Oil Prices, Profits, and Recessions: An Inquiry Using Terrorism as an Instrumental Variable*†

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Abstract

Nearly all post-war recessions were preceded by oil-price shocks, but is this because spikes in the price of oil cause economic downturns? At the heart of this question lies an identification problem: oil prices and the state of the world economy are endogenously determined. This paper uses terrorist incidents as an instrumental variable. In an international panel of industries, we show that, after correction for simultaneity bias – though not before – the price of oil has large negative effects upon profitability. We test for weak instruments and check sub-sample robustness. Our findings seem to lend support to the claim that oil-price spikes can be a source of recessions.

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"... the oil market [is] at the mercy of even small disruptions to supply. Prices tend to jump each time militants sabotage an oil pipeline in Nigeria, bad weather threatens production in the Gulf of Mexico, or political clouds gather over the Persian Gulf".

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1 Introduction

This paper is an attempt to contribute to the debate about whether spikes in the price of oil lead to recessions. We build upon two ideas. The first – in the spirit of work by earlier investigators – is that it is necessary to solve an identification problem: the oil price and the health of the world economy are endogenously determined. The second is that data on terrorist attacks offer economists a potentially valuable instrumental variable.

By instrumenting in this way, we argue, it is possible to obtain improved inference about the role of oil shocks in the economy. Our analysis has a cross-national flavor, and combines theory with disaggregated evidence. It studies a panel of seventeen industries across twelve nations between 1981 and 2003. The data cover manufacturing and services. Throughout the analysis, we make the same simplifying assumption as in the literature, namely, that the price of oil can be thought of as a proxy for the price of energy more generally. We attempt, in two ways, to estimate the long run real oil-price elasticity of profitability.

A number of economists have argued that oil spikes – abrupt movements in the price of oil – have significant macroeconomic effects. The post-war era offers informal and econometric support for this view. Hamilton (1983) set out one of the most persuasive accounts of the thesis. He demonstrated that until the late 1970s almost all modern recessions had been preceded by a marked increase in the price of oil. Subsequent observation – the severe downturn of the early 1980s in particular – appeared to line up on James Hamilton's side.[1] Formal support also emerged. Carruth *et al.* (1998), for example, uncovered evidence of a connection between movements in US unemployment and movements in real oil prices approximately 1-2 years earlier, and showed that changes in oil prices Granger-cause unemployment fluctuations. Using micro data from the early 1970s to the late 1980s, Davis and Haltiwanger (2001) provided other estimates. They

[1] "Nine out of ten of the US recessions since World War II were preceded by a spike up in oil prices" (Hamilton (2005, page 1)).

documented a direct link between the oil price and the labor market. The authors concluded that oil shocks account for almost 25 percent of the variability in employment growth in US manufacturing – twice as much as monetary shocks. A number of papers containing other supporting evidence are summarized in the review by Hamilton (2005).

Neoclassical theory suggests that expensive energy is likely to reduce profitability and therefore be inimical to economic booms. At the time of writing, however, a general issue remains controversial (Zarnowitz (1999), Barsky *et al.* (2002), Barsky and Kilian (2004)): whether oil shocks can be quantitatively important enough to be causal in economic slowdowns. Was the world recession of the early 1980s prompted by the rise in real oil prices that occurred in 1979/1980, and how much did the spike in the oil price in 1990 contribute to the 8 percent US unemployment rate of 1992? Such questions are still debated.

The paper explores this with international data. Unlike most previous analyses, whether macroeconomic or microeconomic, we focus on profitability rather than on employment or output. Perhaps surprisingly, there seems to have been little direct empirical work on how oil shocks alter profitability. It would be possible to study this relationship with aggregate data. Our paper's approach, however, attempts to exploit the greater level of disaggregation offered by sectoral data. Our analysis is complementary to that of Keane and Prasad (1996), who also take a disaggregated approach and study the level of employment rather than profitability, and to Lee and Ni (2002), who examine whether oil prices have their effect predominantly upon industries' demand or supply functions. Later results provide empirical evidence relevant to the theoretical work of Kim and Loungani (1992) and Leduc and Sill (2004), and to cross-industry work by Bohi (1991) that suggests modest output responses to oil shocks.

The paper's underlying point – one raised before and discussed particularly by authors such as James Hamilton (1996, 2003) and in a number of recent papers by Lutz Kilian[2] – is about identification. Oil prices and the state of the world economy are endogenously determined. When GDP increases during boom conditions, for example, the world's demand function for oil shifts out, and this tends to have a positive effect on the price of

[2] See Kilian (2008a-d). In a sense, we find a way to build on a sentiment expressed by Kilian (2008c, page 1): "Energy price fluctuations seem to be determined by forces that are exogenous to the US economy such as political strife in the Middle East". Unlike Abadie and Gardeazabal (2008), we shall here neglect the possible consequences of terrorism for the mobility of the capital stock. Moreover, we shall focus on profitability rather than, like Kilian and Park (2008), on stock-market returns.

crude oil. By contrast, supply shocks – such as wars and interruptions to pipeline delivery – generate an inverse correlation between oil prices and oil output. Precautionary demand for oil is also influenced by supply shocks. Speculative behavior adds a further, and currently poorly understood, twist to such interdependencies. Oil prices and economic output thus interact in complicated ways. In turn, this gives rise to a form of the classic identification problem.

A particularly clear discussion of the analytical issues is provided in Kilian (2008c). He points out that a major contribution was that of Hamilton (2003), and has roots in Mork (1989), Lee, Ni and Ratti (1995), and Hamilton (1996). James Hamilton argued for the use of an appropriate nonlinear transformation of the oil price (based on the amount by which nominal oil prices exceeded their maximum value over three previous years). Hamilton proposed the use of a net oil-price change. His work showed that a seemingly successful way to construct an instrument was to use the oil price movements predicted by exogenous oil supply variations; he demonstrated that in a GDP growth equation, estimated on lagged nominal oil price changes, the structural coefficients look similar to the reduced-form estimates from a regression of GDP growth on net oil-price increases. While sympathetic to this style of argument, Kilian (2008c) suggests that empirically the approach leads to potentially weak instruments and the standard problems associated with such weakness. He proposes that even net oil prices may have to be treated as endogenous. However, Kilian (2008c, page 4) also argues that: "A ... weaker and more defensible assumption than strict exogeneity of the price of oil is that innovations to the oil price series (whether transformed or not) are predetermined with respect to US macroeconomic aggregates. In other words, the price of oil responds to changes in macroeconomic conditions only with a delay". Kilian makes the point that predeterminedness may be an acceptable assumption in data of higher frequency than annual.

In Kilian (2008d), the author estimates the dynamic effects of these shocks on the real price of oil. His historical decomposition helps to shed light on the causes of the major oil price shocks since 1975, and the consequences of higher oil prices for US real GDP and CPI inflation are found to be related to the effective cause of the oil price increase. Changes in the composition of shocks, Kilian demonstrates, explain why regressions of macroeconomic aggregates on oil prices tend to be unstable. The author suggests that the recent increase in crude oil prices – around 2007/2008 – was driven primarily by global aggregate demand shocks, and this is the reason why that oil price shock initially failed to cause a major recession in the world economy.

Hamilton (2003) argues that disruption in oil supply due to military conflicts in the Middle East provides an instrument for oil-price changes. Our later modeling has intellectual links with this tradition, and with that of Cavallo and Wu (2006). Their work is interesting because they develop two measures of "exogenous" oil-price shocks for the period 1984 to 2006 (these are based on market commentaries on daily oil-price fluctuations). The measures are derived from external events that trigger substantial fluctuations in spot oil prices and thus, they argue, are constructed to be free of endogenous and anticipatory movements. The authors conclude that the dynamic responses of output and prices implied by these measures are "well behaved", and that, in a spirit somewhat similar but not identical to ideas developed later, the response of output is then larger than the one implied by a conventional measure of oil-price shocks proposed in the main body of the literature.

The paper is organized as follows. In Section 2 we sketch a simple theoretical framework to motivate our empirical estimations, and show how profitability depends on factor prices including the price of oil. Section 3 describes our dataset and provides descriptive statistics while Section 4 presents our empirical model. Section 5 reports our main results. Estimates of the short run effects of oil prices are provided, but the emphasis is upon the long run consequences of a higher price of oil. We lay out formal evidence that oil prices should not be treated as exogenous and that terrorist incidents are not weak instruments in explaining the price of oil. As will be shown, once a correction is made for the endogeneity of oil prices, the case for Hamilton's ideas seems, in a complementary way to Cavallo and Wu (2006), to become stronger. Section 6 provides robustness checks and Section 7 concludes.

2 Oil and Profitability: An Analytical Framework

In this section we present a model of a perfectly competitive firm as a basis for the empirical work which follows.[3] In this partial equilibrium model, firms own the capital stock, face capital adjustment costs, and pay out their profits as dividends to their owners. The presence of capital adjustment costs mean that profitability will depend on

[3] There is no generally accepted way to model the effects of the price of oil upon economic activity. Finn (2000) adopts a perfectly competitive framework, while Rotemberg and Woodford (1991, 1996) develop imperfectly competitive ones.

lagged factor prices, consistent with the empirical specifications we use in the remainder of the paper.

Consider the problem of a single firm. Define the dividends it pays to its owners as

$$D_t = Y_t - (R_t + \delta) K_t - W_t N_t - P_t^{oil} Z_t \tag{1}$$

where Y_t is output and the three factors of production are K_t capital, N_t labor and Z_t oil with prices $R_t + \delta$, where R is the real interest rate and δ the rate of capital depreciation, W_t and P_t^{oil} respectively. We treat the three factor prices as exogenous to the firm's problem. The firm maximizes its value

$$\max_{K_{t+i}, N_{t+i}} E_t \sum_{i=1}^{\infty} \beta_{t,t+i} D_{t+i} \tag{2}$$

where the discount factor between periods t and $t+i$ is

$$\beta_{t,t+i} = \prod_{j=1}^{i} \frac{1}{R_{t+j}} \tag{3}$$

Firms face a production function which includes capital adjustment costs

$$Y_t = K_t^{\alpha} N_t^{\gamma} Z_t^{1-\alpha-\gamma} - \phi(I_t) \tag{4}$$

where I_t is investment and $\phi'(I_t) > 0$, $\phi''(I_t) > 0$. The capital evolution equation is

$$K_{t+1} = (1 - \delta) K_t + I_t \tag{5}$$

If we derive first-order conditions for the factor choices of the firm, and linearize them the resulting system can be expressed as[4]

$$k_t = A_k(L) w_t + B_k(L) r_t + C_k(L) p_t^{oil} + \gamma_k k_0 \tag{6}$$

$$n_t = A_n(L) w_t + B_n(L) r_t + C_n(L) p_t^{oil} + \gamma_n k_0 \tag{7}$$

$$z_t = A_z(L) w_t + B_z(L) r_t + C_z(L) p_t^{oil} + \gamma_z k_0 \tag{8}$$

where the A, B and C are polynominals in the lag operator and k_0 is the initial capital stock. All factors of production, and hence output and dividends too, can be written as a function of lags of factor prices. There are two sources of lagged dependence in

[4] A full derivation is available upon request. Upper case letters are levels and lower case letters are log deviations.

this system – the first arises from the capital evolution equation; the second from the presence of capital adjustment costs.

In our empirical work below, profitability will be proxied by the price-to-cost margin π_t, defined as in Domowitz *et al.* (1986) as

$$\pi_t = \frac{\text{(Value-Added - Staff Costs)}}{\text{(Value-Added + Costs of Materials)}} \tag{9}$$

Defining value-added as $VA_t = Y_t - P_t^{oil} Z_t$, then in our model this becomes

$$\pi_t = \frac{Y_t - P_t^{oil} Z_t - W_t N_t}{Y_t} \tag{10}$$

We linearize this and then use (6) - (8) and show that this too can be written as a function purely of lagged values of factor prices

$$\pi_t = A_\pi (L) w_t + B_\pi (L) r_t + C_\pi (L) p_t^{oil} + \gamma_\pi k_0 \tag{11}$$

Thus we would expect profitability, as proxied by the price-to-cost margin, to depend on potentially infinite many lags of factor prices. In our empirical analysis, we will therefore let profitability depend on factor prices such as the price of oil, wages, and interest rates.

3 Data and Descriptive Statistics

We exploit a dataset on the manufacturing and services sectors across a range of industrialized nations. Our data cover twelve countries (mostly from the European Union): Austria; Belgium; Denmark; Finland; France; Germany; Italy; Japan; the Netherlands; Portugal; Spain; Sweden. Within the different nations, the dataset provides information on ten manufacturing sectors and seven services sectors. The data cover the period 1981-2003. This provides an unbalanced industry panel (it is unbalanced also with respect to time).

The source for the data is the Bank for the Accounts of Companies Harmonized (BACH) database. This contains account statistics of non-financial enterprises in eleven European countries, Japan, and the US.[5] Accounts are harmonized through a common

[5] The data are available at http://europa.eu.int/comm/economy_finance/indicators.htm. We are unable to include the US in our sample because key variables such as staff costs and the costs of materials are missing for the US.

layout for balance sheets, profit-and-loss accounts, statements of investments, and statements of depreciation. The data are disaggregated at the BACH level of industries, are available annually and are broken down by major sector and firm size.

The model we presented above showed that profitability, as proxied by the price-to-cost margin, depends on factor prices including the price of oil. As an aid to robustness, in the data we use two different measures of sectoral profitability: price-to-cost margins, as in the theory, and total profits. They are defined in the following way.

(i) The price-to-cost margin

Following Domowitz *et al.* (1986), the price-to-cost margin, denoted by $\pi_{ik,t}$ for country i, sector k and year t, is computed as:[6]

$$\pi_{ik,t} = \frac{(\text{Value-Added} \; - \; \text{Staff Costs})_{ik,t}}{(\text{Value-Added} + \text{Costs of Materials})_{ik,t}}$$

(ii) The profits variable

This alternative measure is for total profits,[7] denoted by $\Pi_{ik,t}$. The series, "Profit or Loss for the Financial Year", sometimes takes negative values – in other words, financial losses occur in certain sectors in certain years – and this prevents us using the logarithm of the variable. A way around this problem is to re-scale the series in order to get only positive values. In the later estimations, this will affect only the value of the intercept. In order to control for changes between losses and profits, as a robustness check we also included a dummy for the existence of losses (unreported in later tables but available upon request). Profits are deflated using GDP deflators.

Table 1 reports some descriptive statistics. These are for the mean, minimum and maximum values for each of the countries and the main industrial sectors. These data reveal that, on average, margins are lowest in Italy, Sweden and Germany, and they are highest in Finland. Profits (given here as a percentage of total turnover) vary widely by industry, from a minimum of -25 percent to a maximum of 65 percent, and on average

[6] As shown by Domowitz *et al.* (1986), the price-to-cost margin is equal to $(\mu - 1)/\mu$ where μ is the markup of price over marginal cost.

[7] In the model, there is perfect competition, so economic profits will be zero. However, if financial profits are thought of as the return on entrepreneurial capital, the existence of capital adjustment costs will mean they are also a function of lagged factor prices.

are lowest in Metalliferous ores and highest in Chemicals. Across nations, losses are most severe in Spain while profits are highest in Sweden.

The annual price of oil comes from the International Financial Statistics. It is given as the number of US dollars per barrel of oil (UK Brent). This is then converted to a common currency (Euros) using end of period (annual) nominal exchange rates with the US dollar, and is deflated to real values using the GDP deflators of each country (the base year is the year 2000, and nominal exchange rates and GDP deflators are from the European Commission's AMECO database).[8] Nominal short term interest rates – from the AMECO database as well – are deflated using the GDP deflator for each country. The average wage, which is defined as Wages and Salaries over Total Employment (from the OECD Economic Outlook, and converted to a common currency, i.e. Euros), is deflated using national GDP deflators; it is measured at the country level, so does not vary across sectors. This is perhaps most naturally viewed as an assumption of a mobile competitive labor market where, within any country, workers of given quality earn the same in each sector.

In the empirical analysis we also explore what happens when the price of oil is deflated with sectoral price indices. This is to allow for the possibility that different parts of the economy might be affected differently by changes in real oil prices. Sectoral price indices are available from Eurostat's New Cronos database, and are disaggregated at the 2-digit NACE revision 1 level. Sectoral price indices are not available, unfortunately, at the BACH level of sectors. Because there exists a correspondence between the two sectoral classifications (BACH and NACE, where BACH sectors are composed of several NACE sectors), we calculate the sectoral price indices at the BACH level as a weighted average of the corresponding sectors at the NACE revision 1 level. Value-added shares are used as weights. Due to data unavailability, only manufacturing sectors can be included in this case.

The aim here is to understand the causal role of oil prices. As discussed previously, the price of oil may be endogenously determined alongside the state of the world economy.[9] Our paper experiments with an instrumental variable. We propose that terrorist acts

[8] The AMECO database is available online at http://ec.europa.eu/economy_finance/indicators/annual_macro_economic_database/ameco_en.htm

[9] This reverse causality problem is not solved merely by our use of disaggregated data, because of a likely economy-wide component in profits that may be correlated with oil prices.

might serve as a suitable shifter in an oil-price equation while satisfying an exclusion restriction in equations for profitability. Because terrorist attacks are often politically motivated, such an approach seems a potentially fruitful one.[10]

Data on known terrorist incidents are available online from the MIPT Terrorism Knowledge Database (see Appendix B for more information on this dataset).[11] This website provides information on the number of attacks on a daily basis, as well as the region where the incidents took place, the targets of the attacks, the identity of the organizations that carried out the attacks, and whether the incidents were suicide related or not. As the estimation uses annual data on oil prices and profitability, daily information on the total number of terrorist incidents was aggregated into an annual frequency.

To ensure that our findings are not fragile, we experiment with, and report results for, a range of terrorist-incident variables that are reported in Table 2. The table reports several series on the total number of terrorist attacks which we will use as instruments for the price of oil. The series denoted by RoW (for Rest of the World) includes the total number of terrorist incidents in the world, omitting all incidents that occurred within the set of countries studied in this paper. This is to avoid the case, for instance, that attacks in the Basque country might demotivate people from travelling to Spain and thereby directly influence profitability in the tourism – or some other – sector, independently from the price of oil.

One potential problem is that the MIPT dataset contains both domestic and international incidents for the years 1998 to present but only contains international incidents for the years prior to 1998, creating a break in 1998 in the series on terrorist incidents.[12] Ideally we would like to observe the total number of attacks over the whole period, including both domestic and international incidents, but this information is not available. In our Instrumental Variables regressions, we will therefore pool together the two series before and after 1998, and include a dummy variable (denoted by $d98$) to account for the break. However, as a robustness check, we will also experiment with a series that

[10] Ali (2007) has shown that, on slightly different data from ours, there is a statistically significant reduced-form correlation between oil prices and terrorist incidents.

[11] This is available at http://www.tkb.org.

[12] As explained on the website of the MIPT dataset, "domestic incidents are those perpetrated by local nationals against a purely domestic target [...]. International incidents are those in which terrorists go abroad to strike the targets, select domestic targets associated with a foreign state, or create an international incident by attacking airline passengers, personnel, or equipment".

only includes international incidents over the whole period 1981 to 2003 and will show that our results remain robust to the exclusion of domestic incidents in the latter period. This series is reported in Column (2) of Table 2 and is denoted by RoW^*.

In Columns (3) and (4) of Table 2 we further exclude from the series in Column (1) the attacks in Israel and in Iraq. This is to ensure that the variation over time in our series is not dominantly driven by the large number of events in the two countries. Column (5) records only Middle East attacks (see Appendix C for the list of countries included in each instrument). Finally, we try to identify the terrorist attacks that are more closely related to oil supply disruptions. In Column (6) we give data on incidents in oil producing countries only, although we still leave out those nations in our sample that produce some oil. In Column (7), only OPEC countries are covered. In Columns (8) and (9), we further split the data into suicide and non-suicide attacks in OPEC nations. We experiment with each of these in regression equations.

Figure 1 depicts the underlying correlation of interest, where detrended oil price movements are here plotted against data on terrorist activity. A positive association between terrorism and oil shocks is visible. This holds for six different measures of terrorist incidents. In later regression equations, we turn to this issue in a more formal way.

4 The Empirical Approach

To be consistent with our theory, let us consider a three-factor model. Profitability depends on the costs of oil, capital, and labor. In order to distinguish in the data between the short and the long run effects of oil price shocks upon margins and profitability, we estimate the following two kinds of equations. They are for margins $\pi_{ik,t}$

$$\Delta\pi_{ik,t} = \alpha_k + \xi_i + \beta_1\pi_{ik,t-1} + \beta_2\Delta p^{oil}_{i,t} + \beta_3 p^{oil}_{i,t-1} + \beta_4\Delta r_{i,t} + \beta_5 r_{i,t-1} + \beta_6\Delta w_{i,t} + \beta_7 w_{i,t-1} + \varepsilon_{ik,t} \quad (12)$$

and for profits $\Pi_{ik,t}$

$$\Delta\Pi_{ik,t} = \alpha_k + \xi_i + \varphi_1\Pi_{ik,t-1} + \varphi_2\Delta p^{oil}_{i,t} + \varphi_3 p^{oil}_{i,t-1} + \varphi_4\Delta r_{i,t} + \varphi_5 r_{i,t-1} + \varphi_6\Delta w_{i,t} + \varphi_7 w_{i,t-1} + \epsilon_{ik,t} \quad (13)$$

where $p^{oil}_{i,t}$ is the real price of oil for country i in a common currency, $r_{i,t}$ is the short run real interest rate, $w_{i,t}$ is the average wage for country i, and Δ is the first-difference operator. The variables $p_{i,t}^{oil}$, $\pi_{ik,t}$, $\Pi_{ik,t}$ and $w_{i,t}$ are expressed in natural logarithm. Sector α_k and country ξ_i fixed effects are included in both specifications.

The short run elasticities of margins and profits with respect to oil prices, real interest rates, and wages are given by the estimated coefficients on the variables in first-differences, while the long run elasticities can be calculated using the coefficients on the lagged levels of the variables (or error correction terms).[13] In order to discriminate between the short and the long run effects of oil prices upon profitability, we require the variables in levels to be non-stationary. We report the results of non-stationary tests in Table A1 in Appendix A. It provides a set of panel unit root tests to investigate for the existence of unit roots in margins, profits, interest rates, average wages and the price of oil (we test for unit roots in the price of oil only across countries as the variable does not change across sectors). The Im, Pesaran and Shin (2003) and ADF-Fisher Chi Square statistics test the null of individual root processes, the Levin, Lin and Chu (2002) statistic the null of a common unit root, and the Hadri (2000) statistic the null of no common unit root process. We allow for the inclusion or not of deterministic trends. In almost all cases, it is not possible to reject the null hypothesis of a unit root in the variables for margins, profits, interest rates, the price of oil and, in the majority of cases, the wage variable. In Table A2 we test for the existence of a cointegrating relationship between margins and profits, on the one hand, and the price of oil, on the other hand. The tests proposed by Pedroni (1999) allow us to reject the hypothesis of no cointegration among the variables concerned. These results appear to support the use of error correction specifications.

5 Empirical Results

5.1 Ordinary Least Squares

We begin without Instrumental Variables. In Table 3, elementary regression equations are reported. These are estimated by OLS on a sample of approximately 2700 observations on industry-nation-years. The two dependent variables are margins and profits. Because there are instances where margins go negative, we transform the dependent variable by defining it as the logarithm of one plus the margin.

[13] For the price-to-cost margins and profits, the long run elasticity will be given by $-\beta_3/\beta_1$ and $-\varphi_3/\varphi_1$, respectively.

Table 3 provides estimates of long run elasticities, each denoted by *LR elast.* and calculated using the coefficients on the lagged levels of the variables. These are elasticities of profitability with respect to the price of oil, to the interest rate, and to the wage. The short run effects of the three variables can also be read from the table.

The upper panel of Table 3 contains nine equations explaining margins. We first pool the manufacturing and services sectors together. In Column (1) of Table 3, as a benchmark case, the equation contains solely the price of oil as its explanatory variable. The variable enters with a negative effect on margins in the short run, with a coefficient of -0.003. Movements in oil prices are thus associated with movements, in the reverse direction, in sectoral profit margins.

By adding lagged levels of the oil price and the margin, Column (2) of Table 3 can distinguish between short run and long run effects. As would be expected theoretically, an increase in the real price of oil has in the steady state a downward impact on margins across countries and sectors. Nevertheless, the long run elasticity is small, in Column (2) of the upper half of Table 2, at an estimated value of -0.008. The effect is well-determined, with a t-statistic of 2.36. Thus a *ceteris-paribus* doubling of the price of oil (a 100 percent move upwards in $p_{i,t}^{oil}$) is associated, in the steady state, with an eventual decline in industry profit margins of approximately 1 percent. Without additional controls in the equation, the immediate conclusion from OLS estimation appears to be that oil shocks have negative, but fairly minor, consequences for the economy.

To allow us to consider the difference between large and small effects, the empirical backdrop is the following. Profits rise and fall sharply, of course, over a business cycle. Marcuss (2004) estimates that profitability in the US economy declines by approximately one third from the top of a boom to the trough of a recession. Similar numbers are found by Small (1998) for the UK economy: he shows that profit margins declined almost 40 percent before the bottom of the severe 1980s recession was reached. Hodge (2006) concludes that the size of profit variability over the cycle can be as large as 50 percent. Those who support the Hamilton oil-macroeconomy thesis, therefore, seem to have to provide evidence that oil shocks can generate fluctuations of a similar order to these magnitudes.

In Columns (3), (4) and (5) of Table 3, extra regressors are included. Following the theoretical framework, the variables are, respectively, the real interest rate, a wage variable, and both of these simultaneously. The effect of the oil price is as predicted by the framework, but the variables for the wage and the interest rate, although entering with the expected negative signs and generally working robustly, have a coefficient that is occasionally insignificantly different from zero at conventional confidence levels, either in the short run or in the long run. The estimated long run oil price elasticity varies only a little from one specification to another. In Column (6) we allow for further dynamics in the model by adding a lagged dependent variable. The results remain broadly the same.[14]

Columns (7) and (8) of Table 3 present results on sub-samples. For clarity, to emphasize that these are to be compared to the full sample, the numbers in these columns are written in italics. The major distinction is between manufacturing and services. In Columns (7) and (8), the magnitude of the long run oil price elasticity differs across the sectors (at -0.018 and -0.004, respectively); oil prices enter Column (7) of the upper half of Table 3 with a better-defined coefficient than in Column (8). In the latter case, the null of zero cannot be rejected. Again, the elasticities are small.

Different industrial sectors might, in principle, react differently to changes in (real) oil prices. To try to allow for this, in Column (9) of Table 3 we deflate the price of oil using sectoral price indices (instead of GDP deflators). The resulting long run elasticity with respect to the price of oil, equal to -0.013, remains statistically significantly different from zero.

The lower panel of Table 3 takes instead a measure of total profits as its dependent variable. Perhaps a sign of potential endogeneity, here the short run elasticity of profitability with respect to oil prices in Column (1) is positive (though insignificantly different from zero). The results for profits in the following regressions are largely consistent with those reported in the upper panel of Table 3 for margins, i.e. oil price shocks have a significant and negative steady state effect on profits across countries and sectors. In this paper, however, we are particularly interested in long run consequences. In Column (2) of the lower half of Table 3, the long run elasticity of total profits with respect to oil prices is -0.019. This alters slightly as extra regressors are added, namely, as we go through Column (3) to Column (6). The oil-price elasticity of profits is highest in Column (5) and reaches -0.031, with a t-statistic of 3.92. Real interest rates here typically

[14]When adding a lagged dependent variable, the total number of observations used in each regression does not alter. This is because data on real interest rates are missing for the first year 1981, while data for profits and margins are available for that year.

have estimated coefficients that are significantly different from zero, and a larger wage leads to lower profits in the long run.

The estimate of -0.031 implies that a doubling of real oil prices is associated in the long run with a decline in profits of approximately 3 percent. This effect is a non-negligible one, but, as before for margins, does not appear to be of sufficient size to support the idea that oil spikes are central causes of recessions.

To assess the robustness of the OLS findings across time, Table A3 in Appendix A provides simple checks on the stability of Table 3's coefficients; the table explores whether the effect of oil has changed over the period. Given that our sample covers 1981 to 2003, we decided to divide the data into two sub-periods: for 1981-1992 and 1993-2003. It is likely, given the numbers of observations, that such point estimates will vary by sub-period, but this procedure has the advantage that it offers a simple, and usefully tough, way to scrutinize the reliability of the framework. We report the specification with all controls, as in Column (6) in Table 3. For both margins and profits, four sets of regressions are provided in Table A3. The first pools manufacturing and services sectors together; the second and third consider these two sectors separately; and the last includes the price of oil deflated by sectoral price indices.

5.2 Instrumental Variables

We now compare OLS results to those obtained by instrumenting the price of oil. Using the number of terrorist attacks, Tables 4 and 5 provide Instrumental Variables regression estimates. These are for equations in which the dependent variable is, respectively, margins in Table 4 and total profits in Table 5. The specifications are again for manufacturing and services combined into a full sample; for each of the two sectors separately; and for the oil price deflated by sectoral price indices.

When the price of oil is instrumented, there is an immediate effect upon the paper's key parameter. The long run oil-price elasticity of profitability – measured in each of two ways – goes up. This is what would be expected if OLS estimation is biased by the tendency for oil prices to be driven higher in world booms. In the regression equations of Table 4, $p_{i,t}^{oil}$ continues to have statistically significant negative effects upon margins, and, with the instrumenting of the price of oil, the long run elasticity has approximately tripled in size from the OLS case. Following the data laid out in Table 2, we experiment in Table 4 with a variety of terrorism variables. As can be seen, and as might be hoped, the use of all instruments lead to similar elasticities. For Middle East incidents, in Column (5) of Table 4, the elasticity remains negative but is smaller. It is also reassuring to observe from Column (2) that our conclusions are not affected by the unavailability of domestic incidents prior to 1998.

In Table 4's Columns (8) and (9), which use OPEC terrorist attacks as an instrument (we use this instrument as it yields the largest elasticity of margins with respect to the price of oil in Columns (1) to (7)), the oil-price elasticity is larger in manufacturing than services. Deflating by sectoral prices, in the final column, changes the estimates slightly, but does not alter the fundamental conclusions.

For a number of reasons, Table 5 is more striking. First, the long run elasticity of profits with respect to the real price of oil is now estimated at approximately -0.12, which can be compared to our earlier OLS elasticity of -0.03. Second, this estimate seems fairly robust across a range of different terrorist-incident IV series. Third, the other two "price" variables, the interest rate and the wage, work robustly. Fourth, although not as well-defined as ideal, the long run elasticities of oil price upon profits are similar, in Columns (8) and (9) of Table 5, for the sub-samples of manufacturing and services (at -0.073 and -0.099 respectively).[15] Overall, it can be seen that many terrorism variables could be chosen to instrument the price of oil. The correct signs in the delta-price equations are debatable in the short run, but the dynamics are also complex.

If the true oil-price elasticity of profits is -0.12, spikes in the price of oil have economically significant, and not just statistically significant, consequences. The appropriate metric is open to debate. However, as oil prices often double, and occasionally quadruple, in post-war data, we are in principle explaining a substantial part – even by the standards of Hodge (2006) – of the profit declines observed in economic downturns.

First-stage regressions are reported in both Tables 4 and 5. To save space, we only report the results for the price of oil in levels (the results for the first-difference in the price of oil are available upon request). The long run elasticity – a measure of the consequences of terrorism for the price of oil – is in each case positive, and varies between 0.001 and 0.014. Perhaps encouragingly, the R-squared values suggest that these terrorist incidents,

[15] Note that in Table 5, the largest elasticity is not obtained with OPEC but with the series for oil producing countries. For consistency with margins, we report the last three regressions using the OPEC variable.

when combined with the other exogenous variables of the model, explain approximately one quarter of the variation in the price of oil.

On endogeneity tests, we report at the foot of both Tables 4 and 5 the p-value of the Durbin-Wu-Hausman test. We can reject the null of exogeneity of the price of oil in almost all cases, except for Middle East in the margins equations and for services and the regressions with sectoral price deflators in the margins and profits equations.

A familiar problem with work of this kind is that instruments can be weak.[16] The weak instruments problem can occur even when the correlations between the endogenous variable and the instrument are significant at conventional confidence levels and the researcher is using a large sample. In the past two decades, much attention in the econometrics literature has been devoted to this topic. In the case of more than one endogenous regressor to be instrumented, the most recent technique is the one of Stock and Yogo (2005). Stock and Yogo (2005) have derived the F-stat version of the Cragg-Donald Wald statistic, and its critical values for various estimators. The null is that of weak instruments.

We need to compare the Cragg-Donald statistic to the critical value. If the calculated statistic is larger than the critical value, we can reject the null. However, the Cragg-Donald statistic and critical values from Stock and Yogo are only valid under homoskedasticity. This is a problem because in the regressions we correct for unknown heteroskedasticity. In that case the Cragg-Donald statistic is replaced by the Kleibergen-Paap F statistic, which is a generalization to robust standard errors.[17]

In Tables 4 and 5, the critical value for the test on weak instruments is equal to 13.43 for a size distortion of 5 percent for the 5 percent level test, so in all cases we can reject the null of weak instruments. It should however be borne in mind that in those tables we compare a test statistic computed under heteroskedasticity with critical values generated under homoskedasticity.

[16] For instance, Kilian (2008a) tests for weak instruments in regressions of real GDP growth on oil supply shocks.

[17] Nevertheless, no critical values have been derived at this date for that statistic. The Stock and Yogo critical values are, however, calculated for our regressions and can – cautiously – be used. However, as a robustness check, we have estimated tables that replicate both Tables 4 and 5 while not correcting for heteroskedasticity. The results remain unchanged. The tables are available upon request.

At the foot of both tables, we also report the p-values for two additional tests. The Kleibergen-Paap LM statistic tests the null of underidentification. In all cases we reject the null. We also test the hypothesis that the coefficients on the price of oil are jointly zero in the structural equation explaining profitability, which is given by the Anderson and Rubin statistic. In each case, we reject the hypothesis that the price of oil has zero effect in explaining profitability.

6 Robustness

Although these findings seem of interest, they might be a product of the particular methods or span of time. As a check, Table 6 breaks the sample into separate time periods, and uses incidents in OPEC countries as an instrument. The time periods are again for 1981-1992 and for 1993-2003. As would be anticipated, the estimates of the long run elasticity with respect to oil move around slightly from one sub-sample to another (the effective sizes are not large). However, each of the four is negative, and there is little sub-sample change within equation type. For the equations explaining profit margins, the two sub-sample oil-price elasticities in Table 6 are -0.040 and -0.034. For profits, the elasticities are -0.104 and -0.127. This cutting of the data set into sub-samples is a harsh test of the quantitative framework. Although the outcome from the procedure is not perfect, the broad similarity of the resulting patterns – in the lower panel of Table 6 – is supportive of the paper's conclusions.

Tables A4 and A5 in Appendix A are final explorations in robustness. For both margins and profits, and in the full sample that combines manufacturing and services, we report Instrumental Variables regressions with alternative terrorist-attack data. In Columns (1) and (2) we split terrorist incidents in OPEC countries between suicide and non-suicide. In Columns (3), (4) and (5), instead of considering the total number of attacks, we use information on the number of injuries, the number of fatalities and the sum of injuries and fatalities in attacks in OPEC countries. In Column (6) we drop the lagged dependent variable, using total OPEC incidents as an instrument. Finally, as we included lagged dependent variables throughout the regressions, we verify that our conclusions withstand the induced bias by using recent Arellano Bond (1991) GMM-based corrections. In that case however the price of oil is not instrumented.

Whatever the instrument, the long run elasticity with respect to the oil price is larger than in standard OLS regressions, and the Durbin-Wu-Hausman tests reject the hypothesis of exogeneity of the oil price (except in Columns (4) and (5) of Table A5). Note that we are unable to reject the null of weak instruments when using suicide attacks in OPEC countries (Column (1) in both tables).

Finally, it should be noted that while we use throughout the paper a univariate empirical specification, in reality the three factor prices are also part of a bigger dynamic system. In this case, our definition of long run elasticity is only valid under some strong assumptions.[18] As a robustness check, we estimated a panel-data VAR (details and results available upon request) and calculated impulse response functions.[19] We found that the elasticities of both measures of profits to oil prices remained significant and negative in both the long and short run, so conclude that our results appear to be robust to this change in specification.

7 Concluding Remarks

Oil shocks have been a prominent feature of the modern era. Given the volatility of world politics, it seems prudent to expect sharp oil-price movements to occur again.[20] By drawing on observation and econometric research, some macroeconomists, including James Hamilton, have argued that rises in the price of oil act as key triggers of world recessions. This is an important claim. Currently, it remains controversial.

The first contribution of the paper is methodological. We have emphasized, and attempted to confront, an identification problem. As Kilian (2008c, page 32) puts it: "Today, we know that simple statistical transformations of the price of oil are not sufficient to identify oil price increases driven by exogenous crude oil supply shocks". This paper has proposed the use of terrorist incidents as an instrument. We view these as politically motivated events that can be thought of as driven by forces independent of the business cycle.

Using an international inter-industry panel, the paper begins by showing that, even in simple regression equations, the price of oil matters. However, OLS results do not favor the view that oil-price hikes lead to major downturns in firms' profitability. Without instrumenting, the coefficients are too small. Our analysis estimates the long run OLS

[18] We thank a referee for making this point.

[19] In the panel-data VAR we were however unable to test for weak instruments.

[20] We initially wrote this sentence early in 2007. The dollar price of oil was then approximately half its current amount.

oil-price elasticity of profits to be of the order of -0.03. While this is more than trivial, it does not seem large enough to be important in the genesis of recessions. A deep downturn in the business cycle cuts the level of profits in the economy by one third or more.

The paper's second contribution is designed to be substantive. Once the price of oil is instrumented, with terrorism variables of the sort described in the paper, the empirical picture painted by the data is different. The long run oil-price elasticity of profits rises approximately three-fold to four-fold. Looking across specifications, it is estimated at numbers of approximately -0.1. Historically, the price of oil can double, and occasionally quadruple. The paper's elasticities are large enough to be consistent with the belief that oil shocks may play an influential role in business downturns. In the estimated models, this effect operates independently of our attempts to control for the cost of borrowing and labor. As a further check on the framework's robustness, we have reported evidence in sub-periods that high oil prices depress profitability. The similarity in the findings across periods seems encouraging. Finally, the paper's results do not appear to be the product of weak instruments.

Whatever their merits, our findings should be treated cautiously. One justifiable criticism of the analysis is that the microeconomic mechanisms linking oil to recessions remain opaque. This is also true of the published literature. Ultimately, detailed micro data may hold the key to the unravelling of the oil-macroeconomy relationship.

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Table 1: Descriptive Statistics (17 sectors, 12 countries, 1981-2003)

	Price-To-Cost Margins π			**Profits Π (% of turnover)**		
	Mean	Min	Max	Mean	Min	Max
Countries						
Austria	0.10	-0.01	0.26	2.8	-10.4	21.0
Belgium	0.09	0.02	0.16	2.5	-5.9	24.3
Denmark	0.11	-0.01	0.24	4.2	-7.7	28.2
Finland	0.12	0.01	0.26	4.7	-8.6	38.3
France	0.09	0.03	0.17	2.2	-3.3	9.5
Germany	0.08	-0.04	0.16	1.5	-6.3	6.7
Italy	0.08	0.01	0.14	0.6	-16.9	6.4
Japan	0.09	0.02	0.18	1.0	-2.7	3.6
Netherlands	0.09	0.01	0.22	4.2	-20.4	46.8
Portugal	0.11	0.04	0.23	3.1	-9.8	43.1
Spain	0.10	-0.05	0.31	2.3	-25.0	13.6
Sweden	0.08	-0.13	0.19	5.7	-6.5	65.1
Manufacturing industries						
Metalliferous ores	0.09	-0.05	0.16	0.4	-25.0	11.7
Non-metallic mineral products	0.15	0.07	0.23	5.1	-6.2	13.6
Chemicals	0.13	0.05	0.24	5.4	-5.0	65.1
Metal articles	0.10	0.03	0.15	2.5	-9.0	10.0
Electronic equipment	0.09	-0.13	0.22	3.1	-20.4	46.8
Transport equipment	0.07	-0.01	0.13	1.0	-10.1	20.8
Food, drink and tobacco	0.09	0.04	0.13	3.3	-0.3	14.6
Textiles, leather, clothing	0.08	0.01	0.14	2.0	-4.0	9.3
Timber and paper	0.11	0.07	0.17	3.5	-6.3	13.0
Rubber products, furniture	0.10	0.02	0.16	3.1	-7.7	31.6
Services						
Building and civil engineering	0.06	-0.04	0.13	1.7	-7.9	12.4
Wholesale trade	0.04	0.02	0.16	1.4	-2.2	4.6
Sale of motor vehicles	0.04	0.02	0.11	1.1	-3.5	4.7
Retail trade	0.05	0.02	0.07	1.8	-0.8	8.4
Hotels and restaurants	0.13	0.06	0.26	3.1	-3.1	15.8
Transport and communication	0.17	0.06	0.31	1.7	-8.6	11.8
Other services	0.12	0.06	0.23	5.4	-9.8	43.1

Notes: Authors' calculations. Source: BACH database.

Table 2: Descriptive Statistics: Terrorist Incidents

	Terrorist Incidents								
	RoW	RoW*	RoW ex.	RoW ex.	Middle	Oil	OPEC	OPEC	OPEC
Years			Israel	Iraq	East	prod.		suicide	non-suicide
1981	218	218	211	215	2	89	10	0	10
1982	252	252	246	250	41	93	9	0	9
1983	215	215	212	212	58	112	25	1	24
1984	236	236	226	233	60	123	22	0	22
1985	349	349	303	345	140	120	19	2	17
1986	296	296	269	295	102	153	13	0	13
1987	312	312	280	307	95	162	19	0	19
1988	316	316	285	316	76	147	7	0	7
1989	311	311	284	309	62	167	18	0	18
1990	249	249	226	249	45	150	7	0	7
1991	365	365	350	364	102	178	21	0	21
1992	243	243	232	233	59	137	35	0	35
1993	242	242	227	239	65	116	25	0	25
1994	296	296	272	288	69	157	50	0	50
1995	233	233	223	226	35	84	25	0	25
1996	213	213	203	209	39	100	19	0	19
1997	173	173	167	172	26	109	12	0	12
1998	1111	152	1091	1107	202	575	121	0	121
1999	854	99	840	850	340	305	49	1	48
2000	879	96	860	875	309	414	60	0	60
2001	1393	192	1308	1390	480	526	107	2	105
2002	2430	283	2321	2416	568	886	108	1	107
2003	1674	254	1600	1527	443	648	218	31	187

Notes: Both domestic and international incidents are included between 1998-2003; only international incidents are included between 1981 and 1997. RoW* includes international incidents only. For a description of the variables, see the text.

Table 3: Regression Equations for Margins and Profits, Ordinary Least Squares (17 sectors, 12 countries, 1981-2003)

Margins $\Delta\pi_{ik,t}$	(1)	(2)	(3)	(4)	(5)	(6)	*(7)*	*(8)*	*(9)*
$\pi_{ik,t-1}$	–	−0.244	−0.245	−0.244	−0.245	−0.206	*-0.247*	*-0.188*	*-0.251*
		(−9.111)	(−9.131)	(−9.114)	(−9.148)	(−10.164)	*(-9.330)*	*(-5.789)*	*(-7.295)*
$\Delta\pi_{ik,t-1}$	–	–	–	–	–	−0.152	*-0.093*	*-0.204*	*-0.076*
						(−3.164)	*(-2.052)*	*(-2.291)*	*(-1.333)*
$\Delta p^{oil}_{i,t}$	−0.003	−0.003	−0.004	−0.003	−0.004	−0.004	*-0.003*	*-0.005*	*-0.001*
	(−2.622)	(−2.702)	(−2.884)	(−2.625)	(−2.752)	(−2.993)	*(-2.021)*	*(-2.158)*	*(-0.620)*
$p^{oil}_{i,t-1}$	–	−0.002	−0.002	−0.002	−0.003	−0.003	*-0.005*	*-0.001*	*-0.003*
		(−2.330)	(−2.358)	(−2.613)	(−3.152)	(−3.414)	*(-3.915)*	*(-0.480)*	*(-2.902)*
$\Delta r_{i,t}$	–	–	0.000	–	0.000	0.000	*0.000*	*0.000*	*-0.001*
			(−1.040)		(−1.514)	(−1.458)	*(-1.807)*	*(-0.241)*	*(-1.871)*
$r_{i,t-1}$	–	–	0.000	–	−0.001	−0.001	*-0.001*	*-0.001*	*-0.001*
			(−2.069)		(−2.578)	(−2.788)	*(-2.681)*	*(-1.376)*	*(-3.038)*
$\Delta w_{i,t}$	–	–	–	−0.006	−0.007	−0.012	*-0.021*	*0.008*	*-0.069*
				(−0.410)	(−0.542)	(−1.071)	*(-1.907)*	*(0.324)*	*(-1.777)*
$w_{i,t-1}$	–	–	–	−0.004	−0.007	−0.009	*-0.012*	*-0.002*	*-0.048*
				(−1.597)	(−3.061)	(−3.533)	*(-3.760)*	*(-0.577)*	*(-3.884)*
LR elast. p^{oil}_i	–	−0.008	−0.008	−0.010	−0.012	−0.015	*-0.018*	*-0.004*	*-0.013*
		(−2.36)	(−2.39)	(−2.63)	(−3.16)	(−3.39)	*(-3.83)*	*(-0.48)*	*(-2.85)*
LR elast. r_i	–	–	−0.002	–	−0.002	−0.003	*-0.003*	*-0.003*	*-0.004*
			(−2.05)		(−2.54)	(−2.72)	*(-2.69)*	*(-1.30)*	*(-2.86)*
LR elast. w_i	–	–	–	−0.016	−0.030	−0.041	*-0.047*	*-0.012*	*-0.190*
				(−1.57)	(−2.93)	(−3.34)	*(-3.53)*	*(-0.57)*	*(-3.10)*
Sample	Full	Full	Full	Full	Full	Full	*Manuf.*	*Serv.*	*Sector Pr.*
N	2714	2714	2714	2714	2714	2714	*1778*	*936*	*1210*
R^2	0.009	0.144	0.146	0.144	0.148	0.172	*0.159*	*0.232*	*0.165*

Profits $\Delta\Pi_{ik,t}$	(1)	(2)	(3)	(4)	(5)	(6)	*(7)*	*(8)*	*(9)*
$\Pi_{ik,t-1}$	–	−0.286	−0.297	−0.285	−0.297	−0.304	*-0.345*	*-0.294*	*-0.400*
		(−3.980)	(−4.071)	(−3.963)	(−4.075)	(−3.926)	*(-4.505)*	*(-2.196)*	*(-4.016)*
$\Delta\Pi_{ik,t-1}$	–	–	–	–	–	0.025	*-0.040*	*0.229*	*-0.094*
						(0.197)	*(-0.332)*	*(0.886)*	*(-0.580)*
$\Delta p^{oil}_{i,t}$	0.002	0.004	0.002	0.005	0.002	0.003	*0.003*	*0.003*	*0.003*
	(0.928)	(1.237)	(0.663)	(1.439)	(0.761)	(0.833)	*(0.691)*	*(0.491)*	*(0.586)*
$p^{oil}_{i,t-1}$	–	−0.006	−0.006	−0.007	−0.009	−0.009	*-0.008*	*-0.012*	*-0.008*
		(−2.904)	(−2.995)	(−3.309)	(−4.028)	(−4.131)	*(-3.006)*	*(-3.470)*	*(-2.290)*
$\Delta r_{i,t}$	–	–	−0.001	–	−0.001	−0.001	*-0.001*	*-0.002*	*-0.001*
			(−1.227)		(−1.736)	(−1.778)	*(-0.957)*	*(-1.517)*	*(-0.959)*
$r_{i,t-1}$	–	–	−0.002	–	−0.002	−0.002	*-0.002*	*-0.002*	*-0.003*
			(−3.079)		(−3.796)	(−3.849)	*(-3.321)*	*(-1.652)*	*(-3.237)*
$\Delta w_{i,t}$	–	–	–	−0.041	−0.046	−0.046	*-0.047*	*-0.041*	*-0.160*
				(−4.802)	(−5.183)	(−5.073)	*(-3.999)*	*(-3.103)*	*(-3.899)*
$w_{i,t-1}$	–	–	–	−0.015	−0.026	−0.026	*-0.025*	*-0.027*	*-0.093*
				(−3.559)	(−5.815)	(−5.944)	*(-4.863)*	*(-3.848)*	*(-3.652)*
LR elast. p^{oil}_i	–	−0.019	−0.020	−0.026	−0.031	−0.030	*-0.022*	*-0.041*	*-0.020*
		(−3.13)	(−3.26)	(−3.31)	(−3.92)	(−4.13)	*(-3.20)*	*(-2.43)*	*(-2.54)*
LR elast. r_i	–	–	−0.005	–	−0.007	−0.007	*-0.007*	*-0.006*	*-0.008*
			(−2.78)		(−3.22)	(−3.10)	*(-2.52)*	*(-1.60)*	*(-2.49)*
LR elast. w_i	–	–	–	−0.052	−0.089	−0.085	*-0.073*	*-0.092*	*-0.233*
				(−2.79)	(−3.77)	(−3.61)	*(-3.51)*	*(-2.05)*	*(-2.68)*
Sample	Full	Full	Full	Full	Full	Full	*Manuf.*	*Serv.*	*Sector Pr.*
N	2714	2714	2714	2714	2714	2714	*1778*	*936*	*1210*
R^2	0.004	0.121	0.125	0.123	0.129	0.130	*0.161*	*0.138*	*0.197*

Notes: t-values in parenthesis. Full sample is Manufacturing and Services; Manuf. is Manufacturing; Serv. is Services; and Sector Pr. indicates the oil price is deflated using sectoral price indices (Manufacturing only). Sector and country fixed effects are included. Robust standard errors. LR elast. is the long run elasticity of profitability with respect to each independent variable.

Table 4: Regression Equations for Margins, Instrumental Variables (17 sectors, 12 countries, 1981-2003)

Margins $\Delta\pi_{ik,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Independent variables – Second Stage									
$\pi_{ik,t-1}$	−0.207 (−10.300)	−0.206 (−10.262)	−0.208 (−10.315)	−0.207 (−10.298)	−0.207 (−10.283)	−0.207 (−10.297)	−0.215 (−10.376)	-0.269 (-9.641)	-0.189 (-5.902)	-0.254 (-7.266)
$\Delta\pi_{ik,t-1}$	−0.155 (−3.228)	−0.154 (−3.217)	−0.155 (−3.229)	−0.154 (−3.226)	−0.151 (−3.186)	−0.156 (−3.244)	−0.158 (−3.296)	-0.106 (-2.400)	-0.205 (-2.325)	-0.087 (-1.554)
$\Delta p^{oil}_{i,t}$	−0.009 (−3.797)	−0.009 (−3.673)	−0.008 (−3.885)	−0.009 (−3.741)	−0.001 (−0.183)	−0.011 (−3.954)	−0.010 (−3.026)	-0.009 (-2.304)	-0.009 (-1.632)	-0.006 (-1.599)
$p^{oil}_{i,t-1}$	−0.007 (−3.018)	−0.006 (−3.202)	−0.007 (−3.225)	−0.007 (−2.982)	−0.004 (−1.606)	−0.008 (−2.519)	−0.016 (−2.921)	-0.023 (-3.537)	-0.004 (-0.364)	-0.009 (-2.018)
$\Delta r_{i,t}$	0.000 (−1.107)	0.000 (−0.980)	0.000 (−1.166)	0.000 (−1.113)	0.000 (−1.675)	0.000 (−0.871)	0.000 (−1.523)	-0.001 (-1.979)	0.000 (-0.125)	-0.001 (-1.876)
$r_{i,t-1}$	−0.001 (−3.197)	−0.001 (−3.155)	−0.001 (−3.232)	−0.001 (−3.184)	−0.001 (−2.278)	−0.001 (−3.185)	−0.001 (−3.302)	-0.001 (-3.468)	-0.001 (-1.244)	-0.001 (-3.050)
$\Delta w_{i,t}$	−0.014 (−1.152)	−0.011 (−0.946)	−0.014 (−1.229)	−0.013 (−1.146)	−0.016 (−1.385)	−0.012 (−1.064)	−0.029 (−2.112)	-0.049 (-3.129)	0.006 (0.233)	-0.082 (-2.054)
$w_{i,t-1}$	−0.011 (−3.057)	−0.010 (−2.919)	−0.012 (−3.191)	−0.011 (−3.043)	−0.011 (−3.565)	−0.011 (−2.497)	−0.024 (−2.836)	-0.036 (-3.503)	-0.005 (-0.298)	-0.060 (-3.579)
R^2 second stage	0.166	0.166	0.166	0.166	0.169	0.159	0.118	0.035	0.229	0.147
LR elast. p^{oil}_i	−0.032 (−2.94)	−0.029 (−3.12)	−0.034 (−3.14)	−0.032 (−2.91)	−0.017 (−1.60)	−0.037 (−2.48)	−0.073 (−2.97)	-0.085 (-3.75)	-0.019 (-0.36)	-0.037 (-2.07)
LR elast. r_i	−0.003 (−3.08)	−0.003 (−3.04)	−0.003 (−3.12)	−0.003 (−3.07)	−0.003 (−2.24)	−0.004 (−3.08)	−0.004 (−3.29)	-0.004 (-3.62)	-0.003 (-1.20)	-0.005 (-2.99)
LR elast. w_i	−0.054 (−2.95)	−0.047 (−2.82)	−0.058 (−3.07)	−0.054 (−2.94)	−0.052 (−3.40)	−0.055 (−2.44)	−0.112 (−2.86)	-0.134 (-3.67)	-0.025 (-0.30)	-0.235 (-3.21)
	Independent variables – First Stage Oil-Price Equations									
$\pi_{ik,t-1}$	−0.870 (−3.31)	−0.782 (−3.15)	−0.863 (−3.28)	−0.893 (−3.40)	−0.715 (−2.92)	−1.035 (−3.78)	−0.864 (−3.01)	-1.353 (-3.19)	-0.392 (-0.97)	-0.828 (-1.36)
$\Delta\pi_{ik,t-1}$	−0.118 (−0.35)	0.145 (0.45)	−0.074 (−0.22)	−0.089 (−0.27)	−0.080 (−0.25)	0.128 (0.38)	−0.424 (−1.23)	-0.591 (-1.15)	-0.192 (-0.43)	-2.012 (-3.06)
$\Delta r_{i,t}$	−0.018 (−4.54)	−0.007 (−1.61)	−0.018 (−4.45)	−0.018 (−4.39)	−0.023 (−6.04)	−0.025 (−6.17)	−0.013 (−2.87)	-0.012 (-2.21)	-0.014 (-1.78)	-0.026 (-3.31)
$r_{i,t-1}$	−0.016 (−4.67)	−0.019 (−5.31)	−0.016 (−4.51)	−0.016 (−4.64)	−0.043 (−12.01)	−0.019 (−5.31)	−0.003 (−0.80)	-0.003 (-0.70)	-0.003 (-0.39)	-0.030 (-5.15)
$\Delta w_{i,t}$	−1.388 (−8.19)	−1.317 (−8.39)	−1.431 (−8.43)	−1.393 (−8.19)	−1.536 (−9.81)	−1.666 (−9.18)	−1.935 (−10.66)	-1.958 (-8.62)	-1.866 (-6.13)	-3.562 (-7.42)
$w_{i,t-1}$	−1.508 (−21.46)	−1.404 (−20.69)	−1.529 (−21.45)	−1.490 (−21.32)	−1.059 (−15.47)	−1.626 (−22.63)	−1.703 (−21.22)	-1.701 (-17.11)	-1.702 (-12.27)	-5.048 (-12.14)
$\Delta Inst_t$	0.621 (27.96)	0.727 (40.72)	0.632 (28.15)	0.624 (28.02)	0.597 (31.61)	0.496 (22.16)	0.070 (5.91)	0.061 (4.08)	0.084 (4.21)	0.187 (7.74)
$Inst_{t-1}$	0.629 (29.23)	0.106 (4.95)	0.654 (29.93)	0.636 (29.32)	0.499 (34.37)	0.534 (19.99)	0.053 (3.40)	0.041 (2.09)	0.070 (2.69)	0.231 (6.43)
$d98$	−0.869 (−22.01)	–	−0.918 (−22.53)	−0.886 (−22.24)	−1.016 (−25.83)	−0.608 (−14.30)	0.073 (2.62)	0.087 (2.51)	0.048 (1.03)	-0.018 (-0.39)
R^2 first stage	0.41	0.47	0.41	0.42	0.48	0.36	0.28	0.29	0.26	0.28
Terrorist Incidents $Inst_t$	RoW	RoW*	ex. Israel	ex. Iraq	M.East	Oil Prod	OPEC	OPEC	OPEC	OPEC
Kleibergen-Paap LM test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anderson-Rubin Wald test	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.07	0.00
Kleibergen-Paap F Stat	334.8	539.2	368.4	339.6	60.5	156.1	45.7	28.5	16.6	34.7
Durbin-Wu-Hausman test	0.04	0.02	0.04	0.05	0.33	0.01	0.02	0.01	0.64	0.29
Sample	Full	Full	Full	Full	Full	Full	Full	Manuf.	Serv.	Sector Pr.
N	2714	2714	2714	2714	2714	2714	2714	1778	936	1210

Notes: t-values in parenthesis. The upper half of the table reports regressions in which the dependent variable is a measure of (changes in) industry profitability, and in which the oil price variable is instrumented. The lower half of the table reports the corresponding first-stage regressions in which the dependent variable is the price of oil. Full sample is Manufacturing and Services; Manuf. is Manufacturing; Serv. is Services and Sector Pr. indicates the oil price is deflated using sectoral price indices (Manufacturing only). RoW* includes international incidents only. Sector and country fixed effects are included. Robust standard errors. LR elast. is the long run elasticity of profitability with respect to each independent variable. The Kleibergen-Paap LM, Anderson-Rubin Wald and Durbin-Wu-Hausman report the p-values for the tests of underidentification, weak-instrument-robust-inference and exogeneity tests respectively. The Kleibergen-Paap F stat is for the test on weak instruments (critical value is 13.43 for a size distorsion of 5% for the 5% level test, Stock and Yogo (2005)). $d98$ is equal to 1 from 1998 onwards.

Table 5: Regression Equations for Profits, Instrumental Variables (17 sectors, 12 countries, 1981-2003)

Profits $\Delta\Pi_{ik,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	*(8)*	*(9)*	*(10)*
	Independent variables – Second Stage									
$\Pi_{ik,t-1}$	−0.308 (−4.031)	−0.311 (−4.044)	−0.309 (−4.050)	−0.308 (−4.030)	−0.304 (−3.932)	−0.307 (−4.020)	−0.303 (−3.960)	*-0.346 (-4.439)*	*-0.291 (-2.216)*	*-0.398 (-3.918)*
$\Delta\Pi_{ik,t-1}$	0.018 (0.149)	0.027 (0.215)	0.018 (0.150)	0.018 (0.149)	0.020 (0.159)	0.016 (0.126)	0.018 (0.145)	*-0.044 (-0.368)*	*0.220 (0.849)*	*-0.103 (-0.657)*
$\Delta p_{i,t}^{oil}$	−0.016 (−2.413)	0.013 (1.651)	−0.015 (−2.364)	−0.016 (−2.379)	−0.014 (−1.285)	−0.027 (−3.348)	−0.020 (−2.585)	*-0.019 (-1.820)*	*-0.018 (-1.511)*	*-0.011 (-0.861)*
$p_{i,t-1}^{oil}$	−0.038 (−5.107)	−0.015 (−2.590)	−0.039 (−5.214)	−0.038 (−5.108)	−0.024 (−4.048)	−0.044 (−4.558)	−0.028 (−2.426)	*-0.025 (-1.806)*	*-0.029 (-1.490)*	*-0.025 (-1.943)*
$\Delta r_{i,t}$	−0.001 (−1.781)	−0.001 (−2.504)	−0.001 (−1.876)	−0.001 (−1.778)	−0.001 (−1.248)	−0.001 (−1.422)	−0.001 (−1.189)	*0.000 (-0.570)*	*-0.001 (-1.114)*	*-0.001 (-1.035)*
$r_{i,t-1}$	−0.003 (−5.794)	−0.002 (−3.891)	−0.003 (−5.815)	−0.003 (−5.776)	−0.003 (−5.251)	−0.003 (−6.271)	−0.003 (−5.323)	*-0.003 (-4.244)*	*-0.002 (-2.534)*	*-0.004 (-4.310)*
$\Delta w_{i,t}$	−0.078 (−5.172)	−0.067 (−5.000)	−0.082 (−5.254)	−0.078 (−5.162)	−0.055 (−4.714)	−0.078 (−4.413)	−0.056 (−2.475)	*-0.058 (-2.104)*	*-0.047 (-1.416)*	*-0.196 (-4.183)*
$w_{i,t-1}$	−0.059 (−5.784)	−0.040 (−4.531)	−0.062 (−5.827)	−0.059 (−5.798)	−0.040 (−5.783)	−0.063 (−4.934)	−0.043 (−2.416)	*-0.041 (-1.919)*	*-0.041 (-1.467)*	*-0.128 (-2.846)*
R^2 second stage	0.087	0.121	0.083	0.088	0.116	0.066	0.106	*0.14*	*0.12*	*0.181*
LR elast. p_i^{oil}	−0.123 (−3.31)	−0.047 (−2.34)	−0.127 (−3.35)	−0.122 (−3.30)	−0.079 (−2.95)	−0.142 (−2.91)	−0.093 (−2.02)	*-0.073 (-1.79)*	*-0.099 (-1.12)*	*-0.064 (-1.84)*
LR elast. r_i	−0.009 (−3.61)	−0.007 (−3.04)	−0.009 (−3.64)	−0.009 (−3.61)	−0.008 (−3.46)	−0.010 (−3.56)	−0.009 (−3.35)	*-0.008 (-2.86)*	*-0.008 (-1.87)*	*-0.010 (-2.95)*
LR elast. w_i	−0.193 (−3.41)	−0.128 (−3.26)	−0.199 (−3.43)	−0.191 (−3.40)	−0.131 (−3.42)	−0.204 (−2.99)	−0.141 (−2.00)	*-0.119 (-1.90)*	*-0.140 (-1.10)*	*-0.322 (-2.61)*
	Independent variables – First Stage Oil-Price Equations									
$\Pi_{ik,t-1}$	−0.591 (−3.76)	−0.516 (−3.87)	−0.604 (−3.79)	−0.604 (−3.84)	−0.409 (−2.83)	−0.680 (−4.02)	−0.531 (−2.99)	*-0.852 (-3.98)*	*-0.292 (-1.11)*	*-0.476 (-1.86)*
$\Delta\Pi_{ik,t-1}$	0.511 (3.66)	0.360 (2.77)	0.543 (3.81)	0.523 (3.76)	−0.338 (2.66)	0.570 (3.77)	0.078 (0.46)	*0.381 (2.00)*	*-0.434 (-1.89)*	*-0.010 (-0.05)*
$\Delta r_{i,t}$	−0.019 (−4.83)	−0.008 (−1.75)	−0.019 (−4.75)	−0.019 (−4.69)	−0.024 (−6.25)	−0.027 (−6.57)	−0.014 (−3.08)	*-0.013 (-2.45)*	*-0.015 (-1.92)*	*-0.028 (-3.59)*
$r_{i,t-1}$	−0.017 (−4.80)	−0.020 (−5.53)	−0.016 (−4.65)	−0.017 (−4.78)	−0.043 (−12.09)	−0.020 (−5.61)	−0.004 (−1.00)	*-0.002 (-0.55)*	*-0.005 (-0.71)*	*-0.030 (-5.14)*
$\Delta w_{i,t}$	−1.374 (−8.24)	−1.315 (−8.48)	−1.417 (−8.49)	−1.380 (−8.24)	−1.532 (−9.91)	−1.657 (−9.25)	−1.924 (−10.76)	*-1.943 (-8.71)*	*-1.863 (-6.17)*	*-3.402 (-7.37)*
$w_{i,t-1}$	−1.513 (−21.67)	−1.405 (−20.79)	−1.534 (−21.68)	−1.496 (−21.54)	−1.064 (−15.60)	−1.634 (−22.89)	−1.708 (−21.47)	*-1.702 (-17.41)*	*-1.709 (-12.34)*	*-4.954 (-12.11)*
$\Delta Inst_t$	0.625 (27.96)	0.730 (40.95)	0.637 (28.22)	0.628 (28.04)	0.597 (31.70)	0.506 (22.34)	0.070 (5.71)	*0.058 (3.79)*	*0.082 (4.07)*	*0.177 (7.55)*
$Inst_{t-1}$	0.638 (29.58)	0.097 (4.50)	0.665 (30.33)	0.646 (29.68)	0.501 (34.51)	0.550 (20.43)	0.052 (3.30)	*0.038 (1.89)*	*0.066 (2.54)*	*0.220 (6.28)*
$d98$	−0.867 (−21.90)	–	−0.920 (−22.50)	−0.885 (−22.14)	−1.009 (−25.78)	−0.613 (−14.35)	0.085 (3.00)	*0.110 (3.08)*	*0.057 (1.20)*	*0.000 (0.00)*
R^2 first stage	0.42	0.47	0.41	0.42	0.48	0.37	0.28	*0.29*	*0.27*	*0.27*
Terrorist Incidents $Inst_t$	RoW	RoW*	ex. Israel	ex. Iraq	M.East	Oil Prod	OPEC	*OPEC*	*OPEC*	*OPEC*
Kleibergen-Paap LM test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*	*0.00*	*0.00*
Anderson-Rubin Wald test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.02*	*0.07*	*0.07*
Kleibergen-Paap F Stat	347.2	548.7	383.1	352.2	58.1	162.4	49.1	*31.8*	*16.8*	*32.7*
Durbin-Wu-Hausman test	0.00	0.02	0.00	0.00	0.01	0.00	0.00	*0.02*	*0.34*	*0.29*
Sample	Full	Full	Full	Full	Full	Full	Full	*Manuf.*	*Serv.*	*Sector Pr.*
N	2714	2714	2714	2714	2714	2714	2714	*1778*	*936*	*1210*

Notes: t-values in parenthesis. The upper half of the table reports regressions in which the dependent variable is a measure of (changes in) industry profitability, and in which the oil price variable is instrumented. The lower half of the table reports the corresponding first-stage regressions in which the dependent variable is the price of oil. Full sample is Manufacturing and Services; Manuf. is Manufacturing; Serv. is Services and Sector Pr. indicates the oil price is deflated using sectoral price indices (Manufacturing only). RoW* includes international incidents only. Sector and country fixed effects are included. Robust standard errors. LR elast. is the long run elasticity of profitability with respect to each independent variable. The Kleibergen-Paap LM, Anderson-Rubin Wald and Durbin-Wu-Hausman report the p-values for the tests of underidentification, weak-instrument-robust-inference and exogeneity tests respectively. The Kleibergen-Paap F stat is for the test on weak instruments (critical value is 13.43 for a size distorsion of 5% for the 5% level test, Stock and Yogo (2005)). $d98$ is equal to 1 from 1998 onwards.

Table 6: Regression Equations for Margins and Profits, Instrumental Variables in Two Sub-Periods (17 sectors, 12 countries, 1981-2003)

Margins $\Delta\pi_{ik,t}$	(1)	*(2)*	*(3)*	*(4)*	**Profits** $\Delta\Pi_{ik,t}$	(5)	*(6)*	*(7)*	*(8)*
1981-1992					**1981-1992**				
$\pi_{ik,t-1}$	−0.197	*-0.273*	*-0.154*	*-0.272*	$\Pi_{ik,t-1}$	−0.305	*-0.339*	*-0.298*	*-0.374*
	(−8.508)	*(-7.702)*	*(-5.557)*	*(-5.134)*		(−3.723)	*(-4.266)*	*(-2.207)*	*(-3.695)*
$\Delta\pi_{ik,t-1}$	−0.018	*-0.041*	*0.032*	*0.235*	$\Delta\Pi_{ik,t-1}$	0.111	*0.136*	*0.013*	*0.036*
	(−0.241)	*(-0.488)*	*(0.277)*	*(2.066)*		(0.893)	*(1.007)*	*(0.070)*	*(0.237)*
$\Delta p^{oil}_{i,t}$	−0.015	*-0.014*	*-0.023*	*-0.028*	$\Delta p^{oil}_{i,t}$	−0.019	*-0.027*	*-0.005*	*-0.008*
	(−1.463)	*(-1.319)*	*(-1.079)*	*(-1.985)*		(−0.994)	*(-0.973)*	*(-0.236)*	*(-0.228)*
$p^{oil}_{i,t-1}$	−0.008	*-0.008*	*-0.012*	*-0.015*	$p^{oil}_{i,t-1}$	−0.032	*-0.036*	*-0.027*	*-0.018*
	(−1.293)	*(-1.077)*	*(-1.099)*	*(-1.881)*		(−2.429)	*(-1.861)*	*(-2.215)*	*(-0.786)*
$\Delta r_{i,t}$	−0.001	*-0.001*	*-0.001*	*0.000*	$\Delta r_{i,t}$	−0.003	*-0.003*	*-0.004*	*-0.001*
	(−1.536)	*(-1.278)*	*(-0.608)*	*(0.404)*		(−2.637)	*(-1.789)*	*(-2.218)*	*(-0.622)*
$r_{i,t-1}$	−0.002	*-0.002*	*-0.002*	*-0.001*	$r_{i,t-1}$	−0.004	*-0.005*	*-0.004*	*-0.002*
	(−3.319)	*(-2.913)*	*(-1.946)*	*(-0.946)*		(−5.042)	*(-4.154)*	*(-2.953)*	*(-0.698)*
$\Delta w_{i,t}$	−0.017	*-0.022*	*-0.011*	*-0.139*	$\Delta w_{i,t}$	−0.080	*-0.104*	*-0.043*	*-0.468*
	(−1.069)	*(-1.001)*	*(-0.481)*	*(-2.498)*		(−2.685)	*(-2.334)*	*(-1.219)*	*(-2.188)*
$w_{i,t-1}$	−0.006	*-0.005*	*-0.013*	*-0.060*	$w_{i,t-1}$	−0.056	*-0.061*	*-0.047*	*-0.115*
	(−0.574)	*(-0.401)*	*(-0.734)*	*(-2.073)*		(−2.678)	*(-2.164)*	*(-1.750)*	*(-1.697)*
1993-2003					**1993-2003**				
$\pi_{ik,t-1}$	−0.207	*-0.229*	*-0.209*	*-0.248*	$\Pi_{ik,t-1}$	−0.293	*-0.329*	*-0.285*	*-0.357*
	(−9.408)	*(-7.210)*	*(-6.175)*	*(-6.126)*		(−3.564)	*(-4.096)*	*(-2.109)*	*(-3.480)*
$\Delta\pi_{ik,t-1}$	−0.226	*-0.142*	*-0.304*	*-0.162*	$\Delta\Pi_{ik,t-1}$	−0.013	*-0.105*	*0.226*	*-0.194*
	(−4.228)	*(-2.569)*	*(-3.409)*	*(-2.527)*		(−0.087)	*(-0.667)*	*(0.844)*	*(-0.962)*
$\Delta p^{oil}_{i,t}$	−0.009	*-0.009*	*-0.007*	*-0.009*	$\Delta p^{oil}_{i,t}$	−0.023	*-0.024*	*-0.019*	*-0.032*
	(−3.586)	*(-3.118)*	*(-1.518)*	*(-2.166)*		(−3.347)	*(-2.814)*	*(-1.637)*	*(-2.197)*
$p^{oil}_{i,t-1}$	−0.007	*-0.010*	*-0.001*	*-0.009*	$p^{oil}_{i,t-1}$	−0.037	*-0.033*	*-0.040*	*-0.055*
	(−2.475)	*(-2.795)*	*(-0.167)*	*(-1.388)*		(−3.656)	*(-2.629)*	*(-2.396)*	*(-2.488)*
$\Delta r_{i,t}$	0.000	*0.000*	*0.001*	*0.000*	$\Delta r_{i,t}$	0.001	*0.002*	*0.001*	*0.002*
	(0.990)	*(0.408)*	*(0.631)*	*(0.176)*		(0.999)	*(1.133)*	*(0.441)*	*(1.333)*
$r_{i,t-1}$	0.000	*0.000*	*0.000*	*-0.001*	$r_{i,t-1}$	−0.002	*-0.002*	*-0.001*	*-0.003*
	(−0.271)	*(-0.412)*	*(-0.352)*	*(-1.229)*		(−1.783)	*(-1.573)*	*(-0.765)*	*(-2.579)*
$\Delta w_{i,t}$	−0.008	*-0.016*	*0.007*	*-0.067*	$\Delta w_{i,t}$	−0.049	*-0.046*	*-0.056*	*-0.199*
	(−0.642)	*(-1.105)*	*(0.304)*	*(-1.558)*		(−3.204)	*(-2.259)*	*(-2.585)*	*(-4.053)*
$w_{i,t-1}$	−0.003	*-0.004*	*0.000*	*-0.054*	$w_{i,t-1}$	−0.005	*-0.009*	*-0.001*	*-0.083*
	(−0.633)	*(-0.669)*	*(0.024)*	*(-2.331)*		(−0.395)	*(-0.535)*	*(-0.075)*	*(-1.374)*
1981-1992					**1981-1992**				
LR elast. p^{oil}_i	−0.040	*-0.030*	*-0.080*	*-0.055*	LR elast. p^{oil}_i	−0.104	*-0.105*	*-0.092*	*-0.049*
	(−1.32)	*(-1.12)*	*(-1.13)*	*(-2.21)*		(−2.54)	*(-2.15)*	*(-1.65)*	*(-0.83)*
LR elast. r_i	−0.010	*-0.008*	*-0.012*	*-0.003*	LR elast. r_i	−0.014	*-0.014*	*-0.013*	*-0.004*
	(−3.14)	*(-2.89)*	*(-1.84)*	*(-0.92)*		(−2.96)	*(-3.49)*	*(-1.56)*	*(-0.71)*
LR elast. w_i	−0.030	*-0.018*	*-0.085*	*-0.220*	LR elast. w_i	−0.183	*-0.180*	*-0.157*	*-0.307*
	(−0.58)	*(-0.41)*	*(-0.75)*	*(-2.11)*		(−2.74)	*(-2.36)*	*(-1.56)*	*(-1.65)*
1993-2003					**1993-2003**				
LR elast. p^{oil}_i	−0.034	*-0.045*	*-0.004*	*-0.037*	LR elast. p^{oil}_i	−0.127	*-0.101*	*-0.142*	*-0.155*
	(−2.35)	*(-2.52)*	*(-0.17)*	*(-1.32)*		(−2.50)	*(-2.13)*	*(-1.52)*	*(-1.95)*
LR elast. r_i	−0.001	*-0.001*	*-0.001*	*-0.002*	LR elast. r_i	−0.006	*-0.005*	*-0.005*	*-0.009*
	(−0.27)	*(-0.42)*	*(-0.35)*	*(-1.25)*		(−1.87)	*(-1.44)*	*(-0.83)*	*(-2.17)*
LR elast. w_i	−0.012	*-0.016*	*0.001*	*-0.217*	LR elast. w_i	−0.018	*-0.029*	*-0.005*	*-0.233*
	(−0.64)	*(-0.68)*	*(0.02)*	*(-2.20)*		(−0.40)	*(-0.54)*	*(-0.08)*	*(-1.35)*
*LR elast. p^{oil}_i	0.86	*0.64*	*0.33*	*0.59*	*LR elast. p^{oil}_i	0.71	*0.95*	*0.55*	*0.35*
*LR elast. r_i	0.01	*0.01*	*0.10*	*0.83*	*LR elast. r_i	0.12	*0.04*	*0.43*	*0.53*
*LR elast. w_i	0.65	*0.93*	*0.36*	*0.94*	*LR elast. w_i	0.01	*0.03*	*0.17*	*0.19*
Sample	Full	*Manuf.*	*Serv.*	*Sector Pr.*	Sample	Full	*Manuf.*	*Serv.*	*Sector Pr.*
N	2714	*1778*	*936*	*1210*	N	2714	*1778*	*936*	*1210*
R^2 second stage	0.178	*0.156*	*0.252*	*0.127*	R^2 second stage	0.111	*0.139*	*0.129*	*0.184*

Notes: t-values in parenthesis. * is the p-value of the null that the two effects remain the same between 1981-1992 and 1993-2003. Full sample is Manufacturing and Services; Manuf. is Manufacturing; Serv. is Services; and Sector Pr. indicates that the oil price is deflated using sectoral price indices (Manuf. only). Instrument is incidents in OPEC countries. Sector and country fixed effects are included. Robust standard errors. LR elast. is the long run elasticity of profitability with respect to each independent variable.

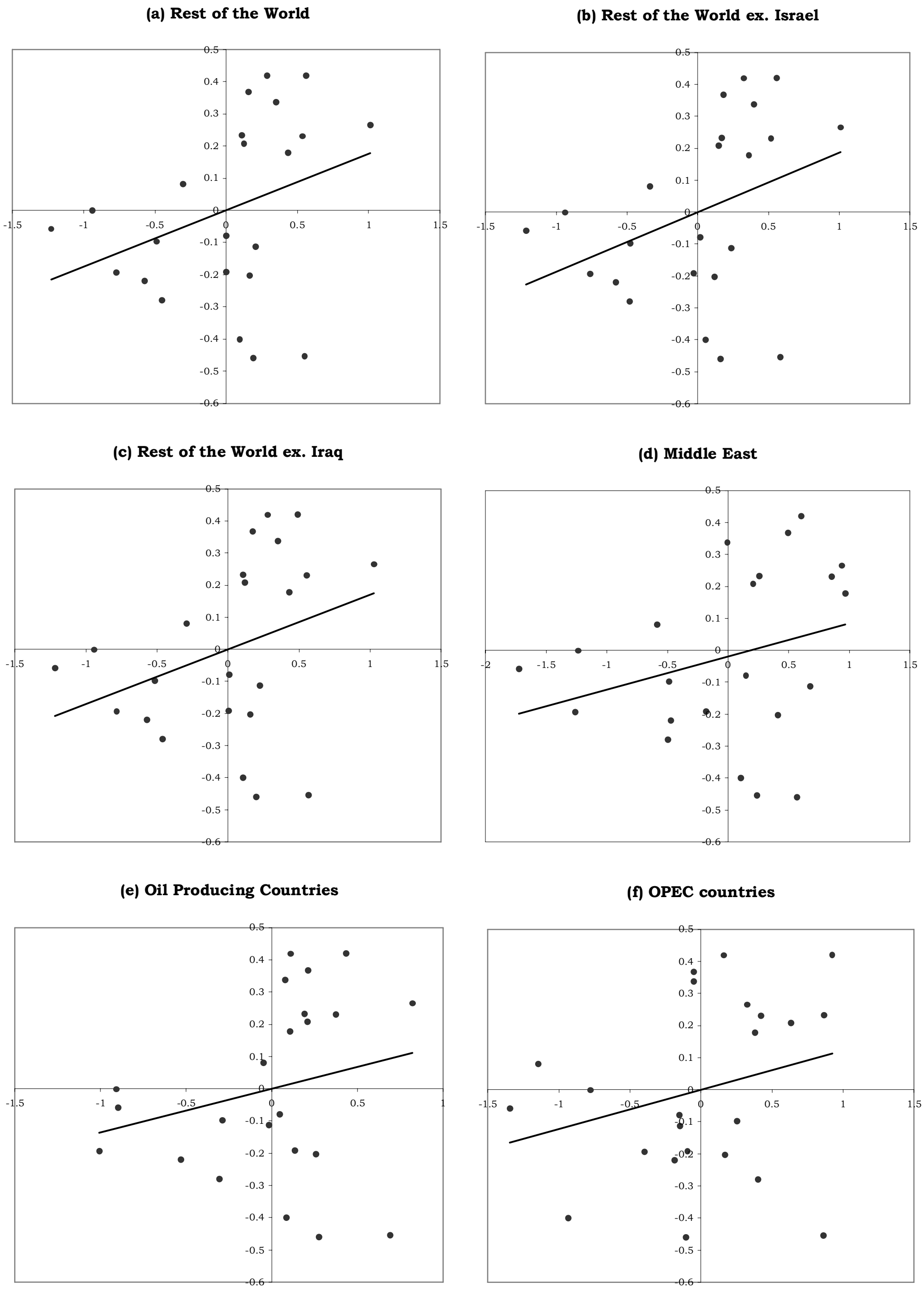

Figure 1: The Correlation Between Movements in Oil Prices and Movements in the Number of Terrorist Incidents. Each graph shows movements of the price of oil on the y-axis and movements in terrorism on the x-axis. Each graph considers a different measure of terrorism. These are detrended values. They are the residuals obtained from regressing the log of each variable on a constant term and a trend. Note that the price of oil is in US dollars.

Appendix A

Table A1: Panel Unit Root Tests (17 sectors, 12 countries, 1981-2003)

	Margins	Profits	Int. Rate	Av. Wage	Oil price
Im-Pesaran-Shin					
Intercept	-2.63 (0.00)	-3.42 (0.00)	1.31^* (0.90)	11.05^* (1.00)	1.35^* (0.90)
Intercept + Trend	-1.46^* (0.07)	-0.76^* (0.23)	-0.34^* (0.39)	-0.38^* (0.35)	-0.34^* (0.37)
ADF-Fisher Chi-square					
Intercept	299.2 (0.04)	277.2^* (0.10)	8.37^* (0.97)	14.62^* (0.69)	8.37^* (0.97)
Intercept + Trend	199.3^* (0.65)	163.9^* (0.96)	9.93^* (0.77)	11.57^* (0.64)	9.93^* (0.77)
Levin-Lin-Chu					
Intercept	3.48^* (0.99)	-46.02 (0.00)	2.34^* (0.99)	52.08^* (1.00)	2.34^* (0.99)
Intercept + Trend	6.39^* (1.00)	18.06^* (1.00)	3.10^* (0.99)	1.38^* (0.92)	3.10^* (1.00)
Hadri					
Intercept	15.77^* (0.00)	12.15^* (0.00)	5.49^* (0.00)	9.96^* (0.00)	5.49^* (0.00)
Intercept + Trend	21.66^* (0.00)	15.66^* (0.00)	6.61^* (0.00)	7.22^* (0.00)	6.61^* (0.00)

Notes: Test-values and p-values in parenthesis. Im-Pesaran-Shin and ADF-Fisher Chi square test the null hypothesis of an individual unit root process. Levin-Lin-Chu report the Breitung t-statistic corresponding to the null hypothesis that there is a common unit root process. The Hadri test reports the Z-statistic corresponding to the null hypothesis that there is no common unit root process. A * indicates that the series contains a unit root (at the 10 percent level).

Table A2: Pedroni Panel Cointegration Tests - Each variable with Real Oil Price (17 sectors, 12 countries, 1981-2003)

	Panel cointegration tests				Group mean cointegration tests		
	v test	rho test	non param. t test	param. t test	rho test	non param. t test	param. t test
Margins	2.71*	-6.57*	-9.29*	-7.64*	-0.03	-9.65*	-123.04*
Profits	3.80*	-8.73*	-12.08*	-10.38*	-1.98*	-12.77*	-16.47*

Notes: Test-values are reported for each of the tests. A * indicates rejection of the null hypothesis of no cointegration at the 10% level.

Table A3: Regression Equations for Margins and Profits, Ordinary Least Squares in Two Sub-Periods (17 sectors, 12 countries, 1981-2003)

Margins $\Delta\pi_{ik,t}$	(1)	*(2)*	*(3)*	*(4)*	Profits $\Delta\Pi_{ik,t}$	(5)	*(6)*	*(7)*	*(8)*
1981-1992					**1981-1992**				
$\pi_{ik,t-1}$	−0.192 (−8.348)	*-0.267 (-7.611)*	*-0.145 (-5.426)*	*-0.239 (-5.333)*	$\Pi_{ik,t-1}$	−0.294 (−3.635)	*-0.323 (-4.356)*	*-0.286 (-2.066)*	*-0.387 (-3.938)*
$\Delta\pi_{ik,t-1}$	−0.023 (−0.308)	*-0.053 (-0.643)*	*0.039 (0.386)*	*0.188 (1.801)*	$\Delta\Pi_{ik,t-1}$	0.086 (0.679)	*0.102 (0.740)*	*-0.012 (-0.070)*	*0.019 (0.126)*
$\Delta p^{oil}_{i,t}$	−0.003 (−1.599)	*-0.004 (-1.643)*	*0.000 (-0.092)*	*-0.006 (-3.153)*	$\Delta p^{oil}_{i,t}$	0.001 (0.488)	*0.001 (0.302)*	*0.003 (0.681)*	*0.001 (0.141)*
$p^{oil}_{i,t-1}$	−0.003 (−1.985)	*-0.005 (-2.548)*	*0.000 (0.039)*	*-0.003 (-2.247)*	$p^{oil}_{i,t-1}$	−0.002 (−0.569)	*0.000 (-0.084)*	*-0.004 (-0.748)*	*0.000 (-0.121)*
$\Delta r_{i,t}$	−0.001 (−3.220)	*-0.001 (-2.460)*	*-0.001 (-1.957)*	*0.000 (-0.613)*	$\Delta r_{i,t}$	−0.001 (−2.266)	*-0.001 (-1.171)*	*-0.002 (-2.236)*	*0.000 (0.170)*
$r_{i,t-1}$	−0.002 (−3.504)	*-0.002 (-3.079)*	*-0.002 (-2.048)*	*-0.001 (-0.771)*	$r_{i,t-1}$	−0.003 (−3.992)	*-0.003 (-3.724)*	*-0.002 (-1.993)*	*0.001 (0.453)*
$\Delta w_{i,t}$	−0.010 (−1.143)	*-0.019 (-1.631)*	*0.014 (1.197)*	*-0.132 (-2.857)*	$\Delta w_{i,t}$	−0.034 (−1.675)	*-0.041 (-1.448)*	*-0.009 (-0.413)*	*-0.356 (-1.478)*
$w_{i,t-1}$	−0.001 (−0.194)	*-0.004 (-1.015)*	*0.008 (1.551)*	*-0.051 (-2.526)*	$w_{i,t-1}$	−0.018 (−1.884)	*-0.017 (-1.631)*	*-0.010 (-0.536)*	*-0.127 (-3.375)*
1993-2003					**1993-2003**				
$\pi_{ik,t-1}$	−0.206 (−9.477)	*-0.230 (-7.530)*	*-0.206 (-6.048)*	*-0.244 (-6.504)*	$\Pi_{ik,t-1}$	−0.286 (−3.532)	*-0.314 (-4.277)*	*-0.283 (-2.044)*	*-0.372 (-3.837)*
$\Delta\pi_{ik,t-1}$	−0.225 (−4.118)	*-0.132 (-2.357)*	*-0.309 (-3.388)*	*-0.148 (-2.250)*	$\Delta\Pi_{ik,t-1}$	−0.008 (−0.056)	*-0.105 (-0.665)*	*0.232 (0.847)*	*-0.162 (-0.784)*
$\Delta p^{oil}_{i,t}$	−0.005 (−3.058)	*-0.003 (-1.719)*	*-0.007 (-2.342)*	*0.000 (0.051)*	$\Delta p^{oil}_{i,t}$	0.000 (0.067)	*-0.001 (-0.189)*	*0.002 (0.189)*	*0.000 (0.063)*
$p^{oil}_{i,t-1}$	−0.006 (−3.907)	*-0.007 (-3.577)*	*-0.004 (-1.748)*	*-0.004 (-1.711)*	$p^{oil}_{i,t-1}$	−0.025 (−3.864)	*-0.025 (-3.149)*	*-0.024 (-2.430)*	*-0.025 (-2.535)*
$\Delta r_{i,t}$	0.000 (0.874)	*0.000 (0.257)*	*0.000 (0.408)*	*0.000 (0.109)*	$\Delta r_{i,t}$	0.001 (0.899)	*0.002 (0.998)*	*0.001 (0.462)*	*0.002 (1.299)*
$r_{i,t-1}$	0.000 (0.049)	*0.000 (-0.024)*	*0.000 (-0.718)*	*0.000 (-0.690)*	$r_{i,t-1}$	−0.001 (−1.024)	*-0.001 (-0.840)*	*-0.001 (-0.392)*	*-0.002 (-1.494)*
$\Delta w_{i,t}$	−0.010 (−0.814)	*-0.017 (-1.247)*	*0.005 (0.217)*	*-0.062 (-1.465)*	$\Delta w_{i,t}$	−0.062 (−4.370)	*-0.060 (-3.206)*	*-0.069 (-3.175)*	*-0.181 (-3.864)*
$w_{i,t-1}$	−0.001 (−0.300)	*-0.003 (-0.719)*	*0.005 (1.152)*	*-0.053 (-2.698)*	$w_{i,t-1}$	−0.007 (−0.667)	*-0.005 (-0.391)*	*-0.015 (-0.924)*	*-0.099 (-2.934)*
1981-1992					**1981-1992**				
LR elast. p^{oil}_i	−0.016 (−2.09)	*-0.018 (-2.83)*	*0.001 (0.04)*	*-0.014 (-2.37)*	LR elast. p^{oil}_i	−0.006 (−0.63)	*-0.001 (-0.08)*	*-0.013 (-0.98)*	*-0.001 (-0.12)*
LR elast. r_i	−0.010 (−3.17)	*-0.007 (-2.99)*	*-0.012 (-1.83)*	*-0.002 (-0.75)*	LR elast. r_i	−0.008 (−2.40)	*-0.008 (-3.00)*	*-0.007 (-1.20)*	*0.002 (0.45)*
LR elast. w_i	−0.003 (−0.20)	*-0.016 (-1.02)*	*0.057 (1.44)*	*-0.215 (-2.27)*	LR elast. w_i	−0.062 (−2.00)	*-0.051 (-1.43)*	*-0.036 (-0.61)*	*-0.329 (-2.25)*
1993-2003					**1993-2003**				
LR elast. p^{oil}_i	−0.027 (−3.55)	*-0.030 (-2.98)*	*-0.018 (-1.73)*	*-0.016 (-1.65)*	LR elast. p^{oil}_i	−0.087 (−2.61)	*-0.079 (-3.10)*	*-0.084 (-1.45)*	*-0.067 (-2.64)*
LR elast. r_i	0.000 (0.05)	*-0.000 (-0.02)*	*-0.002 (-0.72)*	*-0.001 (-0.70)*	LR elast. r_i	−0.003 (−1.09)	*-0.003 (-0.81)*	*-0.003 (-0.41)*	*-0.005 (-1.42)*
LR elast. w_i	−0.004 (−0.30)	*-0.013 (-0.72)*	*0.026 (1.15)*	*-0.216 (-2.33)*	LR elast. w_i	−0.025 (−0.68)	*-0.016 (-0.38)*	*-0.055 (-0.99)*	*-0.267 (-1.98)*
*LR elast. p^{oil}_i	0.32	*0.32*	*0.41*	*0.90*	*LR elast. p^{oil}_i	0.04	*0.01*	*0.28*	*0.02*
*LR elast. r_i	0.00	*0.01*	*0.13*	*0.72*	*LR elast. r_i	0.29	*0.15*	*0.61*	*0.24*
*LR elast. w_i	0.92	*0.78*	*0.32*	*0.98*	*LR elast. w_i	0.39	*0.49*	*0.79*	*0.23*
Sample	Full	*Manuf.*	*Serv.*	*Sector Pr.*	Sample	Full	*Manuf.*	*Serv.*	*Sector Pr.*
N	2714	*1778*	*936*	*1210*	N	2714	*1778*	*936*	*1210*
R^2 second stage	0.19	*0.168*	*0.29*	*0.193*	R^2 second stage	0.139	*0.176*	*0.147*	*0.22*

Notes: t-values in parenthesis. * is the p-value of the null that the two effects remain the same between 1981-1992 and 1993-2003. Full sample is Manufacturing and Services; Manuf. is Manufacturing; Serv. is Services; and Sector Pr. indicates that the oil price is deflated using sectoral price indices (Manuf. only). Sector and country fixed effects are included. Robust standard errors. LR elast. is the long run elasticity of profitability with respect to each independent variable.

Table A4: Regression Equations for Margins, Experiments with Alternative Instruments and Arellano-Bond Estimations (17 sectors, 12 countries, 1981-2003)

Margins $\Delta\pi_{ik,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Independent variables – Second Stage						
$\pi_{ik,t-1}$	−0.201 (−9.571)	−0.215 (−10.368)	−0.217 (−10.356)	−0.215 (−10.470)	−0.216 (−10.427)	−0.256 (−9.433)	−0.087 (−20.257)
$\Delta\pi_{ik,t-1}$	−0.161 (−3.270)	−0.159 (−3.302)	−0.158 (−3.302)	−0.159 (−3.302)	−0.158 (−3.300)	–	−0.061 (−4.228)
$\Delta p^{oil}_{i,t}$	−0.032 (−3.483)	−0.010 (−3.093)	−0.007 (−1.714)	−0.010 (−3.698)	−0.007 (−2.103)	−0.009 (−2.786)	−0.004 (−2.908)
$p^{oil}_{i,t-1}$	−0.008 (−4.079)	−0.016 (−2.902)	−0.017 (−2.840)	−0.016 (−3.756)	−0.017 (−3.060)	−0.016 (−2.861)	−0.002 (−3.254)
$\Delta r_{i,t}$	0.000 (1.177)	0.000 (−1.562)	−0.001 (−1.657)	0.000 (−1.560)	0.000 (−1.801)	0.000 (−1.608)	0.000 (−1.474)
$r_{i,t-1}$	−0.001 (−3.700)	−0.001 (−3.306)	−0.001 (−3.275)	−0.001 (−3.543)	−0.001 (−3.202)	−0.001 (−3.072)	−0.001 (−6.355)
$\Delta w_{i,t}$	0.009 (0.590)	−0.030 (−2.154)	−0.034 (−2.099)	−0.028 (−2.292)	−0.033 (−2.383)	−0.024 (−1.679)	−0.023 (−3.290)
$w_{i,t-1}$	−0.001 (−0.409)	−0.025 (−2.830)	−0.028 (−2.716)	−0.024 (−3.863)	−0.027 (−3.211)	−0.023 (−2.746)	−0.011 (−6.808)
R^2 second stage	0.003	0.114	0.101	0.119	0.105	0.091	
LR elast. p^{oil}_i	−0.042 (−3.72)	−0.075 (−2.96)	−0.078 (−2.92)	−0.073 (−3.68)	−0.077 (−3.10)	−0.061 (−2.93)	−0.027 (−3.26)
LR elast. r_i	−0.005 (−3.36)	−0.004 (−3.30)	−0.004 (−3.28)	−0.004 (−3.45)	−0.004 (−3.20)	−0.003 (−3.09)	−0.006 (−6.09)
LR elast. w_i	−0.007 (−0.41)	−0.115 (−2.86)	−0.127 (−2.77)	−0.111 (−3.74)	−0.124 (−3.22)	−0.091 (−2.80)	−0.122 (−6.64)
	Independent variables – First Stage Oil-Price Equations						
$\pi_{ik,t-1}$	−0.377 (−1.69)	−0.900 (−3.14)	−0.938 (−3.28)	−0.831 (−3.02)	−0.921 (−3.23)	−0.976 (−3.69)	–
$\Delta\pi_{ik,t-1}$	−0.104 (−0.39)	−0.405 (−1.18)	−0.414 (−1.20)	−0.468 (−1.38)	−0.444 (−1.29)	–	–
$\Delta r_{i,t}$	−0.003 (−0.92)	−0.014 (−3.06)	−0.011 (−2.34)	−0.012 (−2.60)	−0.015 (−3.20)	−0.013 (−2.89)	–
$r_{i,t-1}$	0.022 (7.37)	−0.003 (−0.87)	0.002 (0.48)	−0.020 (−4.69)	−0.007 (−1.48)	−0.003 (−0.79)	–
$\Delta w_{i,t}$	−1.322 (−9.79)	−1.933 (−10.64)	−1.969 (−10.65)	−1.729 (−9.76)	−1.933 (−10.67)	−1.921 (−10.72)	–
$w_{i,t-1}$	−1.414 (−23.02)	−1.674 (−20.96)	−1.673 (−21.47)	−1.517 (−19.74)	−1.622 (−20.75)	−1.699 (−21.29)	–
$\Delta Inst_t$	0.375 (15.25)	0.054 (4.63)	0.006 (1.55)	0.056 (9.79)	0.015 (3.41)	0.070 (5.88)	–
$Inst_{t-1}$	0.906 (27.41)	0.026 (1.68)	0.006 (0.93)	−0.014 (−1.72)	−0.007 (−1.03)	0.052 (3.36)	–
$d98$	−0.134 (−6.71)	0.103 (3.77)	0.155 (7.29)	0.058 (2.70)	0.135 (6.14)	0.074 (2.66)	–
R^2 first stage	0.56	0.28	0.28	0.34	0.28	0.28	–
Terrorist Incidents $Inst_t$	OPEC suicide	OPEC non-suic.	OPEC inj.	OPEC fat.	OPEC inj. & fat.	OPEC	OPEC
Kleibergen-Paap LM	0.00	0.00	0.00	0.00	0.00	0.00	–
Anderson-Rubin Wald	0.00	0.00	0.01	0.00	0.02	0.01	–
Kleibergen-Paap F	12.3	40.8	36.7	51.2	42.1	45.6	–
Durbin-Wu-Hausman	0.01	0.02	0.03	0.01	0.04	0.03	–
Sample	Full	Full	Full	Full	Full	Full	Full
N	2714	2714	2714	2714	2714	2714	2231

Notes: t-values in parenthesis. The upper half of the table reports regressions in which the dependent variable is a measure of (changes in) industry profitability, and in which the oil price variable is instrumented. The lower half of the table reports the corresponding first-stage regressions in which the dependent variable is the price of oil. Sector and country fixed effects are included. Robust standard errors. LR elast. is the long run elasticity of profitability with respect to each independent variable. The Kleibergen-Paap LM, Anderson-Rubin Wald and Durbin-Wu-Hausman report the p-values for the tests of underidentification, weak-instrument-robust-inference and exogeneity tests respectively. The Kleibergen-Paap F stat is for the test on weak instruments (critical value is 13.43 for a size distorsion of 5% for the 5% level test, Stock and Yogo (2005)). Arellano-Bond estimation in (7) where the number of lags is chosen to reject autocorrelation of order 2. $d98$ is equal to 1 from 1998 onwards. inj. and fat. indicate injuries and fatalities.

Table A5: Regression Equations for Profits, Experiments with Alternative Instruments and Arellano-Bond Estimations (17 sectors, 12 countries, 1981-2003)

Profits $\Delta\Pi_{ik,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Independent variables – Second Stage						
$\Pi_{ik,t-1}$	−0.293 (−3.626)	−0.301 (−3.941)	−0.302 (−3.981)	−0.303 (−3.974)	−0.304 (−4.001)	−0.298 (−4.123)	−0.112 (−13.509)
$\Delta\Pi_{ik,t-1}$	0.014 (0.108)	0.019 (0.150)	0.020 (0.160)	0.023 (0.183)	0.021 (0.171)	–	0.142 (5.883)
$\Delta p^{oil}_{i,t}$	−0.040 (−1.728)	−0.019 (−2.565)	−0.015 (−1.699)	−0.004 (−0.500)	−0.009 (−1.204)	−0.021 (−2.466)	0.003 (0.787)
$p^{oil}_{i,t-1}$	−0.023 (−4.102)	−0.023 (−1.909)	−0.019 (−1.531)	−0.013 (−1.153)	−0.020 (−1.687)	−0.029 (−2.460)	−0.012 (−5.806)
$\Delta r_{i,t}$	0.000 (−0.020)	−0.001 (−1.055)	−0.001 (−1.057)	−0.001 (−1.564)	−0.001 (−1.456)	−0.001 (−1.185)	−0.002 (−3.583)
$r_{i,t-1}$	−0.003 (−4.814)	−0.003 (−5.055)	−0.002 (−4.781)	−0.002 (−4.121)	−0.002 (−4.656)	−0.003 (−5.373)	−0.002 (−6.744)
$\Delta w_{i,t}$	−0.025 (−1.298)	−0.047 (−2.028)	−0.046 (−1.629)	−0.045 (−2.531)	−0.053 (−2.435)	−0.059 (−2.704)	−0.053 (−2.486)
$w_{i,t-1}$	−0.024 (−3.009)	−0.035 (−1.938)	−0.032 (−1.548)	−0.028 (−1.928)	−0.036 (−2.103)	−0.045 (−2.555)	−0.026 (−5.635)
R^2 second stage	0.076	0.113	0.12	0.129	0.123	0.104	
LR elast. p^{oil}_i	−0.078 (−2.59)	−0.075 (−1.63)	−0.064 (−1.36)	−0.041 (−1.01)	−0.065 (−1.45)	−0.099 (−2.10)	−0.111 (−5.35)
LR elast. r_i	−0.010 (−2.85)	−0.009 (−3.21)	−0.008 (−3.18)	−0.007 (−2.76)	−0.008 (−3.08)	−0.009 (−3.56)	−0.015 (−6.16)
LR elast. w_i	−0.083 (−2.91)	−0.116 (−1.64)	−0.107 (−1.36)	−0.092 (−1.53)	−0.119 (−1.72)	−0.150 (−2.18)	−0.228 (−5.18)
	Independent variables – First Stage Oil-Price Equations						
$\Pi_{ik,t-1}$	−0.405 (−3.15)	−0.545 (−3.05)	−0.568 (−3.16)	−0.460 (−2.73)	−0.524 (−3.02)	−0.506 (−3.28)	–
$\Delta\Pi_{ik,t-1}$	0.486 (4.09)	0.073 (0.43)	0.050 (0.29)	−0.047 (−0.28)	0.028 (0.16)	–	–
$\Delta r_{i,t}$	−0.003 (−1.05)	−0.015 (−3.29)	−0.012 (−2.57)	−0.013 (−2.90)	−0.016 (−3.47)	−0.014 (−3.08)	–
$r_{i,t-1}$	0.022 (7.39)	−0.004 (−1.07)	0.001 (0.25)	−0.021 (−4.96)	−0.008 (−1.73)	−0.004 (−1.02)	–
$\Delta w_{i,t}$	−1.306 (−9.86)	−1.923 (−10.74)	−1.959 (−10.74)	−1.721 (−9.84)	−1.923 (−10.75)	−1.925 (−10.76)	–
$w_{i,t-1}$	−1.414 (−23.20)	−1.680 (−21.22)	−1.680 (−21.72)	−1.519 (−19.83)	−1.627 (−20.98)	−1.708 (−21.46)	–
$\Delta Inst_t$	0.376 (15.27)	0.053 (4.44)	0.005 (1.32)	0.055 (9.47)	0.013 (3.10)	0.069 (5.69)	–
$Inst_{t-1}$	0.910 (27.58)	0.025 (1.60)	0.005 (0.83)	−0.016 (−1.95)	−0.008 (−1.21)	0.052 (3.29)	–
$d98$	−0.125 (−6.25)	0.115 (4.14)	0.168 (7.77)	0.070 (3.16)	0.148 (6.61)	0.084 (2.99)	–
R^2 first stage	0.57	0.28	0.28	0.34	0.28	0.28	–
Terrorist Incidents $Inst_t$	OPEC suicide	OPEC non-suic.	OPEC inj.	OPEC fat.	OPEC inj. & fat.	OPEC	OPEC
Kleibergen-Paap LM	0.00	0.00	0.00	0.00	0.00	0.00	–
Anderson-Rubin Wald	0.00	0.00	0.05	0.24	0.16	0.00	–
Kleibergen-Paap F	11.1	44.1	40.8	52.8	44.7	49.8	–
Durbin-Wu-Hausman	0.04	0.01	0.02	0.20	0.12	0.01	–
Sample	Full	Full	Full	Full	Full	Full	Full
N	2714	2714	2714	2714	2714	2714	2231

Notes: t-values in parenthesis. The upper half of the table reports regressions in which the dependent variable is a measure of (changes in) industry profitability, and in which the oil price variable is instrumented. The lower half of the table reports the corresponding first-stage regressions in which the dependent variable is the price of oil. Sector and country fixed effects are included. LR elast. is the long run elasticity of profitability with respect to each independent variable. Robust standard errors. The Kleibergen-Paap LM, Anderson-Rubin Wald and Durbin-Wu-Hausman report the p-values for the tests of underidentification, weak-instrument-robust-inference and exogeneity tests respectively. The Kleibergen-Paap F stat is for the test on weak instruments (critical value is 13.43 for a size distorsion of 5% for the 5% level test, Stock and Yogo (2005)). Arellano-Bond estimation in (7) where the number of lags is chosen to reject autocorrelation of order 2. $d98$ is equal to 1 from 1998 onwards. inj. and fat. indicate injuries and fatalities.

Appendix B: The MIPT Database on Terrorism

The *MIPT Terrorism Knowledge Database* is a resource for comprehensive research and analysis on global terrorist incidents, terrorism-related court cases, and terrorist groups and leaders. It covers the history, affiliations, locations, and tactics of terrorist groups operating across the world, with over 35 years of terrorism incident data and hundreds of group and leader profiles and trials. All information was taken from open source materials, such as newspapers and every effort was made to verify the accuracy of the information found in the reports.

The *Memorial Institute for the Prevention of Terrorism (MIPT)* is a non-profit institution dedicated to deterring and preventing terrorism on US soil or mitigating its effects. Along with MIPT, the Terrorism Knowledge Base team consists of *DeticaDFI*, a Washington DC-based research, analysis, and knowledge management company, the *RAND Corporation*, a non-profit institution that helps improve policy through research and analysis, and academics at the University of Arkansas.

It is the RAND Corporation that determines whether or not a given act of violence constitutes an act of terrorism. The definition of terrorism used by the MIPT database is the following:

"For the purposes of the database, terrorism is defined by the nature of the act, not by the identity of the perpetrators or the nature of the cause. Terrorism is violence, or the threat of violence, calculated to create an atmosphere of fear and alarm. These acts are designed to coerce others into actions they would not otherwise undertake, or refrain from actions they desired to take. All terrorist acts are crimes".

Appendix C: Terrorist Incidents

Middle East countries include:

Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Qatar, Saudi Arabia, Syria, Oman, Turkey, United Arab Emirates, West Bank/Gaza, Yemen.

OPEC countries include:

Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates and Venezuela.

Oil producing countries include:

Africa: Algeria, Angola, Chad, Congo, Egypt, Guinea, Gabon, Libya, Mauritania, Nigeria, South Africa, Sudan, Tunisia (no data for Cameroon).

Asia: Azerbaijan, China, Georgia, Kazakhstan, Malaysia, India, Indonesia, Pakistan, Philippines, Russia, USSR, Thailand, Turkmenistan, Uzbekistan, Vietnam (no data for Brunei).

Australasia: Australia, New Zealand, Papua New Guinea, East Timor.

Europe: Bulgaria, Croatia, United Kingdom, Norway, Lithuania, Poland, Romania, Serbia, Ukraine (we excluded Austria, Denmark, Germany, Ireland, Italy and the Netherlands).

Persian Gulf: Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen (no data for Oman).

North America: United States, Canada, Mexico.

Central America and the Caribean: Cuba, Guatemala (no data for Barbados, Belize and Trinidad and Tobago).

South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela.