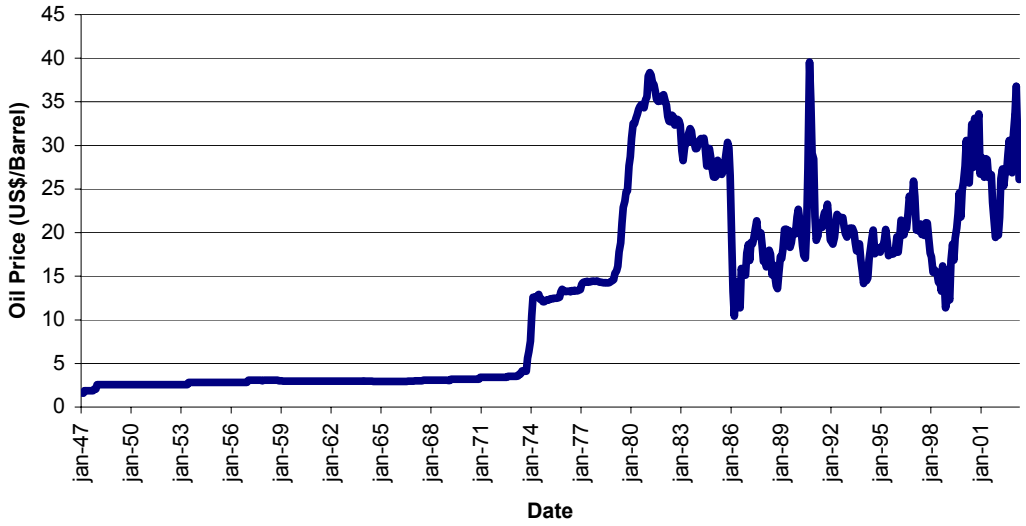


Figure 1. West Texas Intermediate Oil Price (US$/Barrel) from 1947 to 2003.
Notes: source: Global Financial Data Inc..

Since then, the impact of oil price changes on the world economy has been large. In fact according to Adelman (1993, page 537): "Oil is so significant in the international economy that forecasts of economic growth are routinely qualified with the caveat: 'Provided there is no oil shock'."

Not surprisingly, there exists a whole strand of literature that investigates oil prices and the impact of oil price shocks on the economy. Recent examples include Hooker, (1999), Amihud and Wohl (2003), Hammes and Wills (2003) and Leigh, Wolfers and Zitzewitz (2003). Other papers deal with the question whether oil price risk is priced in stock market prices (for instance Jones and Gaul, 1996). However, the question

whether oil prices might forecast future stock market returns has to our knowledge received no attention[1,2].

This paper fills that gap. Using stock market data of 48 countries, a world market index and price series of several types of oil, we find they do. We find statistically significant predictability, especially in developed markets. Stock returns tend to be lower after oil price increases and higher if the oil price falls in the previous month. This predictability is not only statistically significant but also economically significant in many countries. It is robust over time and does not seem to be tied to one or two specific sectors. This predictability can be found in all sectors in the different countries, where we find the effect present. In addition, as we have some indication that the oil effect might be linked to January effect and the Halloween effect, we also show that these results cannot be explained by these calendar anomalies.

Our finding that changes in oil prices predict future stock returns is interesting for several reasons. It adds a new economic variable to the list of variables that seem to have forecasting power, adding a new perspective to the question whether or not stock returns are to some extent predictable. Especially interesting about the oil prices is not only its direct impact on economic growth, but also the notion that changes in oil prices might reflect or even predict changes in international stability, as considered by Leigh, Wolfers and Zitzewitz (2003). In addition, our results also indicate that an investor might be able to profit economically from this predictability. A simple trading strategy generates economically significant outperformance around 4 percent annually (after transaction costs) in comparison to a risk corrected buy and hold benchmark. Although - as we have only one sample of oil returns - these results had to be based on in sample predictability results.

This paper is organised as follows. In section 2 we discuss the data and methodology and our main results. Section 3 contains our robustness tests. Finally, section 4 concludes.

[1] One reason could be that in the past, researchers considered the time period too short to test for predictability of this economic variable.

[2] Only Jones and Gaul (1996) refer to the possibility that oil prices changes forecast stock market returns but they leave this for further research.

2. The puzzle

A. Stock market data

We start our analysis in October 1973, because at this point in time, at the start of the Yom Kippur War, oil prices started to fluctuate. All series end in April 2003, so we base our results on almost thirty year of monthly observations. For our investigation we calculate (continuously compounded) monthly stock returns of the value-weighted market indices[3] of 18 countries (local currencies[4]). These countries are: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, the Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States. All series are end of the month MSCI reinvestment[5] indices (local currency) over September 1973- April 2003. We also use data from markets for which MSCI reinvestment indices are available since 1988 or later. Table I contains the basic characteristics of all indices.

Please insert table I around here

Among these series are several emerging markets series[6]. Claessens, Dasgupta and Glenn (1995) argue that due to their higher degree of segmentation they provide an interesting 'out of sample' test. Whether or not emerging markets are (partially) segmented or integrated is still an ongoing discussion[7]. Many of these so-called emerging markets are, in fact fully "integrated" in the sense that there are no restrictions on capital mobility. We consider these series as a first 'out of sample test' for the robustness of an oil effect. We consider market returns of Argentina, Brazil,

[3] One advantage of the value weighted indices is that these indices exhibit less autocorrelation and are less influenced by the January effect. Since the January anomaly is closely related to the small firm effect (see for instance Hawawini and Keim, 1995).

[4] We obtain similar results if we use indices measured in dollar returns.

[5] In the developed markets, MSCI calculates dividend reinvestment at the end of each month as 1/12th of the indicated annual dividend. There are no lags instituted for the reinvestment of the dividend. MSCI has constructed its Emerging Markets dividends reinvested series as follows: In the period between the ex-date and the date of dividend reinvestment, a dividend receivable is a component of the index return. Dividends are deemed received on the payment date. To determine the payment date, a fixed time lag is assumed to exist between the ex-date and the payment date. This time lag varies by country, and is determined in accordance with general practice within that market. Reinvestment of dividends occurs at the end of the month in which the payment date falls.

[6] For ease of reference, in the remainder of this paper we refer to the shorter series as emerging markets and to the long series as developed markets.

[7] See for instance, De Jong and De Roon (2001) or Bekaert and Harvey (1995).

Chile, China, Columbia, Czech Republic, Egypt, Finland, Hungary, India, Indonesia, Ireland, Israel, Jordan, Malaysia, Mexico, Morocco, New Zealand, Pakistan, Peru, the Philippines, Poland, Portugal, Russia, South Africa, South Korea, Taiwan, Thailand, Turkey and Venezuela. For these shorter series we have at most 184 monthly returns of MSCI re-investment indices (local currency) starting from 1988. In addition we consider the MSCI world market index. Table 1 contains some basic characteristics for all markets.

B. Oil price data

The crude oil market is the largest commodity market in the world[8]. Total world consumption equals around 70-80 million barrels a day of which the United States consume approximately 25 percent. Several times total consumption is traded daily on crude oil, spot, futures and over-the-counter markets at Exchanges in New York (NYMEX) and London (IPE).

Prices of three types of oil – Brent, West Texas Intermediate and Dubai - serve as a benchmark for other types of crude oil. Processing costs and therefore prices of oil depend on two important characteristics: sulphur content and density. Oil that has a low sulphur content ("sweet") and a low density ("light") is cheaper to process than oil that has a high sulphur content ("sour") and high density ("heavy"). For instance the price of West Texas Intermediate is generally higher than Brent oil as it is sweeter and lighter than Brent oil. Of total world oil consumption of 70-80 million barrels a day, Brent oil serves as a benchmark for between 40-50 million barrels a day, West Texas Intermediate for 12-15 million barrels a day and Dubai for around 10-15 million barrels a day.

Even though price differences do exist, oil prices tend to move closely together as shown in figure 2 and table III.

[8] For a more thorough discussion on oil prices and markets we refer the reader to Levin et al. (2003), chapter 3 from which we took the information in the first two paragraphs.

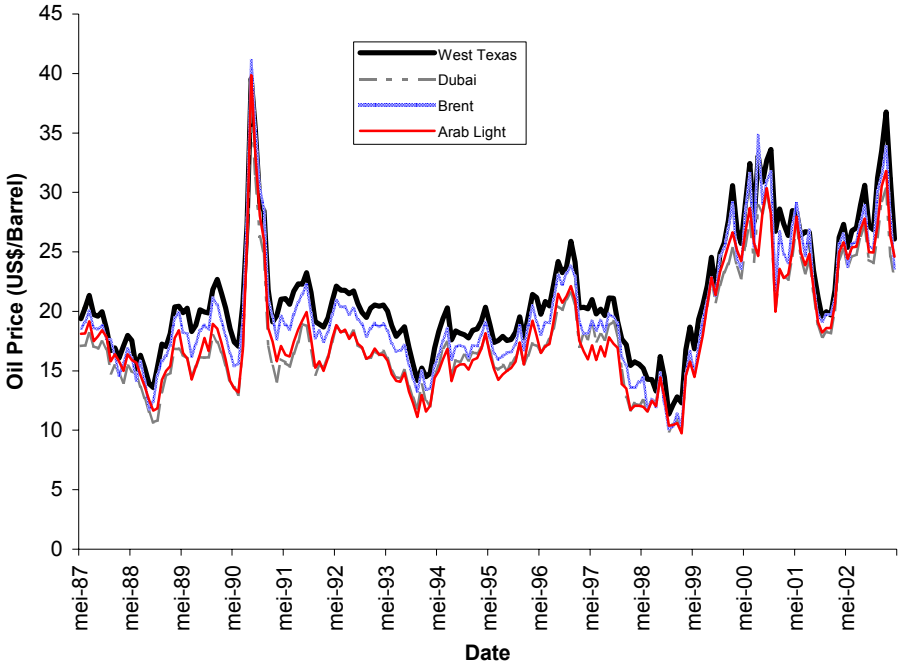


Figure 2. Oil price development.

Notes: Oil price development over the period May 1987 through April 2003 of four types of oil: West Texas, Brent, Dubai and Arab Light.

We use several oil series in our analysis[9]. Firstly, we use the longest oil price series (end of the month prices) we could find from several sources for the three most used crude oil benchmarks Brent, West Texas and Dubai. In addition we used Arabian Gulf Arab Light Crude Oil Spot Price (US$/Barrel) and two futures series, one for NYMEX and one for the IPE.

To save space we focus on results for the Arab Light crude oil as these series more or less give a good indication of our 'average' results for all series. However, results are independent to the oil series used in our analysis.

Please insert table II and table III around here

[9] Long oil series are not easy to find. While the IMF has longer oil series available for Brent and Dubai oil, these are average monthly series based on daily prices. As shown by Working (1960) these data might exhibit spurious correlation. Data from the International Energy Agency suffer from the same problem.

Table II contains some basic information for all these series and in table III we report basic characteristics of oil price changes (measured as log returns). This table also contains the pair wise correlations between these series.

C. Methodology

To test for the existence of an oil-effect we used the usual regression techniques. We incorporated an oil-variable r_{t-1}^{oil} in the regression:

$$r_t = \mu + \alpha_1 r_{t-1}^{oil} + \varepsilon_t \text{ with } \varepsilon_t = r_t - E_{t-1}[r_t] \quad (1)$$

where μ is a constant and ε_t the usual error term.

Note that in the absence of this variable this equation reduces to the well known random walk model. We tested whether the coefficient of r_{t-1}^{oil} is significantly different from zero. When α_1 is significant, this rejects the null hypothesis of no oil effect. The advantage of using this regression is that one can easily include other variables, as we do later in this paper.

D. Results

Table I contains our estimation results for regression 1. We report detailed estimation results for the Arab Light only. If we found statistically significant results (at the ten percent level or higher) using other oil series we mark this with an 'X' in the table[10]. For the developed markets we find that the change in oil price significantly predicts future market returns in 12 of the 18 developed markets (all t-values are based on White standard errors). In all countries the effect is negative. That is, a decrease in this month's oil price on average indicates a higher stock market return next month. The impact of changes in the oil price on stock returns tends to be large. For instance, a decrease of the oil price of ten percent in the US will double the expected return on the stock market in the next month. This oil effect is also significantly present in the world market index.

[10] Also the t-values found, tend to be similar to the Arab Light oil results, regardless which series we use.

While less pronounced the emerging markets show the same effect. In most cases the sign of the oil return coefficient is negative and in 8 of the 30 emerging markets this effect is statistically significant at the 10 percent level. Countries are ordered by the starting date of the stock return series. We find no significant predictability for the shorter data. This does not necessarily mean that there is no significant predictability. It might be that these countries do exhibit a significant oil effect but we simply do not have enough data to confirm this. All in all, these 'emerging' markets results suggest that our results are fairly robust.

Just to give the reader some feel for the strength of these results, we compare in figure 3 t-values one would expect under the null hypothesis of no predictability and estimated t-values. Note, that in this figure we assume that these markets are uncorrelated, which is too strong an assumption. In fact, we do find that the effect tends to be strongly driven by the returns in the world market. For instance, if we include the world market returns as an additional regressor in equation 1, we find that the effect is only significant for five developed markets (Belgium, Germany, Italy, the Netherlands and Switzerland) and three 'emerging' markets (Jordan, Portugal and Israel).

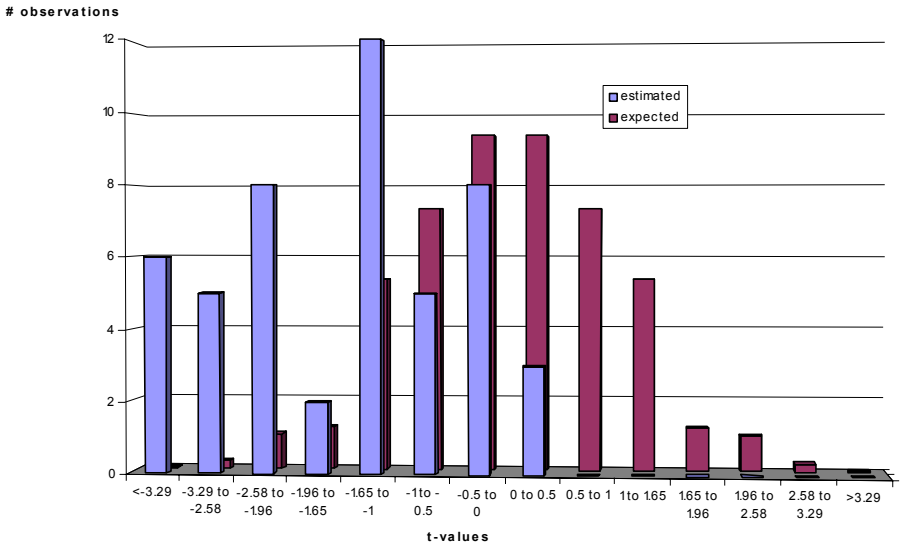


Figure 3. Comparison of expected t-values with real t-values of the oil effect.

Summarising our evidence so far, we find a strong statistically significant relation between lagged oil price changes and stock returns. In the next section, we check the robustness of these results and consider some possible explanations.

3. Possible explanations for the puzzle[11]

A. *Persistence over time*

This oil effect might be caused by some specific outliers in part of our sample. As a robustness check we simply divide our sample of developed markets in two equal periods (November 1973 through July 1988 and August 1988 through April 2003) and run the regression in equation 1 for both samples. In table IV we report the main results for these regressions.

Please insert table IV around here

While the effect is stronger in the second half of our sample (10 countries in the first half versus 14 countries in the second half with significant results) we do find the effect significantly present in both samples. This suggests that the effect is robust with respect to the sample period we consider.

B. *Halloween indicator and January effect*

The demand for oil is highly seasonal which might lead to seasonality in oil price returns. In addition, Bouman and Jacobsen (2002) show that stock market returns tend to be significantly lower during the summer (May trough October) than during the winter months (November through April). They refer to this puzzle as the Halloween indicator or the Sell in May effect. Surprisingly, we find that the countries where we find strong oil effects are similar to the countries where they find a strong Sell in May effect (for instance Belgium, Italy and the Netherlands). This suggests that the oil effect and the Halloween effect could be related. But there is more that suggests these

[11] We have restricted our tests to explanations and robustness tests we found realistic to consider. However, we did many additional tests for which we do not report our results here to save space. But, for instance, we find no evidence that results can be explained by oil price risk in stock returns. Results are robust to the inclusion of the oil price change in the same month (not lagged) in our regression 1. We check whether results for the US and the world market were robust for US inflation and found that this dit not affect our results. We checked for a momentum effect in oil price changes that might cause a momentum effect in stock returns but found none in the oil prices.

effects could be intertwined. Figure 4 contains average monthly returns for our Arab Light oil series.

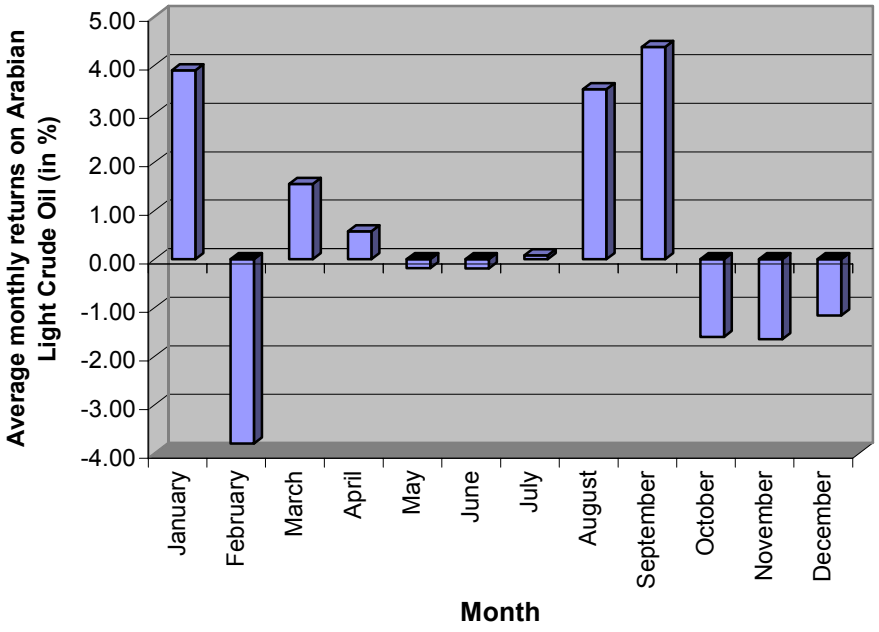


Figure 4. Average monthly oil returns over the period October 1973- April 2003.

Especially in the months August and September oil returns tend to be positive. And as Bouman and Jacobsen (2002) report (table 2) these two months and the month October tend to be the worst months for stocks. Given the negative relation we found between oil returns and stock returns, this suggests even stronger that the oil effect and the Halloween effect might be related. Moreover, oil price changes in December are negative on average. This could mean that there might be a relation with the January effect as well. Therefore, we verify in several ways whether there might be some relation between this effect and our oil effect. First, we check for the existence of a December effect and an adjusted Sell in May effect (adjusted in the sense that we consider the month's April trough September instead of May through October, as we lag the oil price change one month) in oil returns using the following regression:

$$r_t^{oil} = \mu + \alpha_1 S_t^{adjusted} + \varepsilon_t \qquad \text{with } \varepsilon_t = r_t - E_{t-1}[r_t] \tag{2}$$

where $S_t^{adjusted}$ is a dummy that takes the value 1 during the months October through March and zero otherwise. For the December dummy we take the same approach. Then, using a similar regression for stock returns (but now using a January dummy and a Sell in May dummy unadjusted) we verify the results of Bouman and Jacobsen (2002) and finally we include a Halloween/Sell in May dummy and a January dummy in equation 1: the regression with the oil effect.

Based on equation 2 we find no statistically significant adjusted Sell in May effect in oil returns, but for Arab Light and Dubai oil we do find a significant December effect. In table V we report the results of these regressions. Some oil series show a slight tendency to be somewhat lower during the 'winter' months than during the remainder of the year. In table VI we report our t-values for all relevant regressions based on equation 1. First, we report all t-values for the individual variables (Oil, Sell in May Dummy and January Dummy) included separately in equation 1, then we report results of combinations of these variables. (Oil and January combined in one regression; Oil and the Sell in May effect combined in one regression, and finally all three variables included in one regression).

Please insert table V and table VI around here.

We find a significant January effect present in 8 of the developed markets, the world market index and 7 of the 'emerging' markets. Probably due to our later ending date (April 2003 versus August 1998) we find even stronger evidence of the existence of a Sell in May effect in stock returns than Bouman and Jacobsen (2002). This effect is in our sample statistically significant in 16 of the 18 developed markets, the world market index, and 17 of the 'emerging' countries. While results tend to become less stronger for the combination of variables, we find no evidence that one effect can be explained by another. The oil effect is robust to the inclusion of both the January effect and the Sell in May effect. In a regression where we include all three variables, the oil effect remains present in all but two 'emerging' countries. Only the January effect seems to suffer from the inclusion of the other two variables. It is now significant in only three of the developed markets and one of the emerging markets.

All in all it seems unlikely that the oil effect is related to one of these calendar anomalies.

C *Economic significance and market timing ability*

The existence of many so-called anomalies can easily be explained by introducing transaction costs. For instance, if potential benefits do not outweigh the costs of trading – in which the Monday effect is a clear example. From a practical point of view it is interesting to consider how a trading strategy based on this simple market wisdom would perform in comparison with a simple buy and hold strategy. Here, we carry out this comparison in more detail. For the developed markets we split our sample in two, use the first half to estimate our model and use this model in the second half of our sample to judge the economic significance. Note that even while we test economic significance in the second half of our sample, these results must still be seen as in sample results: we already know the effect continues to exist in the second half of our sample[12,13]. The main reason why we investigate the economic significance is to get some indication about the size of the outperformance that could be obtained.

For our oil strategy we take the following approach. Based on our regression results we determine whether the expected return (conditional on the oil price change in the previous month) in a month will be higher or lower than the risk free rate. If the expected return is higher (bull market) we fully invest in the market portfolio, if it is lower (bear market) we invest in short term bills. As such a strategy can easily be implemented using index futures we assume switching costs of 0.10 percent (see also Solnik, 1993).

For every country this gives us the results of our oil strategy portfolio. We compare the risk and return characteristics of this strategy with a buy and hold portfolio and test whether we can reject the null hypothesis that the risk free rate and the market portfolio span the results of this trading strategy. All results include transaction costs

[12] If we use the full sample to estimate equation 1 in the text and then use the same strategy we find qualitatively similar results.

[13] In a practical setting an investor would probably re-estimate the model every month using new data and a fixed window. However, the results reported here are simply intended to get some feel for results that could be obtained and given the in sample measurement we abstain from any further level of sophistication.

for switching of 0.10 percent. We compare risk and return of this trading strategy with a buy and hold benchmark and calculated Jensen's alpha. Table VII contains our results for all developed markets and the world market index.

Please insert table VII around here

Columns 3, 4 and 5, give the mean, standard deviation and Sharpe ratio for the buy and hold strategy, columns 6 and 7 contain the mean and standard deviation for the oil strategy. Alpha and beta and their respective t-values (based on White standard errors) are calculated using the regression:

$$r_t^{oilstrategy} - r_t^f = \alpha + \beta\left(r_t^{market} - r_t^f\right) + \varepsilon_t \text{ with } \varepsilon_t = r_t - E_{t-1}[r_t] \qquad (3)$$

where r_t^f denotes the risk free interest rate at time t[14].

The fore last column of this table reports the maximum obtainable Sharpe ratio using this strategy based on the weights of the tangency portfolio constructed from buy and hold returns and oil strategy returns. The weight of the oil strategy in the tangency portfolio is reported in the last column. These are calculated from the regression results from equation 3. For instance, the Sharpe ratio for the buy and hold portfolio of a US investor would have been 0.35 over the period August 1988- April 2003. Had this investor invested in the mean variance efficient portfolio by investing 114% in the oil strategy (and shorting the market 14%) he would have obtained a (maximum) Sharpe ratio of 0.68.

As the null hypothesis that α (Jensen's alpha) is equal to zero is frequently rejected, this shows that in most countries mean variance efficiency of the stock market index is rejected. Jensen's alpha (after transaction costs) is around 4 percent annually on average. The estimates of β are, not surprisingly, well below 1. This confirms that the

[14] We used monthly short term interest rates (inter bank or treasury bill rates) taken from either the IMF or OECD. We took IMF interest rates when these rates are available for the full sample period, otherwise we took OECD or short term interest rates. For Belgium, Canada, Singapore, Spain, Switzerland, the United Kingdom, the United States and the World index we used treasury bill rates. We used government bond yields for France, the Netherlands and Norway, and Money Market rates (Federal Funds) for Denmark and Germany; government bond yields (medium term) for Australia and Italy and the official discount rate for Austria. For Japan we used the deposit rate. For Hong Kong we took the savings deposit rate. For Sweden we had to construct a time series of interest rates, as they were not available over the full sample. We used the treasury bill rate and from January 2002 the discount rate for Sweden.

oil strategy is substantially less risky than investing in the market index in the respective countries. In general substantial increases in Sharpe ratio's would have been possible by switching form the buy and hold strategy to the oil strategy.

Another way to test whether the oil strategy has forecasting power is to investigate the market timing ability of this strategy. Merton (1981), and Henriksson and Merton (1981) developed a (non-parametric) test for evaluating the market timing ability of investment managers[15]. In their analysis, the investor predicts when stocks will out- or under perform bonds, but does not predict the magnitude of the superior performance[16]. The probability of a correct forecast, given that the stock return is below the risk free rate, is defined as p_1, and the probability of a correct forecast, given that the stock return is above the risk free rate, as p_2.

We analysed whether the oil strategy has significant market timing ability (again for the second half of our sample for the developed markets and the world market). The analysis takes into account the possibility that forecasting skills are different for bull markets and for bear markets. The oil strategy predicts that treasury bills will outperform the stock market in a bear market as described above and that the stock market will outperform in the other months. The results of the non-parametric test are reported in table VIII.

Please insert table VIII around here

The null-hypothesis of no market timing ability is $p_1 + p_2 = 1$. The alternative hypothesis is $p_1 + p_2 > 1$[17]. Perfect market timing ability gives $p_1 + p_2 = 2$. Henriksson (1984) used this test to investigate whether fund managers of 116 mutual funds exhibited positive forecasting ability over the period 1968-1980. For only four funds he was able to reject the null at 5% level. He found an average estimate for $(p_1 + p_2)$ of 0.984 with a standard deviation of 0.115.

[15] As we already know the potential source of superior performance the Merton-Henriksson methodology is in our simple case similar to the methodology of Glosten and Jagannathan (1994).

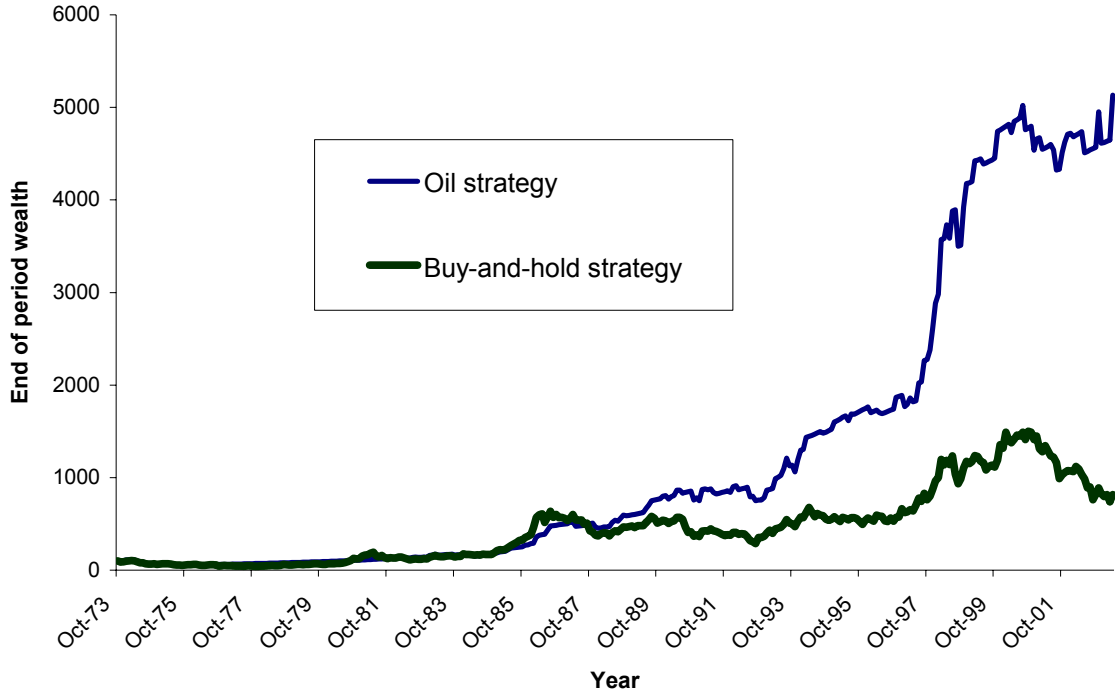
[16] Note that no assumptions about the structure of equilibrium security prices are required, because ex ante the investment manager's predictions are known.

[17] If the forecasts are known and forecasters behave rationally, then a one tail test as we use is most appropriate. Otherwise, a two tailed test would be necessary. See Henriksson and Merton (1981).

Again also based on this measure the oil strategy does well – although somewhat less than on the other tests - when judged on its ability to time bear and bull markets. We find economically significant results in 6 of the 12 countries that showed a significant oil effect.

Finally, just to illustrate the strength of the effect, figure 4 shows the end of period wealth of an initial investment of 100 units of local currency during approximately 30 years in Italy. Italy is the country with the strongest outperformance. Clearly, following a consistent oil strategy would have resulted in substantial higher wealth, even if we incorporate transaction costs when compared to a simple buy and hold strategy.

Summarising our results, we show that in most countries we can reject the null hypothesis that the risk free asset and the market index span the annual returns of this trading strategy (i.e. we reject mean variance efficiency of the index). Moreover, we find that this trading strategy has significant market timing potential in the Henriksson and Merton sense. All in all we find that – at least in sample - the oil strategy is interesting enough for practitioners to trade on. Outperformance tends to be large for most countries.



D *Sectors*

Is the oil effect a sector-specific anomaly, or does it manifest itself in all sectors of the economy? This is an important question because if the anomaly is not sector-specific, we should look to macro economic factors to explain it. In table IX we check whether in the developed markets the effect is found in all sectors in the economy or whether the effect is driven by one sector. We do so using Datastream market indices and Datastream sector indices, as we had no MSCI sector indices available. Datastream assigns the oil industries generally to the sector "resources". The first row for every country shows the statistical significance for the total market and might (although qualitatively similar) deviate from the results for the MSCI market indices reported in table I.

Please insert table IX around here.

Table IX makes it clear that the effect is country specific and not driven by specific sectors. If the effect is present in a country it tends to be present in all sectors. This concurs with our result that the effect tends to disappear when we include the world market index as an additional variable in regression 1, and suggests that the source of this predictability should be sought at the macro economic level. In addition, it is not

strongly present in the sector "resources". If anything the effect tends to be less strong for this sector. This is confirmed if we analyze the specific oil sector indices available from Datastream. Table X contains our results for specific oil sector indices in the different countries that we could obtain.

Please insert table X around here

We reach a similar conclusion. If the effect is present in a country, it will in general show in the oil sectors as well. Otherwise it does not.

4. Conclusions

We find strong evidence that changes in oil prices forecast stock returns. This predictability is especially strong in the developed markets in our sample of countries and the world market index. This predictability is economically significant, robust over time and cannot be explained by the January effect or the Halloween effect. While one might expect that the oil effect is related to the (size of) specific sectors in different countries we find that this is not the case. It tends to be country specific. This suggests that it is a macro economic phenomenon. It might be that this predictability is related to the lagged reaction of the market to the general impact of oil price changes in the different economies. An alternative explanation could be that this predictability is related by a lagged reaction to the oil price change due to an increase in international political instability. Which of these explanations is most likely, needs further research. But even if we are able to determine the source of the predictability, we have no idea why financial markets react slowly to information in oil prices. That remains the real puzzle to be explained.

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Table I. Summary Statistics of Stock Market Returns and Oil effect

Country	Starting Date	# obs.	Mean (%)	Std. dev. (%)	α_1	t-value	WT (1973)	Dubai (1982)	Brent (1987)	Brent (F) (1988)	Oil (F) (1983)
Australia	1973-10	355	1.0	6.2	-0.031	-0.99		X	X	X	X
Austria	1973-10	355	0.5	5.6	-0.067	-1.65		X			
Belgium	1973-10	355	0.9	5.2	-0.095	**-3.61**	X	X	X	X	X
Canada	1973-10	355	0.8	5.2	-0.040	-1.64		X			
Denmark	1973-10	355	0.8	5.2	-0.062	**-2.04**	X	X	X	X	X
France	1973-10	355	0.9	6.3	-0.090	**-2.56**	X	X	X	X	X
Germany	1973-10	355	0.7	6.0	-0.121	**-3.13**	X	X	X	X	X
Hong Kong	1973-10	355	1.0	9.7	-0.017	-0.31					
Italy	1973-10	355	0.9	7.2	-0.153	**-3.52**	X	X	X	X	X
Japan	1973-10	355	0.4	5.3	-0.061	-1.46					
Netherlands	1973-10	355	1.0	5.4	-0.107	**-4.52**	X	X	X	X	X
Norway	1973-10	355	0.6	7.5	-0.067	**-2.22**					
Singapore	1973-10	355	0.4	8.0	-0.044	-0.95					
Spain	1973-10	355	0.8	6.4	-0.112	**-2.38**	X	X	X	X	X
Sweden	1973-10	355	1.3	7.0	-0.122	**-2.64**	X	X	X	X	X
Switzerland	1973-10	355	0.7	5.1	-0.114	**-4.35**	X	X	X	X	X
UK	1973-10	355	1.0	6.1	-0.068	**-2.14**	X	X	X	X	X
US	1973-10	355	0.9	4.7	-0.086	**-3.57**	X	X	X	X	X
World Market	**1973-10**	**355**	**0.7**	**4.2**	**-0.081**	**-2.90**	X	X	X	X	X
Argentina	1988-01	184	5.9	23.6	-0.171	-1.28					
Brasil	1988-01	184	11.3	19.8	-0.315	**-2.63**		X	X	X	
Chile	1988-01	184	1.9	7.0	-0.075	-1.51					
Finland	1988-01	184	1.1	10.1	-0.210	**-2.69**	X	X	X	X	X
Indonesia	1988-01	184	1.1	12.9	-0.130	-1.35					
Ireland	1988-01	184	0.8	6.1	-0.086	-1.51		X			X
Jordan	1988-01	184	0.5	4.2	-0.072	**-2.50**		X	X	X	X
Malaysia	1988-01	184	0.6	8.9	-0.020	-0.22					
Mexico	1988-01	184	2.5	8.9	-0.094	-1.41					
New Zealand	1988-01	184	0.4	6.0	-0.100	**-2.06**	X	X	X	X	X
Philipines	1988-01	184	0.5	9.1	-0.083	-1.01					
Portugal	1988-01	184	0.3	6.4	-0.152	**-3.51**	X	X	X	X	X
South Korea	1988-01	184	0.4	10.1	-0.172	**-1.67**		X	X		
Taiwan	1988-01	184	0.4	11.5	-0.169	-1.53		X			
Thailand	1988-01	184	0.4	11.7	-0.188	-1.53		X	X		
Turkey	1988-01	184	4.5	16.8	-0.092	-0.95					
China	1993-01	124	-1.4	11.6	0.026	0.21					
Columbia	1993-01	124	1.2	8.9	0.017	0.14					
India	1993-01	124	0.3	8.2	-0.128	**-1.78**		X			
Israel	1993-01	124	0.6	7.7	-0.178	**-2.43**		X		X	X
Pakistan	1993-01	124	0.8	11.9	-0.110	-1.10					
Peru	1993-01	124	1.3	8.9	-0.010	-0.10					
Poland	1993-01	124	1.8	14.7	-0.015	-0.14					
South Africa	1993-01	124	0.9	6.6	-0.035	-0.54					
Venezuela	1993-01	124	2.4	13.0	0.038	0.24					
Egypt	1995-01	100	0.8	8.1	-0.030	-0.47					
Hungary	1995-01	100	1.9	11.2	-0.069	-0.75					
Morocco	1995-01	100	0.6	4.4	-0.019	-0.38					
Russia	1995-01	100	1.2	21.1	-0.027	-0.13					
Czech Rep.	1997-01	76	0.7	9.6	0.000	0.00					

Notes: summary results on value weighted MSCI re-investment indices for several countries. Monthly mean returns as percentage, monthly standard deviation as percentage, α_1 refers to the parameter of regression equation (1). In addition we report related t-values based on heteroscedasticity consistent standard errors for Arab Light oil series from Bloomberg. T-values in bold refer to significant t-values at the ten percent level. The last five columns indicate (with an 'x') whether results are also significant at the ten percent level for West Texas Intermediate series (starting Oktober 1973), Dubai oil series (starting Januari 1982), Brent oil series (starting June 1987) and the Brent future series (starting May 1988) from IPE and the light crude oil future series from NYMEX (starting June 1983).

Table II. Oil price series used

Short Name	Full name	Source	Starting Date Series	Starting Date Used
Arab Light	Arabian Gulf Arab Light Crude Oil Spot Price (US$/Barrel)	Bloomberg	December 1969	October 1973
West Texas	West Texas Intermediate Oil Price (US$/Barrel)	Global Financial Data	May 1860	October 1973
Dubai	Dubai Oil Spot Price (US$/Barrel)	Bloomberg	November 1981	November 1981
Brent	Brent Crude – Physical FOB (US$/Barrel)	Datastream	May 1987	May 1987
Brent Future	IPE Brent Crude Oil continuous sett. price (US$/Barrel)	Datastream	June 1988	June 1998
Oil Future	NYMEX Light crude oil continuous sett. price (US$/Barrel)	Datastream	March 1983	March 1983

Table III. Basic characteristics of oil price changes

	Arab Light	Brent	West Texas	Dubai	Brent Fut.	Oil Fut.
Mean (%)	0.59	0.13	0.52	-0.15	0.26	-0.05
Maximum (%)	83.79	38.92	37.14	53.68	37.96	36.89
Minimum (%)	-48.51	-39.14	-35.25	-37.76	-34.31	-35.07
Std. Dev. (%)	10.78	10.99	8.50	10.34	9.61	9.70
# of Obs.	355	191	355	257	178	241
ρ(1)	0.047	0.011	**0.221**	0.161	0.148	0.142
Correlations	**Arab Light**	**Brent**	**West Texas**	**Dubai**	**Brent Fut.**	**Oil Fut.**
Arab Light	1	0.87	0.74	0.90	0.92	0.76
Brent	0.87	1	0.93	0.89	0.96	0.94
West Texas	0.74	0.93	1	0.87	0.96	1.00
Dubai	0.90	0.89	0.87	1	0.94	0.88
Brent Fut.	0.92	0.96	0.96	0.94	1	0.97
Oil Fut.	0.76	0.94	1.00	0.88	0.97	1

Notes: summary results on oil price changes (measured as log returns). Monthly mean returns, maximum and minimum as percentage, monthly standard deviation as percentage. Correlations are pairwise correlations. Series end in April 2003. Arab Light series and West Texas Intermediate series starts Oktober 1973, Dubai oil series starts December 1981, Brent oil series starts June 1987, Brent future series starts July 1988, the light crude oil future series starts April 1983. ρ(1) denotes first order autocorrelation of these series. First order correlation for West Texas is significantly different from zero at the five percent level.

Table IV. Regression results on sub samples.

Country	Start	End	# Obser-vations	Mean (%)	Std. Dev. (%)	Alpha	t-value
Australia	1973-11	1988-07	177	1.30	7.75	0.01	0.20
	1988-08	2003-04	177	0.68	3.99	-0.07	**-2.53**
Austria	1973-11	1988-07	177	0.50	4.18	-0.03	-1.10
	1988-08	2003-04	177	0.49	6.75	-0.11	-1.49
Belgium	1973-11	1988-07	177	1.12	5.36	-0.08	**-2.65**
	1988-08	2003-04	177	0.60	5.04	-0.11	**-2.65**
Canada	1973-11	1988-07	177	0.82	5.76	-0.02	-0.67
	1988-08	2003-04	177	0.66	4.54	-0.06	**-1.74**
Denmark	1973-11	1988-07	177	0.88	4.82	-0.02	-0.49
	1988-08	2003-04	177	0.83	5.58	-0.11	**-2.19**
France	1973-11	1988-07	177	1.11	6.84	-0.08	**-1.66**
	1988-08	2003-04	177	0.70	5.80	-0.10	**-1.96**
Germany	1973-11	1988-07	177	0.75	5.17	-0.10	**-2.17**
	1988-08	2003-04	177	0.56	6.68	-0.14	**-2.28**
Hong Kong	1973-11	1988-07	177	1.20	10.91	-0.07	-0.93
	1988-08	2003-04	177	0.77	8.25	0.04	0.50
Italy	1973-11	1988-07	177	1.10	7.57	-0.12	**-1.79**
	1988-08	2003-04	177	0.60	6.82	-0.19	**-3.94**
Japan	1973-11	1988-07	177	1.22	4.53	-0.08	**-1.72**
	1988-08	2003-04	177	-0.50	5.86	-0.05	-0.69
Netherlands	1973-11	1988-07	177	1.18	5.40	-0.13	**-4.35**
	1988-08	2003-04	177	0.79	5.36	-0.09	**-2.26**
Norway	1973-11	1988-07	177	0.67	8.20	-0.08	**-2.54**
	1988-08	2003-04	177	0.49	6.73	-0.05	-1.01
Singapore	1973-11	1988-07	177	0.59	8.96	-0.06	-0.98
	1988-08	2003-04	177	0.21	7.02	-0.03	-0.44
Spain	1973-11	1988-07	177	0.91	6.26	-0.06	-0.97
	1988-08	2003-04	177	0.76	6.62	-0.16	**-2.60**
Sweden	1973-11	1988-07	177	1.58	6.12	-0.06	-1.18
	1988-08	2003-04	177	0.95	7.76	-0.19	**-2.90**
Switzerland	1973-11	1988-07	177	0.45	4.90	-0.11	**-4.00**
	1988-08	2003-04	177	0.89	5.26	-0.12	**-2.62**
UK	1973-11	1988-07	177	1.34	7.39	-0.06	-1.13
	1988-08	2003-04	177	0.69	4.51	-0.08	**-2.20**
US	1973-11	1988-07	177	0.83	4.97	-0.07	**-2.05**
	1988-08	2003-04	177	0.89	4.35	-0.10	**-3.18**
World	1973-11	1988-07	177	0.98	4.13	-0.07	**-2.02**
	1988-08	2003-04	177	0.49	4.22	-0.09	**-2.15**

Notes: summary results on value weighted MSCI re-investment indices for several countries on sub samples. Monthly mean returns as percentage, monthly standard deviation as percentage, α_1 refers to the parameter of regression equation (1). In addition we report related t-values based on heteroscedasticity consistent standard errors for Arab Light oil series from Bloomberg. T-values in bold refer to significant t-values at the ten percent level.

Table V. Tests for calendar effects in oil returns.

	December dummy		Adjusted Sell in May dummy		December and adjusted Sell in May jointly			
Oil series	**Estimate**	**t-value**	**Estimate**	**t-value**	**December estimate**	**Decemer t-value**	**Sell estimate**	**Sell t-value**
Arab Light	-0.05	**-2.27**	-0.01	-0.53	-0.05	**-2.18**	0.00	0.17
West Texas	-0.02	-1.06	0.00	0.29	-0.02	-1.06	0.00	0.20
Dubai	-0.04	**-2.13**	-0.01	-0.51	-0.04	**-1.98**	0.00	0.01
Oil Future	-0.03	-1.32	0.00	0.06	-0.04	-1.41	0.01	0.53
Brent	-0.03	-1.49	-0.01	-0.40	-0.03	-1.37	0.00	-0.04
Brent Future	-0.02	-0.87	0.00	-0.18	-0.02	-0.81	0.00	0.04

Notes: We report parameter estimates and t-values for regression equation (2) in the text where we include respectively a December dummy, an adjusted Sell in May dummy and both dummies jointly in the equation. t-values in bold refer to significant t-values at the ten percent level.

Table VI. Oil predictability and the calendar anomalies

Country	Start series	# obs.	Only Oil t-value	Only Jan t-value	Only Sell t-value	Oil & Jan Oil t-value	Oil & Jan Jan t-value	Oil & Sell Oil t-value	Oil & Sell Sell t-value	Oil & Jan & Sell Oil t-value	Oil & Jan & Sell Jan t-value	Oil & Jan & Sell Sell t-value
Australia	1973-11	354	-0.98	1.41	**1.65**	-0.91	1.36	-0.90	1.58	-0.86	1.00	1.25
Austria	1973-11	354	-1.65	-0.18	**3.59**	-1.65	-0.30	-1.56	**3.50**	-1.58	-1.37	**3.81**
Belgium	1973-11	354	**-3.61**	1.22	**3.78**	**-3.51**	1.07	**-3.52**	**3.59**	**-3.49**	0.20	**3.44**
Canada	1973-11	354	-1.63	1.29	**2.37**	-1.56	1.21	-1.49	**2.25**	-1.46	0.65	**1.98**
Denmark	1973-11	354	**-2.04**	**2.84**	1.10	**-1.97**	**2.74**	**-1.99**	0.93	**-1.96**	**2.61**	0.12
France	1973-11	354	**-2.56**	1.42	**3.54**	**-2.49**	1.27	**-2.44**	**3.37**	**-2.42**	0.34	**3.17**
Germany	1973-11	354	**-4.20**	0.73	**2.67**	**-3.10**	0.49	**-3.06**	**2.43**	**-3.06**	-0.44	**2.42**
Hong Kong	1973-11	354	-0.31	**1.70**	1.29	-0.24	**1.68**	-0.22	1.26	-0.19	1.39	0.82
Italy	1973-11	354	**-3.51**	**3.60**	**3.84**	**-3.33**	**3.42**	**-3.59**	**3.64**	**-3.42**	**2.49**	**2.81**
Japan	1973-11	354	-1.46	1.33	**3.16**	-1.42	1.21	-1.36	**3.11**	-1.35	0.32	**2.85**
Netherlands	1973-11	354	**-4.52**	1.47	**3.75**	**-4.37**	1.29	**-4.33**	**3.51**	**-4.28**	0.41	**3.34**
Norway	1973-11	354	**-2.22**	**2.61**	**1.87**	**-2.06**	**2.47**	**-2.00**	**1.75**	**-1.95**	**2.04**	1.10
Singapore	1973-11	354	-0.95	**2.10**	**2.40**	-0.84	**2.05**	-0.80	**2.33**	-0.75	1.59	**1.74**
Spain	1973-11	354	**-2.38**	**1.82**	**3.46**	**-2.33**	**1.71**	**-2.34**	**3.31**	**-2.31**	0.76	**2.97**
Sweden	1973-11	354	**-2.64**	**2.46**	**3.55**	**-2.56**	**2.39**	**-2.62**	**3.36**	**-2.57**	1.35	**2.79**
Switzerland	1973-11	354	**-4.34**	1.11	**2.21**	**-4.27**	0.92	**-4.24**	**1.94**	**-4.21**	0.43	**1.79**
UK	1973-11	354	**-2.14**	**1.69**	**3.41**	**-2.02**	1.59	**-2.03**	**3.23**	**-1.96**	1.02	**2.86**
US	1973-11	354	**-3.57**	1.46	**2.05**	**-3.48**	1.26	**-3.50**	**1.80**	**-3.45**	0.85	1.49
World Market	1973-11	354	**-2.90**	**1.89**	**3.23**	**-2.83**	**1.68**	**-2.82**	**3.00**	**-2.79**	0.90	**2.66**
Argentina	1988-01	184	-1.28	0.05	0.58	-1.25	-0.05	-1.11	0.38	-1.11	-0.18	0.42
Brasil	1988-01	184	**-2.49**	1.59	**2.05**	**-2.47**	1.46	**-2.40**	**1.73**	**-2.33**	1.11	1.26
Chile	1988-01	184	-1.51	1.14	**1.67**	-1.42	1.01	-1.32	1.48	-1.29	0.67	1.19
Finland	1988-01	184	**-2.69**	0.74	**1.88**	**-2.69**	0.44	**-2.39**	1.35	**-2.41**	0.03	1.25
Indonesia	1988-01	184	-1.35	1.30	**1.98**	-1.27	1.17	-1.04	**1.69**	-1.02	0.56	1.47
Ireland	1988-01	184	-1.51	**2.10**	**2.94**	-1.38	**1.95**	-1.21	**2.77**	-1.17	1.29	**2.28**
Jordan	1988-01	184	**-2.50**	**1.65**	**1.85**	**-2.34**	1.34	**2.12**	-1.39	**-2.09**	1.01	1.06
Malaysia	1988-01	184	-0.22	0.50	**1.96**	-0.19	0.47	0.03	**1.90**	0.02	-0.23	**1.83**
Mexico	1988-01	184	-1.41	0.19	1.01	-1.42	0.06	-1.28	0.76	-1.29	-0.17	0.77
New Zealand	1988-01	184	**-2.06**	1.04	0.55	**-1.99**	0.80	**-1.99**	0.11	**-1.96**	0.80	-0.10
Philipines	1988-01	184	-1.01	1.41	**1.88**	-0.93	1.31	-0.79	**1.70**	-0.77	0.82	1.40
Portugal	1988-01	184	**-3.51**	**1.81**	**1.91**	**-3.34**	1.60	**-3.34**	1.38	**-3.26**	1.35	0.91
South Korea	1988-01	184	**-1.67**	**1.72**	**1.66**	-1.61	**1.76**	-1.53	1.29	-1.52	1.51	0.70
Taiwan	1988-01	184	-1.53	**1.92**	**3.14**	-1.43	**1.72**	-1.19	**2.87**	-1.16	1.01	**2.46**
Thailand	1988-01	184	-1.53	**2.37**	**1.82**	-1.45	**2.39**	-1.36	1.41	-1.33	**2.07**	0.77
Turkey	1988-01	184	-0.95	**1.92**	**1.77**	-0.75	**1.82**	-0.56	1.61	-0.50	1.34	1.14
China	1993-01	124	0.21	-1.18	-0.03	0.05	-1.18	0.20	0.00	0.08	-1.25	0.39
Columbia	1993-01	124	0.14	1.01	1.56	0.27	1.03	0.29	1.53	0.36	0.73	1.24
India	1993-01	124	**-1.78**	0.94	0.80	**-1.66**	0.73	**-1.71**	0.60	-1.63	0.57	0.38
Israel	1993-01	124	**-2.43**	0.39	0.83	**-2.45**	-0.08	**-2.30**	0.50	**-2.35**	-0.26	0.52
Pakistan	1993-01	124	-1.10	0.80	1.09	-0.94	0.65	-0.96	0.96	-0.86	0.45	0.81
Peru	1993-01	124	-0.10	0.41	1.27	-0.04	0.40	0.05	1.28	0.07	0.14	1.20
Poland	1993-01	124	-0.14	1.43	1.15	0.11	1.42	0.06	1.14	0.21	1.16	0.79
South Africa	1993-01	124	-0.54	0.22	**2.29**	-0.52	0.15	-0.28	**2.27**	-0.33	-0.51	**2.37**
Venezuela	1993-01	124	0.24	-0.90	-0.04	0.17	-0.90	0.24	0.00	0.18	-0.91	0.21
Egypt	1995-01	100	-0.47	1.62	**2.27**	-0.08	1.59	-0.13	**2.23**	0.07	1.31	**1.71**
Hungary	1995-01	100	-0.75	1.07	**1.79**	-0.48	1.01	-0.50	**1.70**	-0.35	0.78	1.44
Marocco	1995-01	100	-0.38	0.40	**1.71**	-0.34	0.34	-0.20	**1.67**	-0.21	-0.17	1.59
Russia	1995-01	100	-0.13	-0.64	1.32	-0.21	-0.67	0.04	1.33	-0.05	-1.15	1.60
Czech Rep.	1997-01	76	0.00	1.62	1.05	0.18	1.61	0.22	1.03	0.30	1.11	0.75

Notes: We report t-values for regression equation 1 in the text where we include respectively Oil returns, a January dummy, a Sell in May dummy and combinations of these variables in the in the equation. t-values based on heteroscedasticity consistent standard errors for Arab Light oil series from Bloomberg. t-values in bold are significant at least at the ten percent level.

Table VII. Economic significance of the oil strategy.

Country	# obs.	Buy & Hold Strategy			Oil Strategy after transaction costs							
		Mean (yearly in %)	std.dev. (yearly in %)	Sharpe ratio	mean (yearly in %)	std.dev. (yearly in %)	alpha (yearly in %)	t-value	Beta	t-value	Max Sharpe Ratio	Weight Oil in TP (%)
Australia	177	8.2	13.8	0.03	3.8	10.2	-4.2	**-2.38**	0.55	**9.30**	-0.62	231
Austria	177	5.9	23.4	0.06	9.6	15.6	4.5	1.50	0.44	**5.42**	0.40	156
Belgium	177	7.2	17.5	0.09	11.3	10.6	5.1	**2.33**	0.38	**5.36**	0.62	144
Canada	177	7.9	15.7	0.08	8.1	9.1	1.4	0.70	0.34	**4.96**	0.17	108
Denmark	177	10.0	19.3	0.14	14.2	12.9	6.0	**2.42**	0.45	**7.64**	0.62	149
France	177	8.4	20.1	0.17	11.1	12.2	3.7	1.44	0.37	**6.45**	0.54	146
Germany	177	6.7	23.2	0.03	12.1	13.8	6.3	**2.20**	0.36	**5.10**	0.33	145
Hong Kong	177	9.3	28.6	0.2	6.1	18.8	0.0	0.01	0.43	**5.49**	0.20	8
Italy	177	7.2	23.6	-0.08	16.5	15.5	8.5	**2.81**	0.44	**6.99**	0.73	196
Japan	177	-6.1	20.3	-0.35	-0.7	14.3	1.7	0.64	0.50	**6.61**	-0.39	-197
Netherlands	177	9.5	18.6	0.15	12.3	10.8	4.8	**2.06**	0.34	**5.26**	0.55	126
Norway	177	5.9	23.3	-0.1	9.0	13.3	2.1	0.75	0.32	**5.50**	0.18	263
Singapore	177	2.5	24.3	0.02	3.4	17.3	1.2	0.37	0.50	**6.30**	0.10	168
Spain	177	9.1	22.9	0.01	15.7	14.8	7.3	**2.48**	0.43	**6.26**	0.61	169
Sweden	177	11.3	26.9	0.12	16.6	18.4	7.4	**2.13**	0.47	**6.32**	0.55	153
Switzerland	177	10.7	18.2	0.34	13.0	11.9	6.2	**2.53**	0.43	**6.10**	0.75	119
UK	177	8.2	15.6	0.02	11.2	10.2	3.4	**1.73**	0.42	**6.80**	0.41	164
US	177	10.7	15.1	0.35	11.9	9.8	4.6	**2.32**	0.43	**6.76**	0.68	114
World	177	5.9	14.6	0.04	8.8	9.2	3.5	**1.91**	0.40	**6.30**	0.47	153

Notes: economic significance results for all developed countries and the world market index. Results for the oil strategy based on parameter estimates of the regression model in equation one over the period October 1973 through July 1988. Alpha en beta estimated by regression equation (3) in the text. t-values based on heteroscedasticity consistent standard errors for Arab Light oil series from Bloomberg. t-values in bold are significant at least at the ten percent level.

Table VIII. Market timing ability of oil strategy.

Country	# obs.	# of monthly bull markets	# of correct bull forecasts	# of monthly bear markets	# of correct bear forecasts	# of total correct forecasts	total number of correct forecasts (as %)	market timing ability	p-value	average annual transaction costs (in%)	total # transactions
Australia	177	94	47	83	33	80	45.2	0.90	0.885	0.53	78
Austria	177	93	48	84	46	94	53.1	1.06	0.184	0.54	79
Belgium	177	98	50	79	42	92	52.0	1.04	0.274	0.54	79
Canada	177	90	46	87	45	91	51.4	1.03	0.326	0.55	81
Denmark	177	96	54	81	47	101	57.1	1.14	**0.025**	0.55	81
France	177	98	50	79	43	93	52.5	1.05	0.226	0.54	79
Germany	177	98	52	79	45	97	54.8	1.10	**0.088**	0.54	79
Hong Kong	177	89	43	88	44	87	49.2	0.98	0.560	0.54	79
Italy	177	82	48	95	57	105	59.3	1.19	**0.005**	0.54	79
Japan	177	81	40	96	49	89	50.3	1.01	0.440	0.54	79
Netherlands	177	102	53	75	42	95	53.7	1.07	0.146	0.54	79
Norway	177	97	47	80	41	88	49.7	0.99	0.500	0.54	79
Singapore	177	92	45	85	43	88	49.7	0.99	0.500	0.54	79
Spain	177	94	48	83	45	93	52.5	1.05	0.226	0.54	79
Sweden	177	98	55	79	46	101	57.1	1.14	**0.025**	0.55	81
Switzerland	177	108	59	69	42	101	57.1	1.14	**0.025**	0.54	79
UK	177	94	51	83	47	98	55.4	1.11	**0.066**	0.54	79
US	177	107	56	70	40	96	54.2	1.08	0.115	0.54	79
World	177	99	51	78	42	93	52.5	1.05	0.226	0.54	79

Notes: market timing results for all developed countries and the world market index. Results for the oil strategy based on parameter estimates of the regression model in equation 1 over the period October 1973 through July 1988. p-values in bold are significant at least at the ten percent level.

Table IX. Summary Statistics of Stock Sector Returns and Oil effect.

Country	Sector	Start	# obs.	mean return (%)	std. dev. (%)	μ	t-value	α_1	t-value
Australia	**Market**	1973-11	354	1.06	6.23	0.01	3.26	-0.02	-0.70
	Resources	1973-11	354	0.95	7.71	0.01	2.31	0.01	0.33
	Basic Industries	1973-11	354	1.00	6.48	0.01	2.97	-0.02	-0.66
	General Industrials	1973-11	354	1.03	6.16	0.01	3.27	-0.05	**-2.16**
	Cyc.Cons.Goods	1973-11	354	1.15	8.79	0.01	2.56	-0.04	-0.50
	Non Cyc.Cons.Gds	1973-11	354	1.02	5.67	0.01	3.51	-0.05	**-1.93**
	Cyclical Service	1973-11	354	1.33	7.09	0.01	3.69	-0.07	-1.62
	Non Cyc. Services	1993-08	117	1.10	6.24	0.01	1.96	-0.05	-0.81
	Utilities	1973-11	354	1.39	8.35	0.01	3.16	-0.02	-0.79
	Information Tech.	1994-06	107	2.14	11.36	0.02	1.95	-0.06	-0.53
	Financials	1973-11	354	1.16	6.18	0.01	3.56	-0.02	-0.72
Austria	**Market**	1973-11	354	0.61	5.53	0.01	2.23	-0.05	-1.30
	Resources	1988-01	184	0.85	8.63	0.01	1.36	-0.07	-0.90
	Basic Industries	1973-11	354	0.67	7.06	0.01	1.86	-0.03	-0.66
	General Industrials	1973-11	354	-0.17	7.02	0.00	-0.34	-0.08	**-2.20**
	Cyc.Cons.Goods	1995-03	98	1.28	8.17	0.01	1.53	0.01	0.15
	Non Cyc.Cons.Gds	1973-11	354	0.74	7.54	0.01	2.05	-0.11	**-2.24**
	Cyclical Service	1988-07	178	-0.13	9.45	0.00	-0.10	-0.22	**-1.75**
	Non Cyc. Services	1992-09	128	-0.76	11.83	-0.01	-0.68	-0.24	**-2.27**
	Utilities	1989-01	172	0.71	7.29	0.01	1.37	-0.08	-1.22
	Information Tech.	1993-08	117	0.05	10.98	0.00	0.02	0.05	0.62
	Financials	1973-11	354	0.92	6.11	0.01	2.92	-0.03	-0.77
Belgium	**Market**	1973-11	354	0.81	5.13	0.01	3.12	-0.09	**-3.55**
	Basic Industries	1973-11	354	0.70	6.07	0.01	2.38	-0.09	**-2.16**
	General Industrials	1973-11	354	0.87	6.18	0.01	2.88	-0.11	**-2.90**
	Cyc.Cons.Goods	1997-06	71	0.72	9.24	0.01	0.78	-0.19	**-2.57**
	Non Cyc.Cons.Gds	1973-11	354	1.04	7.68	0.01	2.70	-0.08	**-1.98**
	Cyclical Service	1973-11	354	0.86	6.25	0.01	2.76	-0.08	**-2.27**
	Non Cyc. Services	1973-11	354	1.11	7.46	0.01	3.08	-0.14	**-3.88**
	Utilities	1973-11	354	0.96	5.14	0.01	3.65	-0.05	**-2.05**
	Information Tech.	1986-07	202	0.39	12.51	0.00	0.52	-0.18	**-2.43**
	Financials	1973-11	354	0.81	5.13	0.01	3.17	-0.08	**-2.92**
Canada	**Market**	1973-11	354	0.81	4.73	0.01	3.38	-0.04	**-1.74**
	Resources	1973-11	354	0.64	6.65	0.01	1.87	-0.03	-0.94
	Basic Industries	1973-11	354	0.49	6.45	0.01	1.52	-0.05	-1.53
	General Industrials	1973-11	354	0.78	7.16	0.01	2.16	-0.07	**-2.03**
	Cyc.Cons.Goods	1977-03	314	0.65	12.76	0.01	0.97	-0.21	**-3.47**
	Non Cyc.Cons.Gds	1973-11	354	1.23	5.50	0.01	4.38	-0.06	**-2.26**
	Cyclical Service	1973-11	354	0.60	5.42	0.01	2.23	-0.06	**-1.82**
	Non Cyc. Services	1973-11	354	1.16	5.32	0.01	4.14	0.01	0.29
	Utilities	1973-11	354	0.85	4.30	0.01	3.76	-0.01	-0.72
	Information Tech.	1973-11	354	0.67	9.29	0.01	1.47	-0.07	-1.26
	Financials	1973-11	354	1.07	5.09	0.01	4.10	-0.04	-1.53
Denmark	**Market**	1973-11	354	0.90	5.17	0.01	3.44	-0.07	**-2.42**
	Basic Industries	1973-11	354	0.64	7.41	0.01	1.69	-0.04	-0.78
	General Industrials	1973-11	354	0.57	7.03	0.01	1.58	-0.03	-0.74
	Cyc.Cons.Goods	1973-11	354	0.39	8.07	0.00	1.04	-0.09	**-2.70**
	Non Cyc.Cons.Gds	1973-11	354	1.12	6.11	0.01	3.68	-0.08	**-2.40**
	Cyclical Service	1973-11	354	0.83	7.51	0.01	2.20	-0.08	**-2.19**
	Non Cyc. Services	1973-11	354	1.16	9.24	0.01	2.55	-0.13	**-2.97**
	Utilities	1988-05	180	2.24	11.73	0.02	2.54	-0.03	-0.41
	Information Tech.	1999-04	49	-0.19	18.45	0.00	0.13	-0.26	-1.19
	Financials	1973-11	354	1.13	5.76	0.01	3.75	-0.02	-0.66
France	**Market**	1973-11	354	1.00	6.32	0.01	3.16	-0.09	**-2.52**
	Resources	1973-11	354	1.35	7.88	0.01	3.20	-0.01	-0.24
	Basic Industries	1973-11	354	1.14	6.41	0.01	3.50	-0.07	**-1.69**
	General Industrials	1973-11	354	0.97	7.28	0.01	2.70	-0.09	**-2.52**
	Cyc.Cons.Goods	1973-11	354	0.61	8.39	0.01	1.58	-0.13	**-2.63**

	Non Cyc.Cons.Gds	1973-11	354	1.07	6.40	0.01	3.28	-0.07	**-2.02**
	Cyclical Service	1973-11	354	0.72	7.50	0.01	2.01	-0.11	**-2.34**
	Non Cyc. Services	1973-11	354	1.25	7.63	0.01	3.23	-0.07	**-2.41**
	Utilities	2000-08	33	-1.56	12.15	-0.02	-0.76	-0.18	-0.78
	Information Tech.	1973-11	354	1.06	10.63	0.01	2.08	-0.15	**-3.43**
	Financials	1973-11	354	1.13	6.26	0.01	3.55	-0.08	**-2.42**
Germany	**Market**	1973-11	354	0.63	5.34	0.01	2.53	-0.11	**-3.19**
	Resources	1988-11	174	0.82	4.47	0.01	2.39	0.03	0.83
	Basic Industries	1973-11	354	0.70	5.58	0.01	2.61	-0.09	**-2.55**
	General Industrials	1973-11	354	0.68	5.58	0.01	2.50	-0.09	**-2.42**
	Cyc.Cons.Goods	1973-11	354	0.52	7.34	0.01	1.55	-0.12	**-3.37**
	Non Cyc.Cons.Gds	1973-11	354	0.52	7.34	0.01	1.55	-0.12	**-3.37**
	Cyclical Service	1973-11	354	0.45	5.97	0.01	1.69	-0.11	**-2.67**
	Non Cyc. Services	1973-11	354	0.31	8.20	0.00	0.91	-0.13	**-2.83**
	Utilities	1973-11	354	0.81	3.51	0.01	4.54	-0.05	**-2.16**
	Information Tech.	1988-12	173	2.02	12.71	0.02	2.24	-0.20	**-2.17**
	Financials	1973-11	354	0.64	6.55	0.01	2.10	-0.12	**-3.22**
Hong Kong	**Market**	1973-11	354	1.11	9.59	0.01	2.22	-0.02	-0.42
	Resources	1988-05	180	0.94	24.73	0.01	0.48	0.19	1.29
	Basic Industries	1987-06	191	0.44	11.54	0.00	0.52	0.02	0.21
	General Industrials	1973-11	354	1.09	11.67	0.01	1.83	-0.05	-0.69
	Cyc.Cons.Goods	1991-07	142	1.47	8.41	0.01	2.04	0.07	0.76
	Non Cyc.Cons.Gds	1993-11	114	0.84	12.58	0.01	0.70	0.00	-0.03
	Cyclical Service	1973-11	354	0.78	9.33	0.01	1.64	-0.04	-0.65
	Non Cyc. Services	1988-03	182	0.55	9.61	0.01	0.76	0.05	0.61
	Utilities	1973-11	354	1.42	8.56	0.01	3.18	-0.02	-0.29
	Information Tech.	1988-07	178	0.83	15.35	0.01	0.74	-0.08	-0.72
	Financials	1973-11	354	1.22	10.04	0.01	2.32	-0.01	-0.25
Italy	**Market**	1973-11	354	0.95	7.26	0.01	2.76	-0.15	**-3.46**
	Resources	1986-02	207	0.50	9.50	0.00	0.76	-0.15	**-1.94**
	Basic Industries	1973-11	354	0.51	8.15	0.01	1.39	-0.14	**-2.69**
	General Industrials	1973-11	354	0.55	8.78	0.01	1.40	-0.15	**-2.74**
	Cyc.Cons.Goods	1973-11	354	0.89	9.71	0.01	1.99	-0.19	**-3.55**
	Non Cyc.Cons.Gds	1986-02	207	0.26	7.47	0.00	0.50	-0.13	**-3.57**
	Cyclical Service	1973-11	354	0.63	9.77	0.01	1.33	-0.09	**-2.23**
	Non Cyc. Services	1973-11	354	1.20	8.48	0.01	2.97	-0.19	**-3.70**
	Utilities	1973-11	354	1.21	8.17	0.01	2.90	-0.08	**-2.19**
	Information Tech.	1986-02	207	-0.80	10.92	-0.01	-1.10	-0.25	**-4.66**
	Financials	1973-11	354	0.98	7.53	0.01	2.72	-0.14	**-3.49**
Japan	**Market**	1973-11	354	0.40	5.17	0.00	1.58	-0.05	-1.29
	Resources	1973-11	354	0.31	8.19	0.00	0.76	-0.04	-0.64
	Basic Industries	1973-11	354	0.27	5.99	0.00	0.96	-0.05	-1.10
	General Industrials	1973-11	354	0.40	6.10	0.00	1.39	-0.07	-1.59
	Cyc.Cons.Goods	1973-11	354	0.51	6.21	0.01	1.68	-0.06	-1.34
	Non Cyc.Cons.Gds	1973-11	354	0.58	4.89	0.01	2.35	-0.04	-0.82
	Cyclical Service	1973-11	354	0.36	4.88	0.00	1.56	-0.06	-1.55
	Non Cyc. Services	1973-11	354	0.87	8.52	0.01	1.98	-0.04	-0.76
	Utilities	1973-11	354	0.70	6.43	0.01	2.08	-0.01	-0.16
	Information Tech.	1973-11	354	0.51	8.29	0.01	1.31	-0.10	**-2.00**
	Financials	1973-11	354	0.24	6.90	0.00	0.72	-0.05	-0.99
Netherlands	**Market**	1973-11	354	0.96	4.96	0.01	4.02	-0.10	**-4.74**
	Resources	1973-11	354	1.21	5.96	0.01	4.02	-0.09	**-3.41**
	Basic Industries	1973-11	354	0.55	7.53	0.01	1.64	-0.14	**-3.20**
	General Industrials	1973-11	354	0.70	8.73	0.01	1.76	-0.16	**-4.76**
	Cyc.Cons.Goods	1973-11	354	1.18	7.77	0.01	3.13	-0.14	**-4.63**
	Non Cyc.Cons.Gds	1973-11	354	1.08	5.27	0.01	4.05	-0.08	**-2.80**
	Cyclical Service	1973-11	354	0.80	6.03	0.01	2.81	-0.12	**-4.15**
	Non Cyc. Services	1973-11	354	0.97	8.22	0.01	2.50	-0.15	**-4.01**
	Information Tech.	1985-06	215	0.86	11.36	0.01	1.13	-0.24	**-4.20**

	Financials	1973-11	354	0.85	5.07	0.01	3.42	-0.09	**-3.52**
Norway	**Market**	1980-02	279	0.87	7.48	0.01	1.94	-0.06	-1.54
	Resources	1980-02	279	0.73	8.83	0.01	1.37	-0.03	-0.60
	Basic Industries	1980-02	279	0.98	8.45	0.01	1.96	-0.11	**-2.14**
	General Industrials	1980-02	279	1.01	9.73	0.01	1.74	-0.04	-0.69
	Cyc.Cons.Goods	1994-08	105	1.35	7.31	0.01	1.90	-0.04	-0.65
	Non Cyc.Cons.Gds	1980-02	279	1.49	9.92	0.01	2.51	-0.01	-0.10
	Cyclical Service	1980-02	279	1.37	15.28	0.01	1.50	-0.08	-1.21
	Non Cyc. Services	1999-08	45	-1.48	16.38	-0.01	-0.54	-0.16	-0.77
	Utilities	1980-02	279	1.25	9.69	0.01	2.16	-0.08	-1.30
	Information Tech.	1983-12	233	0.02	12.22	0.00	0.02	-0.10	-1.38
	Financials	1980-02	279	1.13	9.02	0.01	2.09	0.00	0.04
Singapore	**Market**	1973-11	354	0.49	8.11	0.01	1.22	-0.05	-1.15
	Resources	1990-12	149	-0.11	9.94	0.00	-0.11	0.15	1.02
	Basic Industries	1973-11	354	0.87	12.20	0.01	1.39	-0.04	-0.59
	General Industrials	1973-11	354	0.44	9.54	0.00	0.97	-0.08	-1.46
	Cyc.Cons.Goods	1983-02	243	0.50	11.56	0.00	0.67	0.03	0.27
	Non Cyc.Cons.Gds	1973-11	354	0.74	7.84	0.01	1.82	-0.02	-0.41
	Cyclical Service	1973-11	354	0.58	8.70	0.01	1.34	-0.05	-1.03
	Non Cyc. Services	1980-01	280	0.08	9.59	0.00	0.14	-0.06	-0.82
	Utilities	2001-02	27	4.76	16.26	0.04	1.42	0.38	1.49
	Information Tech.	1991-08	141	-0.80	15.90	-0.01	-0.57	-0.10	-0.65
	Financials	1973-11	354	0.59	9.37	0.01	1.26	-0.05	-0.94
Spain	**Market**	1987-04	193	0.85	6.42	0.01	1.99	-0.16	**-2.88**
	Resources	1987-04	193	1.07	7.63	0.01	2.04	-0.12	**-1.98**
	Basic Industries	1987-04	193	0.79	8.75	0.01	1.35	-0.18	**-2.13**
	General Industrials	1987-04	193	0.31	7.29	0.00	0.65	-0.13	**-2.24**
	Cyc.Cons.Goods	1987-04	193	-0.57	11.33	-0.01	-0.65	-0.19	**-1.80**
	Non Cyc.Cons.Gds	1987-04	193	0.50	8.47	0.01	0.88	-0.14	**-2.17**
	Cyclical Service	1987-04	193	0.85	6.14	0.01	2.04	-0.13	**-2.97**
	Non Cyc. Services	1987-04	193	1.19	8.27	0.01	2.07	-0.12	**-2.10**
	Utilities	1987-04	193	1.17	6.36	0.01	2.70	-0.13	**-2.68**
	Information Tech.	1999-12	41	-4.67	25.37	-0.04	-1.14	-0.86	**-2.70**
	Financials	1987-04	193	0.79	7.34	0.01	1.61	-0.16	**-2.60**
Sweden	**Market**	1982-02	255	1.21	7.21	0.01	2.71	-0.17	**-3.54**
	Basic Industries	1982-02	255	1.21	7.23	0.01	2.69	-0.14	**-2.97**
	General Industrials	1982-02	255	1.11	7.41	0.01	2.41	-0.15	**-2.79**
	Cyc.Cons.Goods	1982-02	255	1.43	8.93	0.01	2.62	-0.23	**-5.08**
	Non Cyc.Cons.Gds	1991-08	141	0.93	6.74	0.01	1.68	-0.07	-1.22
	Cyclical Service	1985-06	215	2.12	7.81	0.02	4.04	-0.13	**-2.73**
	Non Cyc. Services	1994-06	107	1.44	11.54	0.02	1.41	-0.20	**-2.34**
	Utilities	1988-10	175	0.80	6.13	0.01	1.78	-0.08	-1.22
	Information Tech.	1982-02	255	1.11	14.83	0.01	1.18	-0.19	**-2.21**
	Financials	1982-02	255	1.23	8.68	0.01	2.28	-0.18	**-3.51**
Switzerland	**Market**	1973-11	354	0.70	4.75	0.01	3.11	-0.10	**-3.63**
	Basic Industries	1973-11	354	0.53	5.51	0.01	2.10	-0.11	**-3.07**
	General Industrials	1973-11	354	0.35	6.54	0.00	1.22	-0.11	**-2.85**
	Cyc.Cons.Goods	1986-08	201	0.82	9.99	0.01	1.30	-0.16	**-1.91**
	Non Cyc.Cons.Gds	1973-11	354	0.62	9.77	0.01	1.30	-0.09	**-2.64**
	Cyclical Service	1973-11	354	0.39	6.64	0.00	1.42	-0.15	**-4.43**
	Non Cyc. Services	1973-11	354	0.62	9.77	0.01	1.30	-0.09	**-2.64**
	Utilities	1973-11	354	0.61	4.15	0.01	2.85	-0.03	**-2.48**
	Information Tech.	1983-08	237	-0.36	11.32	0.00	-0.50	-0.14	**-2.13**
	Financials	1973-11	354	0.76	5.73	0.01	2.77	-0.11	**-3.61**
United Kingdom	**Market**	1973-11	354	1.09	6.03	0.01	3.59	-0.07	**-2.08**
	Resources	1973-11	354	1.25	7.24	0.01	3.36	-0.06	**-2.05**
	Basic Industries	1973-11	354	0.93	6.87	0.01	2.65	-0.05	-1.22
	General Industrials	1973-11	354	0.91	7.38	0.01	2.42	-0.05	-1.18
	Cyc.Cons.Goods	1973-11	354	0.69	8.66	0.01	1.61	-0.07	-1.19
	Non Cyc.Cons.Gds	1973-11	354	1.29	6.11	0.01	4.08	-0.05	-1.30
	Cyclical Service	1973-11	354	0.94	6.86	0.01	2.74	-0.08	**-1.94**

	Non Cyc. Services	1973-11	354	1.27	7.74	0.01	3.22	-0.08	**-2.80**
	Utilities	1973-11	354	1.14	5.34	0.01	3.00	-0.04	-1.17
	Information Tech.	1973-11	354	0.84	10.42	0.01	1.62	-0.09	**-1.68**
	Financials	1973-11	354	1.15	6.85	0.01	3.32	-0.08	**-2.21**
United States	**Market**	1973-11	354	0.90	4.67	0.01	3.95	-0.09	**-3.65**
	Resources	1973-11	354	0.88	5.39	0.01	3.18	-0.04	**-1.79**
	Basic Industries	1973-11	354	0.74	6.07	0.01	2.45	-0.06	-1.63
	General Industrials	1973-11	354	0.92	5.62	0.01	3.32	-0.08	**-2.88**
	Cyc.Cons.Goods	1973-11	354	0.73	6.00	0.01	2.67	-0.13	**-3.41**
	Non Cyc.Cons.Gds	1973-11	354	1.03	4.90	0.01	4.19	-0.08	**-2.88**
	Cyclical Service	1973-11	354	0.82	5.88	0.01	2.93	-0.12	**-3.87**
	Non Cyc. Services	1973-11	354	0.87	4.91	0.01	3.61	-0.08	**-2.48**
	Utilities	1973-11	354	0.82	4.45	0.01	3.58	-0.04	-1.29
	Information Tech.	1973-11	354	0.78	7.52	0.01	2.17	-0.12	**-3.61**
	Financials	1973-11	354	1.07	5.69	0.01	3.85	-0.10	**-3.36**
World	**Market**	1973-11	354	0.81	4.37	0.01	3.76	-0.06	**-2.10**
	Resources	1973-11	354	0.91	5.09	0.01	3.47	-0.04	-1.56
	Basic Industries	1973-11	354	0.66	5.03	0.01	2.62	-0.04	-1.05
	General Industrials	1973-11	354	0.78	4.97	0.01	3.15	-0.06	**-1.66**
	Cyc.Cons.Goods	1973-11	354	0.67	5.17	0.01	2.67	-0.08	**-1.83**
	Non Cyc.Cons.Gds	1973-11	354	0.98	4.22	0.01	4.62	-0.06	**-2.23**
	Cyclical Service	1973-11	354	0.74	4.76	0.01	3.20	-0.08	**-2.38**
	Non Cyc. Services	1973-11	354	0.84	4.84	0.01	3.45	-0.06	**-1.78**
	Utilities	1973-11	354	0.88	4.16	0.01	4.06	-0.02	-0.86
	Information Tech.	1973-11	354	0.77	6.92	0.01	2.31	-0.11	**-3.02**
	Financials	1973-11	354	0.88	5.21	0.01	3.37	-0.06	**-1.67**

Notes: summary results on Datastream market indices and sector indices for sectors of the developed countries and the world market countries. Monthly mean returns as percentage. monthly standard deviation as percentage. μ and α_1 refer to the parameters of regression equation (1). In addition we report related t-values based on heteroscedasticity consistent standard errors for Arab Light Oil series from Bloomberg. t-values in bold refer to significant t-values at the ten percent level.

Table X. Presence of the oil effect in specific oil sector indices.

Country	Sector	Start	# Obs.	Mean monthly (in %)	Std.dev. (in %)	μ	t-value	α_1	t-value
Australia	oil & gas	1973-11	354	0.92	9.66	0.01	1.71	0.06	**1.93**
	oil integrated	1990-04	157	1.19	10.80	0.01	1.38	-0.02	-0.28
	exp & prod	1973-11	354	0.92	9.66	0.01	1.72	0.06	**1.93**
Austria	oil & gas	1988-01	184	0.85	8.63	0.01	1.37	-0.07	-0.90
	oil integrated	1988-01	184	0.85	8.63	0.01	1.37	-0.07	-0.90
Canada	oil & gas	1973-11	354	0.66	7.03	0.01	1.80	-0.01	-0.17
	oil integrated	1975-06	335	0.85	6.60	0.01	2.33	0.02	0.52
	oil services	1973-11	354	0.90	15.27	0.01	1.07	0.04	0.72
	exp & prod	1973-11	354	0.83	7.63	0.01	2.09	-0.02	-0.52
France	oil & gas	1973-11	354	1.35	7.88	0.01	3.20	-0.01	-0.24
	oil integrated	1973-11	354	1.39	8.24	0.01	3.17	-0.01	-0.43
	oil services	1973-11	354	-0.06	12.57	0.00	-0.08	0.04	0.44
	exp & prod	1988-07	178	0.80	24.82	0.01	0.40	0.18	1.25
Hong Kong	oil & gas	1988-07	178	0.78	24.81	0.01	0.39	0.18	1.24
	oil integrated	2001-05	24	6.35	17.62	0.06	1.73	0.76	**1.80**
	exp & prod	1988-07	178	0.80	24.82	0.01	0.40	0.18	1.25
Italy	oil & gas	1986-02	207	0.50	9.51	0.00	0.76	-0.15	**-1.94**
	oil integrated	1995-12	89	1.21	7.06	0.01	1.74	-0.11	-1.65
	oil services	1986-02	207	0.63	10.65	0.01	0.85	-0.14	-1.50
Japan	oil & gas	1973-11	354	0.32	8.19	0.00	0.78	-0.04	-0.62
	oil integrated	1973-11	354	0.42	8.89	0.00	0.94	-0.04	-0.81
	oil services	1973-11	354	-0.51	14.91	0.00	-0.55	-0.13	-1.47
	exp & prod	1973-11	354	0.31	8.34	0.00	0.74	-0.04	-0.63
Netherlands	oil & gas	1973-11	354	1.21	5.96	0.01	4.02	-0.09	**-3.41**
	oil integrated	1973-11	354	1.21	5.96	0.01	4.02	-0.09	**-3.41**
	oil services	1992-04	133	0.78	10.74	0.01	0.82	0.02	0.20
Norway	oil & gas	1980-02	279	0.73	8.83	0.01	1.37	-0.03	-0.60
	oil integrated	1980-02	279	0.79	8.87	0.01	1.49	-0.04	-0.78
	oil services	1981-08	261	0.22	21.06	0.00	0.18	0.07	0.99
	exp & prod	1980-07	274	0.38	11.98	0.00	0.52	0.01	0.10
Singapore	oil & gas	1990-12	149	-0.11	9.94	0.00	-0.11	0.15	1.02
	oil integrated	2002-01	16	-1.43	6.95	-0.02	-1.24	0.24	**2.22**
	exp & prod	1990-12	149	0.03	10.03	0.00	0.07	0.15	1.03
Spain	oil & gas	1987-04	193	1.07	7.63	0.01	2.04	-0.12	**-1.98**
	oil integrated	1987-04	193	1.07	7.63	0.01	2.04	-0.12	**-1.98**
United Kingdom	oil & gas	1973-11	354	1.27	7.34	0.01	3.37	-0.06	**-1.99**
	oil integrated	1973-11	354	1.31	7.30	0.01	3.50	-0.06	**-2.12**
	oil services	1973-11	354	-0.13	17.49	0.00	-0.13	-0.01	-0.12
	exp & prod	1973-11	354	0.77	11.25	0.01	1.27	0.01	0.12
United States	oil & gas	1973-11	354	0.89	5.40	0.01	3.21	-0.05	**-1.82**
	oil integrated	1973-11	354	1.01	5.20	0.01	3.77	-0.05	**-1.97**
	oil services	1973-11	354	0.59	8.46	0.01	1.35	-0.04	-0.99
	exp & prod	1973-11	354	0.55	7.23	0.01	1.45	-0.02	-0.49
World	oil & gas	1973-11	354	0.95	5.12	0.01	3.59	-0.04	**-1.89**
	oil integrated	1973-11	354	1.05	5.15	0.01	3.98	-0.05	**-2.24**
	oil services	1973-11	354	0.62	7.94	0.01	1.51	-0.03	-0.84
	exp & prod	1973-11	354	0.88	6.38	0.01	2.58	0.00	-0.07

Notes: summary results on Datastream sector indices for sectors of the countries and the world market which have available oil sectors. Monthly mean returns as percentage. monthly standard deviation as percentage. μ and α_1 refer tot the parameters of regression equation (1). In addition we report related t-values based on heteroscedasticity consistent standard errors for Arab Light oil series from Bloomberg. t-values in bold refer to significant t-values at the ten percent level.

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