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PRECIO DEL PETRÓLEO: TENSIONES GEOPOLÍTICAS Y EVENTOS DE OFERTA*

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Abstract

The impact on oil prices of geopolitical tensions and oil supply-side events is examined. Using a GARCH model on daily oil price data, we find that, when these events actually occur -10% frequency- the geopolitical events explain around 3/4 of daily oil returns forecasted by the model, and oil supply-side events explain 2/3. When there is no occurrence of these events, financial factors (i.e. dollar fluctuations and market risk perception changes) explain around 4/5 of the daily return of oil price forecasted in average. Variance of oil return is highly persistent and these events explain no more than 10% of the daily conditional variance on the day the events actually occur.

Resumen

Este trabajo examina el impacto en el precio del petróleo de las tensiones geopolíticas y eventos relacionados a la oferta de crudo. Utilizando un modelo GARCH se encuentra que, cuando estos eventos ocurren –con una frecuencia aproximada de 10%- las tensiones geopolíticas explican alrededor de 3/4 de los retornos diarios del precio proyectado por el modelo, y que los eventos provenientes del lado de la oferta explican alrededor de 2/3. Cuando no hay presencia de estos eventos, los factores financieros son la principal variable económica que mueve el precio proyectado, explicando en promedio alrededor de 4/5 de la variación diaria proyectada. Se observa una alta persistencia de la varianza de los retornos sobre el petróleo. Los eventos geopolíticos y los shocks de oferta no explican más del 10% de la varianza condicional de los retornos diarios el día que ocurre un evento.

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1. Introducción

Por su naturaleza estratégica, el precio del petróleo es permanentemente afectado por consideraciones distintas a sus fundamentales económicos. Son importantes en este sentido, en primer lugar, las perturbaciones de origen político, asociados a la seguridad nuclear y/o la provisión del crudo para las economías industriales; y en segundo lugar, las decisiones o anuncios por el lado de la oferta, asociados en parte a la Organización de Países Exportadores de Petróleo (OPEP) -mecanismos de asignación de cuotas de producción y los incentivos que tienen sus países integrantes a incumplir estos programas de producción-, los anuncios de nuevas inversiones, exploraciones o aumentos de producción países productores fuera de la OPEP, y también las decisiones de EE.UU. respecto del uso de sus reservas estratégicas del crudo. En este contexto, es interesante responder a la pregunta de qué efecto tienen sobre el nivel y la volatilidad del precio del petróleo eventos noticiosos de este tipo.

Existe literatura que analiza los determinantes del precio del petróleo¹ y un conjunto que considera también su volatilidad usando datos en frecuencia diaria, dentro de los cuales se enmarca este trabajo. En este grupo, Choi y Hammoudeh (2010a) estudia la persistencia de la volatilidad en el mercado del crudo mediante modelos GARCH. Choi y Hammoudeh (2010b) estudian la volatilidad del petróleo y otros commodities encontrando un incremento de la correlación entre ellos después de la guerra de Iraq y diferentes respuestas frente a crisis financieras y geopolíticas. En una línea similar, Lunieski (2009) estima un modelo GARCH para un índice de precios de materias primas usando como variable de incertidumbre sobre la tasa de política monetaria de Estados Unidos el error de proyección de contratos futuros sobre dicha tasa, encontrando que esta incertidumbre tiene un efecto sobre la ecuación de volatilidad pero no ayuda a predecir el precio. Kaufmann (2004) estudia como la OPEC afecta los precios usando el test de causalidad de Granger. Respecto al impacto del terrorismo sobre precios de activos, Carrera y Mussio (2009) analizan el impacto de hechos terroristas sobre los retornos accionarios a través de un estudio de eventos, considerando variables binarias que indican el día en que ocurre el hecho y a través de test de quiebre estructural buscan impactos de largo plazo. De manera similar, Chen y Siems (2003) y Karolyi y Martell (2006) usan la metodología de retornos anormales para identificar el impacto de eventos terroristas sobre los mercados de un grupo de economías.

En este trabajo, se examina el impacto de noticias relacionados a tensiones geopolíticas y eventos relacionados a la oferta de crudo sobre precio del petróleo, para esto se estima un modelo GARCH usando los marcadores Brent y WTI. Nuestros principales hallazgos se resumen en que los eventos geopolíticos explican alrededor de $\frac{3}{4}$ de la variación diaria del precio proyectado por el modelo. Por su parte, los eventos provenientes de la oferta explican alrededor de $\frac{2}{3}$ de esta variación. Cuando no hay presencia de estos eventos, los factores financieros son el principal factor económico que mueve al precio y explican alrededor de $\frac{4}{5}$ de la variación diaria del precio proyectado. En cuanto al comportamiento de la varianza de los retornos sobre el petróleo, se observa una elevada persistencia, lo cual

¹ Ver López & Riquelme, 2010; Stefanski, 2011; Baumeister y Kilian (2011); Kilian y Murphy (2010); Lippi y Nobili (2008),

provoca una predominancia del impacto de los valores pasados de la propia varianza sobre el impacto de shocks nuevos. En línea con esto, los eventos geopolíticos y los shocks de oferta no explican más del 10% de la varianza diaria el día que ocurre un evento. No obstante, estas contribuciones cambian dramáticamente según el evento que se trate.

La estructura del trabajo es la siguiente, luego de esta introducción se introduce el conjunto de eventos bajo estudio. La sección 3 trata la metodología econométrica y la 4 revisa los principales resultados. Por último, en la sección 5 se detallan las principales conclusiones y comentarios finales.

2. Tensiones Geopolíticas y Eventos de Oferta

Para analizar el rol de las tensiones geopolíticas en medio oriente y los eventos de oferta, primero es necesario identificarlos. Para ello, se examinó diversas fuentes noticiosas tales como Bloomberg, Wall Street Journal, Financial Times, IEA-DOE, entre otras, para establecer cronologías de eventos que a priori se consideran significativos para el mercado mundial del petróleo durante el período 1995-2012.

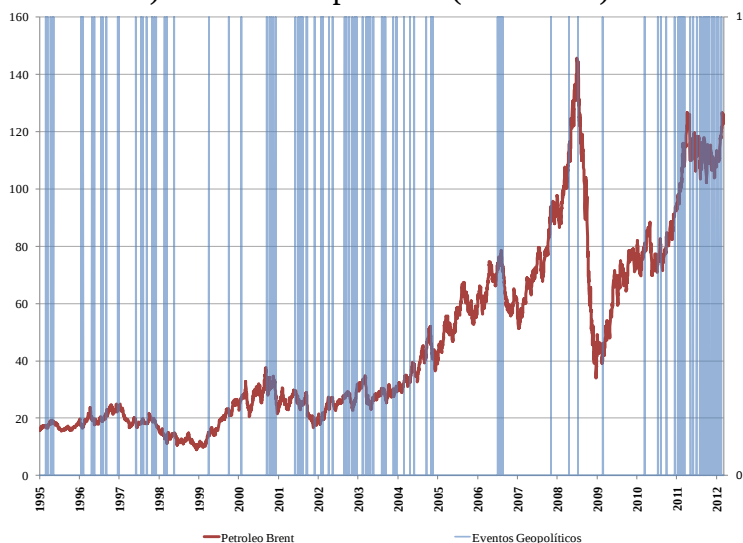
En la identificación de los eventos geopolíticos, se consideraron episodios de inestabilidad política en Medio Oriente y en otras zonas petroleras, actos de violencia y terrorismo contra fuentes de producción petrolera, o contra países del mundo árabe, anuncios de guerra en la zona, decisiones de las Naciones Unidas relacionadas con los principales países productores de crudo, etc. En el caso de los eventos vinculados a las decisiones de oferta, se consideró anuncios de modificación de las cuotas de producción por parte de la OPEP, anuncios por parte de EE.UU. respecto del uso de sus reservas estratégicas de petróleo, noticias de nuevas exploraciones, e inversiones o aumento de capacidad productiva de países y/o empresas productoras de petróleo. Un recuento de estos eventos desde 1995 hasta la actualidad se reporta en el Anexo 2, los cuales se ilustran en relación a la evolución del precio del petróleo en la Figura 1. Dentro de la muestra de 4486 cierres diarios de precios, que corresponden al periodo entre 1 de enero 1995 y 9 de marzo 2012, se identificaron 144 eventos de naturaleza geopolítica y 104 anuncios asociados a la oferta de crudo.

Como se observa en la Figura 1, existe un alto grado de agrupamiento ("*clustering*") de los eventos en torno a ciertas fechas y, por lo tanto, es razonable establecer un conjunto de categorías para entender mejor la naturaleza de estos eventos².

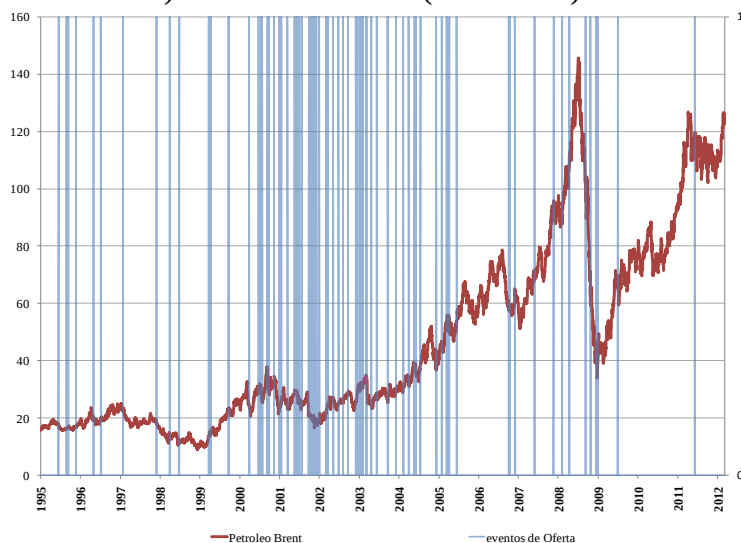
² Considerando que cada noticia es por definición un evento único, se escoge la estrategia de agrupamiento por sobre la individualización de eventos. La razón es que esta última no sería informativa para cuantificar el efecto de un evento nuevo, mientras que un grupo de noticias del mismo tipo permite estimar un efecto promedio, que si permite cuantificar el impacto de un evento nuevo, de naturaleza individual pero perteneciente al mismo tipo.

Figura 1: Eventos Geopolíticos y de Oferta en el Mercado del Petróleo

a) Eventos Geopolíticos (147 fechas)



b) Eventos de Oferta (104 fechas)



Fuente: Autores en base a *Bloomberg* e identificación de eventos a través de prensa

De este modo, a nuestro juicio podemos definir las siguientes categorías³:

- (i) **Iraq (UN Oil for Food Program) (-).** Programa de las NU establecido en 1995 como respuesta a los argumentos de ciudadanos iraquíes afectados por las sanciones económicas impuestas con posterioridad de la Guerra del Golfo Pérsico de 1991. El programa permitió a Iraq vender petróleo en los mercados mundiales a cambio de alimentos, medicinas y otras ayudas humanitarias, cautelando que Iraq no aumentara su capacidad militar. El programa terminó el año 2003. Las noticias referentes a estos programas consisten en resoluciones de las UN para permitir una cuota determinada por parte de Irán en el mercado, y por tanto su impacto esperado es similar al de un aumento potencial de la oferta disponible de petróleo.
- (ii) **Relaciones EE.UU.-Libia e Irán (1996-2004) (+).** Son eventos noticiosos relacionados con el Acta de sanciones a Irán y Libia promulgadas en 1996. Esta ley impuso sanciones económicas a las empresas que hicieran negocios con Irán y Libia. Este programa es una respuesta al programa nuclear y apoyo de Irán a grupos terroristas (Hezbollah, Hamas y Jihad). El 19 de Diciembre de 2003, Libia anunció su intención de abandonar sus programas nucleares, así como de armamento de destrucción masiva y comienza una etapa de cooperación con EE.UU.
- (iii) **Guerra de Iraq (2003) (+).** Son hechos noticiosos que se refieren a la invasión de Iraq por parte de EE.UU. en marzo de 2003 y la captura de Saddam Hussein en diciembre de 2003.
- (iv) **Iraq post Guerra de Iraq (-).** Eventos noticiosos relacionados con la instalación del gobierno provisional en Iraq y el restablecimiento de las relaciones de Iraq con el resto del mundo.

³ Dentro del paréntesis, “+” significa que a priori se espera un impacto positivo de dicha categoría sobre el nivel de precio y su varianza, mientras que “-“ representa lo contrario.

- (v) **Irán post Guerra de Iraq (+).** Eventos asociados con el resurgimiento de los temores nucleares durante el gobierno de Mahmoud Ahmadinejad que comienza en agosto de 2005.
- (vi) **Ataques Terroristas (+).** Son eventos que se refieren a ataques terroristas sobre instalaciones productivas en el medio oriente, o sobre objetivos de grupos terroristas. Se incluye especialmente en esta categoría el ataque a las Torres Gemelas de septiembre de 2001.
- (vii) **Guerra del Líbano (2006) (+).** También llamada la Guerra de Israel Hezbollah o la Guerra de Julio es un conflicto de 34 días en el Líbano que comienza el 12 julio de 2006 y finaliza el 14 de agosto del mismo año con la declaración de las NU para un cese del fuego. El conflicto formalmente finaliza el 8 de septiembre de 2006 cuando Israel levanta el bloqueo naval sobre el Líbano
- (viii) **Primavera Árabe (2011) (+).** Es la ola de demostraciones y protestas que irrumpieron en el mundo árabe el 18 de diciembre de 2010 en Túnez. A la fecha, los gobiernos de Túnez, Egipto, Libia, y Yemen fueron derrocados; movimiento de alzamientos civiles han ocurrido en Bahrein y Siria; y masivos movimientos de protestas en Argelia, Iraq, Jordania, Kuwait, Marruecos y Omán, y protestas menores en el Líbano, Mauritania, Arabia Saudita, Sudan y Sahara Occidental
- (ix) **Anuncios Expansivos OPEP (-).** Corresponden a anuncios de aumentos de cuotas de producción
- (x) **Anuncios Restrictivos OPEP (+).** Anuncios de reducciones o mantenciones de las cuotas de producción.
- (xi) **Uso de SPR (-).** La Strategic Petroleum Reserve (SPR) es la reserva de petróleo de emergencia más grande del mundo, cuya capacidad alcanza más de 700 millones de barriles. Aquí se reflejan los anuncios por parte de EE.UU. de vender parte de estas reservas con fines de estabilización del mercado o para emergencias nacionales.
- (xii) **Noticias Países No OPEP (+).** Son noticias de ampliación de la producción en Rusia principalmente.
- (xiii) **Anuncios Nuevas Inversiones (-).** Son noticias relacionadas a descubrimientos, exploraciones y asociaciones entre empresas para explotar zonas en Medio Oriente.

Los 248 eventos identificados se distribuyen entre las distintas categorías según resume la tabla 1.

Tabla 1: Eventos identificados según clasificación*

a) Tensiones Geopolíticas			b) Eventos de Oferta	
Eventos Geopolíticos	34	(23%)	Anuncios Expansivos OPEP	20 (19%)
Iraq (UN Oil for Food Program)	16	(11%)	Anuncios Restrictivos OPEP	63 (61%)
Relaciones EE.UU.-Libia e Irán pre 2001	23	(16%)	Uso de SPR	5 (5%)
Guerra de Iraq (2003)	5	(3%)	Noticias sobre Países no OPEP	3 (3%)
Irán por Guerra de Iraq	12	(8%)	Anuncios Nuevas Inversiones	13 (13%)
Ataques Terroristas	23	(16%)		
Guerra del Líbano (2006)	8	(5%)		
Primavera Árabe (2011)	26	(18%)		

* Número de eventos y en paréntesis el porcentaje respecto al total de días con eventos.

Fuente: Autores usando Bloomberg, Wall Street Journal, Financial Times e IEA-DOE.

A partir de estas categorías, construimos variables dicotómicas que toman un valor 1 si el evento en la categoría particular ocurre durante ese día, y 0 de otra forma. Asumimos que un tipo de estos eventos afecta al precio en un día determinado, el cual corresponde al día de anuncio y puede tener un efecto positivo o negativo. Por su naturaleza, los eventos de oferta, en ocasiones pueden coincidir con eventos geopolíticos. Por ello, podría existir cierta colinealidad que asumimos acotada⁴.

En general, los efectos que estos eventos tienen sobre el precio dependerá de si el mercado percibe que existe algún impacto sobre la producción futura del crudo, por lo tanto, si el evento refleja mayor (menor) disponibilidad futura del crudo, el efecto sobre el precio será negativo (positivo). El impacto de los eventos geopolíticos se canaliza a través de la percepción por parte del mercado respecto de si las tensiones (distensiones) son disruptivas para la estabilidad de la región, y por lo tanto, ponen en riesgo la disponibilidad de la oferta crudo. De este modo, eventos que contengan información respecto de una mayor tensión geopolítica se espera que tengan un impacto positivo sobre el precio y viceversa. En el caso de los anuncios de oferta, se esperan efectos positivos de parte de los anuncios restrictivos por parte de la OPEP, y efectos negativos provenientes de anuncios expansivos de la OPEP, sobre nuevas inversiones, y sobre usos de la SDR. Por el lado de la varianza, como estos anuncios tienen el carácter de *shocks*, se espera que tengan un efecto positivo sobre la varianza condicional.

3. Metodología

El rol de las tensiones geopolíticas y los eventos de oferta es estimado considerando un modelo estilizado para el precio del petróleo. Este usa datos diarios para los precios de los marcadores Brent y WTI durante el período 1995-2012⁵. Habitualmente se consideran los siguientes determinantes para el precio del petróleo, los cuales son agrupados en un vector que llamaremos X_t

- (i) Índice Baltic Dry: Indicador de los cargos de transporte marítimo que se encuentra altamente correlacionado con la actividad industrial, el cual aproxima a su vez el consumo global y es obtenida desde Bloomberg. Se espera que su relación con el precio sea positiva.
- (ii) Nivel de inventario en bolsa: el cual a falta de una medida global se utiliza la información reportada semanalmente por el Departamento de Energía de Estados Unidos para esta economía. Se espera que afecte negativamente los precios.
- (iii) La tasa de interés real: Esta se aproxima utilizando la T-Bill a 1 año ajustada por la inflación mensual de EE.UU, ambas obtenidas desde Bloomberg. Su impacto debería ser inverso sobre el precio del petróleo.
- (iv) Dólar multilateral: Corresponde al índice construido por la FED en base al valor de una canasta de moneda, en que aumentos del índice corresponden a apreciaciones del

⁴ La estimación mediante grupos de eventos permite evitar la multicolinealidad perfecta que impide la estimación.

⁵ No obstante disponemos de datos diarios para todas la variables desde 1990, la serie de dólar multilateral con frecuencia diaria esta sólo disponible desde 1995, lo cual limita la extensión de la muestra utilizada finalmente.

dólar y se obtiene de Bloomberg. Su impacto se canaliza principalmente a través del consumo. En particular, una depreciación de dólar aumenta los precios locales del petróleo importado en EE.UU. lo que reduce su consumo y hace posible que todo el resto del mundo consuma más. Dado que el consumo de EE.UU. es relativamente menor que el del resto del mundo, es de esperar que el consumo aumente a nivel total y presione al alza los precios⁶.

- (v) Índice VIX: Corresponde a la volatilidad implícita inferida de las opciones sobre el S&P500 obtenido desde Bloomberg. Esta variable de carácter financiero captura la percepción de riesgo por parte de los inversionistas. Una percepción más negativa respecto del riesgo inducirá a los inversionistas a proteger sus portafolios aumentando su exposición a activos más seguros y reduciendo la de activos riesgosos, incluidas las materias primas. Como consecuencia, la demanda por estos activos se reduce y provoca una caída del precio spot.
- (vi) Diferencia de precio entre marcadores WTI y Brent: Se ha encontrado que ambos mercados se encuentran conectados pero en ciertas circunstancias específicos estos precios pueden desalinearse, y para capturar el posible arbitraje entre los precios se incluye esta medida en base a los precios spot que entrega bloomberg.
- (vii) Diferencia entre precio spot y su tendencia: Se incluye un término de desalineamiento entre el precio spot y el precio de largo plazo, similar a un término de corrección de errores. En particular, se espera que cuando el precio spot se ubique por encima del precio de largo plazo, la variación del precio se reduzca o sea negativa, para asegurar que el precio se dirija gradualmente a sus fundamentales. La medida corresponde a la desviación del nivel del precio spot respecto de una estimación del precio de largo plazo, medido a través de un filtro HP con un parámetro de suavidad igual a 1.400.000.000 usando datos desde Bloomberg.
- (viii) Para captar la persistencia de los precios, se incluyen los rezagos de los precios en la especificación⁷.

La alta volatilidad en los datos de frecuencia diaria sugiere modelar las características del precio del petróleo considerando su nivel y varianza. Para ello se usa un modelo GARCH, ya que mientras el modelo de regresión lineal clásico asume errores homocedásticos, en los cuales la varianza del término de error es idénticamente distribuida en la data, el modelo GARCH trata la varianza como heterocedástica y busca modelarla. Este tipo de modelos, ampliamente aplicados en el campo de las finanzas, permite estimar factores causales de esta volatilidad. Este modelo fue introducido por Bollerslev (1986), ampliando el modelo ARCH original de Engle (1982), aumentando la ecuación de varianza para incluir una proyección de esta desde el valor previo.

La especificación econométrica que estimamos se describe como un $GARCH(n,m)$ de la siguiente forma:

$$(1) \Delta P_t = \sum_{i=1}^k b_i X_{it} + \varepsilon_t$$

⁶ No obstante. Las fluctuaciones del dólar también afectan a los precios a través de su impacto en los costos de producción. Una depreciación del dólar reduce los costos marginales de producción, y consecuentemente, aumenta la producción.

⁷ En la tabla de resultados no se reportan por resultar no significativos.

$$(2) \sigma_t^2 = \alpha_0 + \underbrace{\sum_{i=1}^n d_i \varepsilon_{t-i}^2}_{ARCH} + \underbrace{\sum_{i=1}^m c_i \sigma_{t-i}^2}_{GARCH} + \sum_{i=1}^k h_i Z_{t-i} + \sum_{i=1}^k g_i X_{t-i}$$

La ecuación (1) es conocida como la ecuación de la media y la ecuación (2) la especificación para la varianza condicional de las innovaciones. Como se observa, en la ecuación de la varianza se incluyen los determinantes de la media (X_{it}) y otras variables (Z_{t-i}) que tienen solo un efecto sobre la varianza y no sobre la media. El coeficiente c_i representa el i -ésimo efecto GARCH o de la varianza pasada, en tanto que d_i captura el i -ésimo efecto ARCH o de los shocks pasados. La suma $\sum_{i=1}^m (c_i) + \sum_{i=1}^n (d_i)$ mide el grado de convergencia al equilibrio de largo plazo o la persistencia de la volatilidad del precio. Un valor alto de esta suma indica una convergencia lenta o alta persistencia.

4. Resultados

La Tabla 2 presenta los resultados de la estimación del modelo para la media y varianza de los cambios en el precio del petróleo Brent y WTI⁸. Con fines de simplificación, se reportan sólo las versiones más parsimoniosas encontradas a partir de un proceso de reducción de general a particular. Los test de diagnóstico de los residuos en el panel inferior de la Tabla 2 indican que el modelo contiene residuos que son homocedásticos y sin correlación serial.

⁸ Los test ADF y PP (no reportados) para probar la presencia de raíces unitarias indican que las series de precios no son estacionarias, mientras que las diferencias de sus logaritmos si lo son al 5%. Para los regresores en X, en todos los casos a excepción del desalineamiento y la tasa de interés real el orden de integración es unitario, por lo que son agregados usando las primeras diferencias.

Tabla 2: Modelo GARCH (1,1)⁹
Muestra: 1995-2012
Variable Dependiente: $\Delta \text{Log}(\text{precio})$

Variable	r _z g	Petróleo Brent		Petróleo WTI	
		Media	Varianza	Media	Varianza
$\Delta \text{Tasa Real}$	1	0.000		0.003	
$\Delta \text{Dólar Multilateral}$	0	-1.158 ***		-1.370 ***	
$\Delta \text{inventarios}$	3	-0.226 ***		-0.299 ***	
$\Delta \text{actividad}$	1	0.014		0.021	
ΔVIX	0	-0.002 ***		-0.002 ***	
EC	1	-0.016 ***		-0.017 ***	
Desalineamiento ($P_i - \alpha P_i^{LP} - (1-\alpha) * P_j$)	1	0.727 ***		0.691 ***	
Desalineamior WTI-Brent	1		0.000001 ***		0.00002 **
D. Iraq (UN Oil-Food Program)		-0.006	0.000033	-0.008	0.00004
D. Ley de sanciones contra Irán y Libia (+)		-0.013 ***	0.000006	-0.005	-0.00018
D. Ley de sanciones contra Irán y Libia (-)		-0.003	0.000008	0.001	-0.00005
D. Ataques Terroristas		0.006	0.000096 ***	0.009	0.00011 ***
D. Guerra de Iraq (2003)		-0.001	0.000014	0.004	0.00004
D. Iran post Guerra Iraq		0.003	0.000012	0.005	-0.00002
D. Iraq post Guerra Iraq		0.021	0.000043	0.025	0.00016
D. Guerra del Libano (2006)		0.014 ***	0.000019	0.010 **	0.00001
D. Primavera Arabe		0.006	0.000033	0.005 **	0.00003
D. Anuncios OPEP (+)		-0.004	0.000018	-0.007	0.00002 *
D. Anuncios OPEP (-,0)		0.002	0.000002	0.002	0.00003
D. Uso de SPR			0.000055		0.00002
D. Anuncios Nuevas Inversiones		-0.005	0.000056	-0.008	0.00002
D. Crisis		0.009	0.000008	0.011	0.00001
C			0.000003 **		0.00001
ARCH	1		0.031920 ***		0.03709 ***
GARCH	1		0.960157 ***		0.94484 ***
DW			2.00		1.98
F (Heterocedasticidad)			0.87		2.59

Nota: Errores modelados usando distribución de errores generalizada. Significancia al 10%*; 5%**; 1%***.

Fuente: Estimación de los Autores

En la especificación para las media de los retornos, los signos de los coeficientes asociados a los factores económicos (financieros y físicos) son coherentes con la teoría, salvo el caso de la tasa de interés real para el petróleo WTI, el cual aparece con signo positivo pero no estadísticamente significativo. En el caso de la variable que utilizamos como proxy de la escala de la demanda se encuentra un efecto positivo pero no significativo. El indicador de cargo navieros tiene una correlación con la actividad de alrededor de 60%, lo cual en parte puede explicar la significancia. No obstante, es posible que los efectos de la actividad tomen más tiempo en tener impacto y por lo tanto no sean perceptibles para la frecuencia de

⁹ Se examina la presencia de un componente ARCH antes y después de la estimación del modelo GARCH(1,1) descartando su permanencia, lo cual se interpreta como señal que la ecuación de varianza está bien especificada.

datos diarios que estamos utilizando en este trabajo. Respecto del dólar multilateral, los inventarios y de la percepción de riesgo, se observa que el signo, la magnitud y la significancia estadística de los respectivos coeficientes resultaron ser robustos a las especificaciones y metodologías utilizadas.

La especificación incluye un término de desalineamiento (d^i) que considera desviaciones respecto de un promedio ponderado entre el precio de largo plazo del marcador respectivo (i) y el precio del marcador sustituto (j), i.e. $d^i = P^i - \alpha P^{i,LP} - (1-\alpha)P^j$ con $i=WTI$ y $j=Brent$ o viceversa según corresponda. El coeficiente de este término de desalineamiento es robustamente significativo y similar para ambos marcadores.

En relación a las variables dicotómicas asociadas a las noticias geopolíticas y de oferta, se observa los signos esperados para los marcadores WTI y Brent en los casos de los eventos asociados al programa de las Naciones Unidas *Oil for Food* para Iraq, las noticias de mayor distensión en las relaciones entre EE.UU. e Irán y Libia, los ataques terroristas, la Guerra del Líbano de 2006, la Primavera Árabe de 2011, los anuncio expansivos y restrictivos de la OPEP y los anuncios de nuevas inversiones. En algunos casos, no obstante, los coeficientes no son estadísticamente significativos. Ello puede explicarse por la alta colinealidad de los datos en frecuencia diaria, lo cual típicamente obscurece el cálculo de los errores estándar de los coeficientes.

Existen disparidades en dos casos: el impacto de las mayores tensiones entre EE.UU. e Irán y Libia y la Guerra de Iraq de 2003. Para el caso del Brent, aparentemente el establecimiento y las nuevas informaciones posteriores respecto de la Ley de Sanciones de EE.UU. contra Irán y Libia tuvieron un efecto favorable sobre el precio, y la distinción entre noticias positivas y negativas parece no ser relevante. Esta última si parece ser relevante para el petróleo WTI, el cual respondió a la baja cuando hubo noticias de mayor distensión entre estos países y al alza cuando la tensión incrementó. En el caso de los coeficientes asociados a la Guerra de Iraq en la especificación para el Brent es negativo y es positivo en el caso de la especificación para el WTI. Una posible interpretación de este resultado es que el petróleo Brent es un precio referencial para el mercado europeo, el cual es provisto principalmente del crudo proveniente del Medio Oriente. En consecuencia, el petróleo Brent tiende a ser más sensible a las turbulencias en la región. En este sentido, la Guerra de Iraq en la medida que constituye un restablecimiento de la capacidad productiva petrolera para las economías occidentales tiene el efecto económico de un shock de oferta positivo para Europa. Para el caso de EE.UU. como los efectos del Medio Oriente no tienen efectos perceptibles sobre la capacidad productiva su efecto es equivalente al de cualquier otro evento de mayor tensión geopolítica, y por tanto su impacto es positivo.

En la especificación para la varianza condicional, se observa que el impacto de la varianza pasada y de los shock pasados son significativamente positivos. Dado los coeficientes se verifica que el impacto de las varianzas pasadas predominan por sobre los shocks pasados (i.e alrededor de 0.94 vs 0.04). Esto significa que las varianzas pasadas y no los shocks deberían ser usados para predecir las varianzas en el futuro. Las estimaciones también sugieren que la varianza es persistente y converge lentamente hacia el equilibrio. Lo anterior significa que los shocks en la media tienen una duración de 1 día ($=1/(1-0.04)$) pero si estos impactan la varianza pueden persistir por 16 días ($=1/(1-0.94)$). Se observa

también todos los eventos tienen un impacto positivo sobre la varianza de las variaciones diarias del precio, salvo en el caso de las tensiones entre EE.UU. e Irán y Libia y la Guerra de Iraq.

Como se indicó anteriormente, el objetivo en esta sección es cuantificar el rol que cumple las tensiones geopolíticas y los anuncios por el lado de la oferta en la determinación del precio del petróleo y en la varianza condicional de los retornos del precio. Con ese fin hemos desarrollado un ejercicio de descomposición histórica que consiste en el cálculo de la parte explicada por las variables independientes dentro de la muestra utilizando el modelo estimado para el petróleo WTI y para el petróleo Brent¹⁰. En la Tabla 3 se reportan los resultados, en donde se distinguen los factores financieros (dólar, tasas de interés y VIX), físicos (actividad, inventarios), inerciales (desalineamientos rezagados) y el efecto del evento propiamente tal. Asimismo, se analiza mediante tres submuestras, distinguiendo entre días con presencia de eventos geopolíticos (2.8% de la muestra), eventos de oferta (2.1% de la muestra) y días que no tienen eventos (95.1% de la muestra).

Según se expone en la Tabla 3, considerando primero la ecuación de los media, los eventos geopolíticos cuando suceden explican una parte significativa de la variación diaria. Se observa que cuando los eventos geopolíticos ocurren, en promedio estos explican entre el 73% y el 81% de la variación diaria proyectada para el Brent y para el WTI respectivamente. Se observa que en cada evento geopolítico hay diferencias en la magnitud de su impacto según se trate del WTI y del Brent, en donde particularmente se destaca el caso de la Guerra de Iraq, cuyas noticias tuvieron mayor impacto en el WTI que en el Brent. Los factores financieros explican un 27% para el Brent y un 19% en el caso del WTI. Ello se extiende a cada una de los eventos considerados. Sin embargo, en los días en que no hay eventos, estos factores explican más de un 90% de la variación diaria proyectada. El principal factor detrás es el dólar multilateral, reflejando la ya conocida alta sensibilidad del precio a los shocks en la moneda norteamericana.

Además de las contribuciones que explican el nivel de precio proyectado, es interesante también cuantificar que proporción de la varianza es atribuible a las tensiones geopolíticas y los eventos de oferta. Con ese fin se obtiene la varianza condicional en el período de estimación 1995-2012. Para medir el impacto marginal de las tensiones se utilizó el coeficiente correspondiente a la variable dicotómica en la ecuación de varianza. La mediana de las contribuciones se exponen en la Tabla 3, donde en promedio, cuando ocurren, los eventos geopolíticos explican alrededor de 8% de la varianza condicional del WTI, y un 7% en el caso del Brent. Los eventos de oferta explican una proporción menor comparado con los eventos geopolíticos para ambos marcadores de petróleo.

¹⁰ Este cálculo no considera el error estocástico del modelo, razón por la cual las incidencias explican el 100% del movimiento.

Tabla 3: Precio del Petróleo: Descomposición Histórica (en porcentajes)
Muestra: 1995-2012

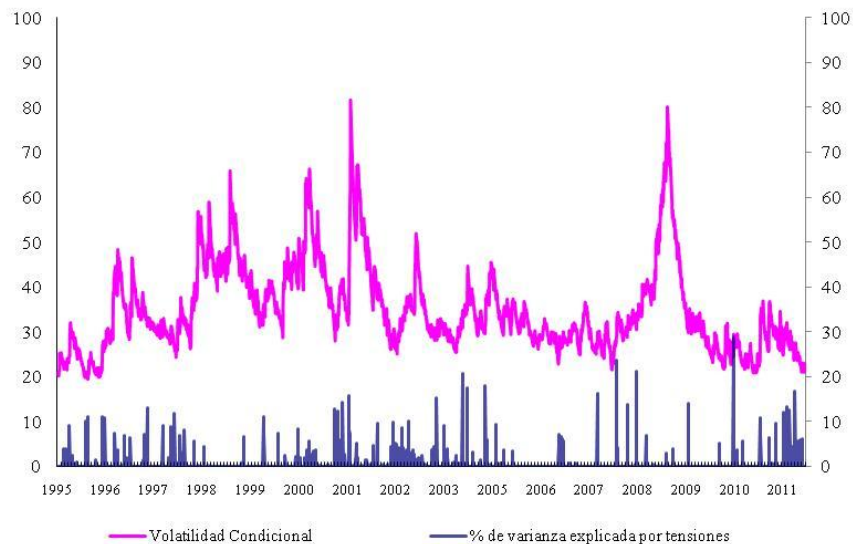
Variable	Petróleo Brent					Petróleo WTI				
	Media				Varianza	Media				Varianza
	Financieros	Físicos	Inercia	Evento		Financieros	Físicos	Inercia	Evento	
A. EVENTOS GEOPOLÍTICOS	27.7	0.4	-1.2	73.1	6.8	18.5	0.5	-0.5	81.5	7.8
Iraq (UN Oil-Food Program)	10.2	0.0	-5.6	95.4	6.8	5.7	-0.1	-6.5	100.9	7.2
Relaciones EE.UU con Irán y Libia	3.7	0.1	-4.5	100.7	2.2	37.7	-0.2	-6.9	69.4	-41.4
Ataques Terroristas	27.5	0.2	3.1	69.2	13.4	21.3	0.5	0.9	77.3	14.3
Guerra de Iraq (2003)	90.1	1.7	-4.9	13.2	2.9	0.2	0.9	6.2	92.7	6.8
Iran e Iraq post Guerra Iraq	57.2	-0.2	1.2	41.7	6.7	43.4	0.6	-0.9	56.9	-0.4
Guerra del Libano (2006)	-12.7	0.5	-0.7	112.9	6.1	-20.5	1.2	0.0	119.3	3.0
Primavera Arabe	18.0	0.7	2.9	78.3	9.3	42.0	0.4	3.4	54.1	7.6
B. EVENTOS DE OFERTA	44.4	0.3	-3.2	58.5	5.3	32.1	0.6	-4.6	71.8	4.5
Anuncios Expansivos OPEP	40.6	-1.2	-9.5	70.1	3.7	12.5	-0.3	-8.7	96.5	3.7
Anuncios Restrictivos OPEP	56.8	1.2	5.7	36.4	0.4	54.7	1.4	4.0	39.8	4.8
Anuncios Nuevas Inversiones	35.7	1.0	-5.8	69.0	11.6	29.2	0.7	-9.1	79.2	5.2
C. SIN EVENTO	92.4	1.2	5.9	-	-	92.9	1.2	5.9	-	-

Nota: La tabla entrega la mediana de las contribuciones de las variables independientes sobre el precio proyectado usando la especificación econométrica presentada en las ecuaciones 1) y 2), cuyos resultados de la estimación se presentan en la tabla 2. Una vez calculados los valores proyectados dentro de muestra para cada día tanto del nivel como de la varianza condicional, se calculan las contribuciones diarias de cada variable usando los coeficientes estimados (Tabla 2) y los valores efectivos de las variables independientes. La muestra total de valores proyectados y contribuciones se divide en tres submuestras, A. días con evento geopolítico B. días con evento de oferta y C. días sin evento. Media y varianza corresponden a la parte explicada de cada ecuación de la especificación GARCH respectivamente. Las contribuciones que explican la ecuación de media se han escalado para que sumen 100%. Los números en negrita corresponden al promedio de las contribuciones distinguiendo entre eventos geopolíticos y de oferta. Financieros agrupa los regresores financieros (dólar, tasas de interés y VIX), físicos (actividad, inventarios), inerciales (desalineamientos rezagados) y el efecto de las dummies del evento propiamente tal.

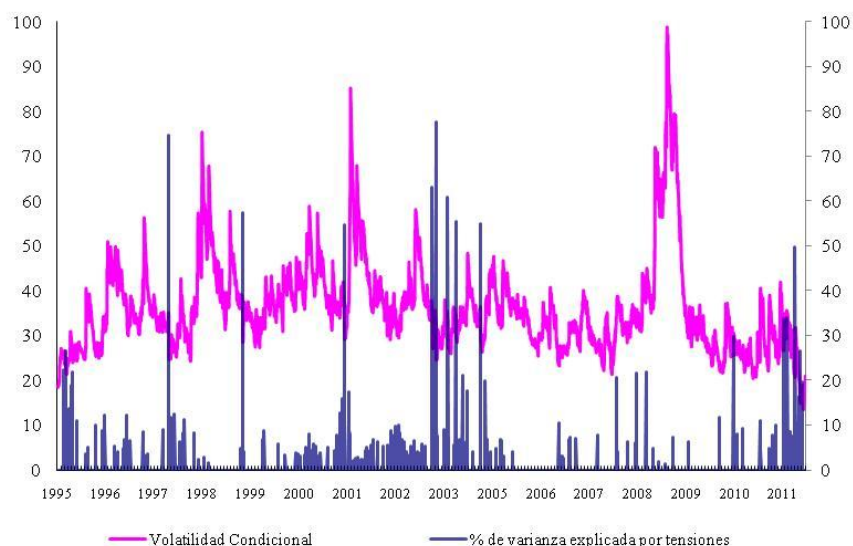
Fuente: Estimación de los Autores

La Figura 2 ilustra la volatilidad condicional anualizada de la variación del precio del petróleo, la cual se grafica junto a la proporción de la varianza atribuible a las tensiones geopolíticas y a los eventos de oferta. Como se observa, los eventos geopolíticos y de oferta explican una mayor proporción de la varianza de los retornos diarios en el caso del petróleo WTI.

Figura 2: Volatilidad del retorno del precio del petróleo: Rol de los Eventos
Petróleo Brent



Petróleo WTI



Fuente: Estimación de los Autores

No obstante estos valores, como los procesos de varianza tienen una elevada persistencia¹¹, un shock puntual puede demorar en desaparecer alrededor de 16 días después de ocurrido el evento. Si se considera que algunos eventos ocurren juntos durante un periodo corto (Guerra de Iraq, Guerra del Líbano, Ataque Terrorista a las Torres Gemelas, entre otros), el impacto acumulado sobre la varianza ciertamente se incrementa.

¹¹ Esta afirmación se realiza según coeficientes asociados a términos ARCH y GARCH en Tabla 1

5. Conclusiones

Las principales conclusiones de este trabajo son:

- (i) A partir de un modelo estilizado para el precio del petróleo estimado con datos diarios durante el período 1995-2012 se constatan similitudes en la forma que los eventos geopolíticos impactan al petróleo Brent y al petróleo WTI. Si bien existen algunas disparidades, éstas son puntuales.
- (ii) Los eventos geopolíticos explican alrededor de $\frac{3}{4}$ de la variación diaria del precio proyectado por el modelo. Por su parte, los eventos provenientes de la oferta explican alrededor de $\frac{2}{3}$ de la variación diaria de los precios proyectados. Cuando no hay presencia de estos eventos, los factores financieros son el principal factor económico y explican alrededor de $\frac{4}{5}$ de la variación diaria. La mayor parte de esta contribución está asociada al dólar multilateral.
- (iii) En cuanto al comportamiento de la varianza de los retornos sobre el petróleo, se observa una elevada persistencia predominando el impacto de los valores pasados de la propia varianza versus el impacto de shocks nuevos.
- (iv) Es por lo anterior que los eventos geopolíticos y los shocks de oferta no explican más del 10% de la varianza condicional. No obstante, estas contribuciones cambian dramáticamente según el evento que se trate.

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Anexo 1: Eventos

Fecha	Noticia
	The Pentagon announces that it monitored Iranian installation of surface-to-air Hawk missiles in the Strait of Hormuz. The Iranians also have taken possession of and fortified the nearby Abu Musa and the Tunb Islands, which are claimed by both Iran and the United Arab Emirates (UAE). (DJ)
28/02/1995	15 march 1995 U.S. government issued Executive Order 12957 prohibiting U.S. trade in Iran's oil industry
15/03/1995	UN Security council adopted unanimously resolution 986 after reaffirming all resolutions on Iraq and noting the serious humanitarian situation with the Iraqi civilian population, the Council, acting under Chapter VII of the United Nations Charter, established a mechanism whereby Iraqi oil exports would finance humanitarian aid to the country,
14/04/1995	30 april 1995 U.S. government announce plans of total embargo on trade with Iran
01/05/1995	6 may 1995 U.S. government issued Executive Order 12959 prohibiting any U.S. trade with Iran
08/05/1995	Iraq agrees to talks concerning a U.N. plan to allow for the Iraqi sale of \$1 billion of oil for 90 days for a 180-day trial period. Under U.N. Resolution 986, proceeds from the sale would be used for humanitarian purposes. In the past, Iraq has opposed clauses 6 and 8b contained in Resolution 986. Clause 6 stipulates that oil exports under this plan must pass through the 1.6 Mbb/d (250,000 m3/d) Iraq-Turkey pipeline, which currently is unusable because of sludge build-ups and pumping station damage. By most estimates, the line would take a minimum of three months to repair. Clause 8b states that part of the proceeds from the sales would be disbursed under U.N. supervision to Kurdish provinces in northern Iraq. Negotiations between Iraq and the United Nations are scheduled to begin February 6, 1996. (FT, PON, Vice Admiral Scott Redd, commander of the U.S. Fifth Fleet based in the Persian Gulf, states that Iran test-fired a new anti-ship missile near the Strait of Hormuz on January 6. The missile reportedly has a range of 60 miles (100 km) and is viewed as a threat to regional security by U.S. naval forces operating in the area. Oil tankers carry about 15 Mbb/d (2,400,000 m3/d) through the Strait. (DJ)
17/01/1996	30/01/1996 Iraq and a U.N. begin negotiations on plan to allow for the Iraqi sale of \$1 billion of oil for 90 days for a 180-day trial
06/02/1996	In New York, the United Nations and Iraq end a third round of negotiations over Iraq's possible sale of \$1 billion of oil for 90 days for a 180-day trial period. Under U.N. Resolution 986, proceeds from the sale would be used for humanitarian purposes. While both sides have reached agreement on most of the key issues, chief Iraqi negotiator Abdul Amir al-Anbari says that the United States and the United Kingdom have fundamentally altered the text of a proposed agreement which he had received from the United Nations early in the third round. Al-Anbari states that the changes have postponed any possible deal. The U.N.-Iraq talks are scheduled to restart on May 10. (DJ)
24/04/1996	In New York, the United Nations and Iraq agree to U.N. Resolution 986, which provides Iraq with the opportunity to sell \$1 billion of oil for 90 days for a 180-day trial period. Under the resolution, proceeds from the sale would be used for humanitarian purposes. The agreement comes following months of heated negotiations. Iraqi oil exports are expected to begin by the Fall of 1996, after a pumping station on the Iraq-Turkey pipeline is repaired and U.N monitoring and aid distribution facilities are put in place. Shortly after the agreement, the White House announces its July 18: The United Nations formally approves an Iraqi aid distribution plan, a major step forward in the direction of
20/05/1996	allowing Iraq to sell oil under Resolution 986. (DJ)
19/07/1996	President Clinton signs a new bill imposing sanctions on non-U.S. companies which invest over \$40 million a year in the energy sectors of either Iran or Libya. Under the law, the President would be required to impose at least two of the following sanctions: import and export bans; lending embargoes from U.S. banks; a ban on U.S. procurement of goods and services from sanctioned companies; and a denial of U.S export financing. The European Union has stated its opposition to the U.S. law and threatened retaliation. (FT)
06/08/1996	Following U.S. cruise missile strikes on military facilities in southern Iraq, crude oil prices rise as the market speculates when Iraq will begin exporting oil under U.N. Resolution 986. Benchmark Brent Blend for October rises above \$22/barrel amidst the uncertainty. The U.S. attack follows an Iraqi-supported invasion of Kurdish safe haven areas in the country's northern area. Subsequently, President Bill Clinton states that the U.N. oil-for-food sale should
05/09/1996	During a press conference, Iranian Deputy Foreign Minister Abbas Maleki states that Iran supports the free flow of oil through the Strait of Hormuz, but reserves the option of closing off the shipping route if it is threatened. Iran recently
18/12/1996	has admitted to deploying anti-aircraft and anti-ship missiles on Abu Musa, an island strategically located near the December 30: The United Nations announces that a total of 21 contracts have been approved for the limited Iraqi oil sales under U.N. Resolution 986. The approved contracts will allow for 43.68 million barrels (6,945,000 m3) of oil to be exported in the first 90 days of the sale. At present, exports of 26.37 million barrels (4,192,000 m3) have been approved for the second 90-day period of the sale, which allows Iraq to sell up to \$1 billion worth of oil every 90 days for an initial 6-month period. In mid-December 1996, Iraq restarted the Kirkuk-Ceyhan pipeline, which is expected to carry up to 450,000 bbl/d (72,000 m3/d) of oil under the sales agreements approved so far under U.N. Resolution 986.
31/12/1996	Iraq's remaining oil exports will flow through the Mina al-Bakr terminal. (NYT, DJ)

In a unanimous vote, the United Nations Security Council renews for another 180-day period its "oilforfood" initiative with Iraq. Under the resolution, Iraq may sell \$2 billion worth of oil to buy food, medicine and other necessities to alleviate civilian suffering under the sanctions imposed when it invaded Kuwait in 1990. (WP)

04/06/1997 The U.S. State Department rules that Turkey's August 1996 agreement to purchase \$23 billion worth of natural gas from Iran over a 20-year period does not violate the Iran and Libya Sanctions Act. In a May 1997 memorandum of understanding with Iran and Turkmenistan, Turkey modified the original arrangement so that the natural gas will be purchased from Turkmenistan rather than Iran. (DJ)

23/07/1997 The United Nations approves a sale-price formula for Iraqi crude oil sales under the oil-for-food plan. The approval cleared the way for Iraq to resume limited oil exports immediately through the Turkish port of Ceyhan on the Mediterranean Sea and Iraq's Persian Gulf port of Mina al-Bakr. The United Nations will also begin reviewing contracts for Iraqi crude oil purchases. Iraq has until September 5 to raise the \$1.07 billion allowed under the existing 90 day oil-for-food plan window. Iraqi officials state they will boost exports to 2 million barrels per day (320,000 m3/d) to meet the sales target. However, industrv experts sav that Iraq's export capacity is untested beyond 1.4-million-

08/08/1997 The United Nations Security Council passes a resolution that allows Iraq to reach the \$2.14 billion oil sales limit under its oil-for-food program by December 5. The current 6-month oil sales window, running from June 8 to December 5, will be split into a 120-day segment and a 60-day segment instead of two 90-day segments. During each segment Iraq can sell \$1.07 billion worth of oil. The resolution should enable Iraq to make up for lost revenues during a delay in the start of oil sales during the first two months of the current six month sale period. (DJ)

12/09/1997 Iraq's Revolution Command Council, the country's main decision making body, announces that it will no longer allow U.S. citizens and U.S. aircraft to serve with the United Nations (U.N.) arms inspection teams. The council's statement gives U.S. citizens working with the inspection teams one week to leave Iraq. Iraq has also asked the U.N. to stop flights by American reconnaissance aircraft monitoring its compliance with U.N. resolutions requiring the elimination of weapons of mass destruction. In response to this statement, the U.N. Security Council unanimously approves a

29/10/1997 Iraq's Revolution Command Council formally endorses an agreement, arranged by Russia, that enables United Nation's (U.N.) weapons inspection teams to resume operations in Iraq. The deal ends a three-week standoff between the U.N. and Iraq that began in late October 1997 after Iraq announced it would no longer allow U.S. citizens to serve on U.N. weapons' inspection teams. (DJ)

20/11/1997 Iraq's United Nations (U.N.) Ambassador Nizar Hamdoun warns that Iraq will not allow oil to flow during a third six-month phase of the U.N.'s oil-for-food sale until the U.N. approves an aid distribution plan. Despite the warning, the U.N. Security Council approves a third six-month phase following the end of the second six-month phase. Like the first two phases, the third phase allows Iraq to sell up to \$1.07 billion of oil in each of two 90-day periods. However, the sales level may be increased by the Security Council in January 1998 after U.N. Secretary-General Kofi Annan reports on Iraq's needs. The next day Iraq stops pumping oil into the Iraqi-Turkish pipeline at the end of the second six-month

04/12/1997 February 20: The United Nations (U.N.) Security Council votes unanimously to more than double the amount of oil Iraq can export under the U.N. oil-for-food program. The Security Council's vote increases the amount Iraq can export from \$2.14 billion to \$5.26 billion over six months. Iraq maintains that it only has the capability to export up to \$4

19/02/1998 India announces that it has conducted three underground nuclear tests, the country's first since 1974. The tests were conducted simultaneously 330 miles (530 km) southwest of New Delhi, near the Pakistani border. The Indian

11/03/1998 government indicates that the three tests included a thermonuclear device, commonly known as a hydrogen bomb.

13/03/1998 India announces that it has conducted two more underground nuclear tests in the same desert range. (WP) (DJ)

The United Nations (U.N.) Security Council unanimously approves a resolution allowing Iraq to spend \$300 million on spare parts for its oil industry. The funding is intended to help Iraq increase oil exports under the fourth phase of the U.N.'s oil-for-food program. The spare parts are expected to expand Iraq's oil export capacity from 1.6 million barrels

19/05/1998 per day (250,000 m3/d) to 1.8 million or 1.9 million barrels per day (300,000 m3/d). (NYT) (DJ)

Following the arrival in the Netherlands of two Libyan suspects in the 1988 bombing of Pan American Flight 103 that killed 270 people, United Nations sanctions against Libya are suspended. The sanctions, imposed on March 31, 1992, initially included a ban on the sale of equipment for refining and transporting oil, but excluded oil production

05/04/1999 equipment. Sanctions were then expanded on November 11, 1993, to include a freeze on Libya's overseas assets, The United Nations Security Council agrees to raise the monetary ceiling on Iraqi oil sales to \$8.3 billion from \$5.26 billion, guaranteeing the continuation of Iraqi production until the November 20 end date for the current six month extension of the "oil-for-food" program. The move is a one time adjustment, and does not bind the Security Council to continue a higher ceiling if the program is renewed for another six month term. The increase reflects the difference

04/10/1999 between previous monetary ceilings and actual Iraqi sales during previous phases of the program. (DJ)

The United Nations Security Council reaches agreement on the appointment of Hans Blix of Sweden, the former head of the International Atomic Energy Agency (IAEA), to lead the new United Nations weapons inspection organization

26/01/2000 for Iraq. Iraq has indicated that it does not intend to accept the new Security Council resolution. (DJ)

15/09/2000 increase in tensions between Iraq and Kuwait

18/09/2000 Oil prices rise sharply on news of a terrorist attack on an American warship, the USS Cole, in the Yemeni port of Aden, as well as escalating violence between Palestinians and Israeli security forces.

12/10/2000 The United Nations Sanctions Committee approves an Iraqi request to be paid in Euros, rather than United States dollars, for oil exported under the "oil for food" program, which is part of the sanctions regime stemming from Iraq's Iraq's State Oil Marketing Organization (SOMO) demands that companies lifting cargoes of Iraqi crude oil begin paying a fifty cent per barrel surcharge starting on December 1, 2000. The surcharge would be paid directly to the Iraqi government rather than being channeled into the account administered by the United Nations under the "oil for food"

16/11/2000 The United Nations Security Council approves a six month extension to the Iraq "oil for food" program. (DJ)

05/12/2000 Iraq announces that it will halt crude oil exports in response to a United Nations Security Council resolution, approved May 31, that extends the oil-for-food program by only one month, instead of the normal six-month period. The oil-for-food program affects revenues from Iraqi sales of about 2.1 million barrels (330,000 m3) per day. However, it has been reported Iraq will continue to sell several hundred thousand barrels per day to its neighbors through sales that are outside of the oil-for-food program. OPEC announces that, if need be, it will make up for lost Iraqi production. Oil

04/06/2001 The United Nations (U.N.) Security Council, facing an almost certain Russian veto, agrees to postpone indefinitely a vote on the U.S.-led "smart sanctions" package for Iraq, despite support by the four other council members. Instead, it will extend, most likely through the end of the year, the program that allows Iraq to export oil and import food and other commodities under U.N. supervision (WSJ)

02/07/2001 Iraq resumes oil exports, ending a 5-week halt in protest of a U.S. and British-sponsored United Nations (U.N.) Security Council resolution that would have overhauled U.N. sanctions, after this resolution did not come to a vote (see July 2). The oil-for-food program will be extended for five months. (NYT)

11/07/2001 An Iranian warship in the Caspian Sea threatens a BP oil exploration ship off the coast of Azerbaijan. This prompts BP to suspend exploration in the area. The two vessels were in the Araz-Alov-Sharg field 90 miles (140 km) southeast of Baku. Iran claims the field is in Iranian waters. Caspian Sea region countries have been unable to agree on a division of

24/07/2001 U.S. President George Bush signs into law the Iran and Libya Sanctions Act (ILSA) Extension Act of 2001. This Act provides for a 5-year extension of ILSA with amendments that affect certain of the investment provisions. ILSA sanctions foreign companies that provide new investments of over \$40 million for the development of petroleum resources in Iran or Libya, or that violate existing United Nations prohibitions against trade with Libya. The law allows the president to waive sanctions against a foreign company if doing so is deemed to be in the U.S. national interest.

03/08/2001 U.S. companies are prohibited by U.S. law from engaging in any commercial or financial transactions with Iran or August 10 The United States and Great Britain reject a proposal by United Nations Secretary General Kofi Annan to permit the Iraqi government to use \$1 billion per year to fund infrastructure improvements and to increase oil production capacity. It has been suggested that without infrastructure investment, Iraq's production could fall

10/08/2001 significantly over the next few years. (WMO)

11/09/2001 The largest terrorist attack in world history occurs as 2 hijacked airplanes crash into the twin towers of the World Trade Center in New York City, one hijacked plane crashes into the U.S. Department of Defense's Pentagon headquarters, and another hijacked plane crashes into a rural part of Pennsylvania. The World Trade Center is destroyed, and the Pentagon is heavily damaged. Thousands of people die and economic damage is estimated to be in the billions. Aviation is halted in the United States and all major trading markets (including energy) are closed for the

12/09/2001 remainder of the week. The U.S. government blames the attack on Osama Bin Laden's terrorist network (NYT)

13/09/2001 Relative calm returns to world oil markets as U.S. retail gasoline prices return to normal levels and Brent crude oil futures fall back to \$28.02 per barrel for October delivery after spiking to above \$31.00 in the aftermath of the

14/09/2001 September 11 attacks. Also, energy trading by Houston energy companies resumes and limited commercial aviation

Major trading markets in the United States, including the New York Stock Exchange and the New York Mercantile Exchange (NYMEX), reopen for the first time since September 11. (NYT)

17/09/2001

18/09/2001

19/09/2001

20/09/2001

21/09/2001 Crude oil and petroleum products futures fall to their lowest levels in nearly two years amid fears that a recession will reduce energy demand. At the New York Mercantile Exchange (NYMEX), crude oil set for October delivery falls \$3.96 to \$22.01 per barrel, and crude oil for November delivery falls \$3.82 to \$22.44 per barrel. Over the past six

24/09/2001 trading sessions crude oil and gasoline futures have fallen more than 26% and heating oil futures have fallen nearly

The United Nations Security Council unanimously approves a resolution extending the Oil-for-Food program in Iraq for another six-month period. This resolution allows Iraq to sell unlimited quantities of oil on the condition that the proceeds are used to buy food, medicine, and other humanitarian goods, and to pay war reparations. This resolution

29/11/2001 also calls on members of the Security Council to agree by May 31, 2002, on a list of "dual use" items that would U.S. President George W. Bush delivers his State of the Union address. In his speech he identifies Iraq, Iran, and North

29/01/2002 Korea as part of an "axis of evil" that supports terrorism. President Bush also states, "The United States of America will not permit the world's most dangerous regimes to threaten us with the world's most destructive weapons." (NYT) Iraq says that it will not allow United Nations (U.N.) arms inspectors to return to Iraq. Iraqi Vice President Taha Yassin Ramadan states, "There is no need for the spies of the [U.N.] inspection teams to return to Iraq since Iraq is free

13/02/2002 of weapons of mass destruction." The United States has hinted that actions may be taken against the Iraqi government Iraq announces that it will halt its "oil-for-food" exports for 30 days as a gesture of support for the Palestinians struggle with Israel. Iraq also requests that other OPEC countries do not raise production to make up for lost Iraqi exports. Iraqi "oil-for-food" exports had averaged about 1.7 million barrels per day (270,000 m³/d) to date in 2002.

08/04/2002 Major Arab OPEC exporters Saudi Arabia, Kuwait, and Qatar have expressed unwillingness to join in any embargo. (Reuters)

The United Nations Security Council approves an overhaul of the "oil-for-food" program for Iraq that makes use of an extensive list of "dual-use" goods (goods that could have a military as well as civilian use). Iraq will be able to use its oil revenues, which go into a U.N. escrow account out of which suppliers exporting products to Baghdad are paid, in

14/05/2002 order to purchase items not on the list. The resolution renews the U.N. program until November 25, 2002. On May 16, official Iraqi news agency INA announces that it will comply with the new six-month tranche of the "oil-for-food" program voted by the U.N. Security Council on May 14, despite condemning the Security Council resolution in the same statement. Iraq officially accepts the U.N. proposal on May 29. (Reuters)

U.S. Vice President Cheney states that a new round of U.N. weapons inspections in Iraq is likely to be insufficient to guarantee that Iraq has ended its biological, chemical, and nuclear weapons programs. That same day, Iraqi Vice President Ramadan declares that future inspections by the United Nations are a "waste of time," as the U.S.

29/08/2002 administration has already decided upon "changing the regime by force." (WP)

September 12: U.S. President Bush addresses the United Nations. President Bush declares in regard to Iraq that "The Security Council resolutions will be enforced — the just demands of peace and security will be met — or action will be

12/09/2002 unavoidable...and a regime that has lost its legitimacy will also lose its power." (Reuters)

13/09/2002 According to United Nations officials and representatives of the oil industry, Iraq has stopped attempting to impose illegal surcharges on oil it sells through the United Nations' "Oil-for-Food" program. Though the surcharges have provided funds to the regime, Iraq may be attempting to cooperate more closely with U.N. resolutions in the face of

18/09/2002 increased scrutiny by the United States and Britain. (DJ)

October 11: The U.S. Senate votes to give President George Bush the authority to use force, if necessary, to persuade Iraqi President Saddam Hussein to abandon programs for the development of biological, chemical or nuclear weapons. The U.S. House of Representatives passed a similar measure the previous day. This moves the focus of debate to the

11/10/2002 U.N. Security Council. (Reuters)

14/10/2002 The United Nations (UN) Security Council unanimously adopts resolution 1441, that Iraq must accept or reject within seven days, giving United Nations inspectors the unconditional right to search anywhere in Iraq for banned weapons. Furthermore, Iraq will have to make an "accurate full and complete" declaration of its nuclear, chemical, biological and ballistic weapons and related materials used in civilian industries within 30 days. The resolution requires violations to be reported back to the Security Council by inspectors before any actions could be taken against Iraq for violating

08/11/2002 weapons bans. (Reuters)

In a letter to United Nations (UN) Secretary General Kofi Annan, Iraq accepts UN Security Council resolution 1441 of November 8, granting UN inspectors the right to conduct unfettered inspections in Iraq, "despite its bad contents." In

13/11/2002 the letter, Iraq also denies that it possesses any weapons of mass destruction. (AP)

The United Nations (U.N.) Oil-for-Food program is unanimously renewed by the Security Council for another six months, and shortly thereafter accepted by the Iraqi government. The Oil-for-Food program allows Iraq to sell

04/12/2002 unlimited quantities of oil, with revenues going into a U.N. account that pays vendors for approved goods that Iraq U.S. Secretary of State Colin Powell declares that Iraq is in "material breach" of United Nations resolutions after reviewing Iraq's weapons of mass destruction declaration released December 7 to the United Nations. States Powell:

19/12/2002 "Our [U.S.] experts have found it to be anything but currently accurate, full or complete. The Iraqi declaration ...

12/02/2003 supply concerns before an impending war in Iraq. (WSJ)

17/03/2003 U.S. President George Bush's March 17 ultimatum to Iraq

18/03/2003 Saddam Hussein and his regime reject of U.S. President George Bush's March 17 ultimatum

Military action in Iraq commences with a bombing raid and missile attack on targets in the Iraqi capital of Baghdad (March 20 Baghdad time) by Coalition forces. Iraq launches several conventional missiles at Kuwait, but this has no effect on Kuwaiti oil production. However, the Kuwait Petroleum Company does implement an emergency plan to

19/03/2003 protect its workers and facilities. (Reuters)

After Coalition forces have pushed further into Iraq securing most of the southern oilfields over the weekend, Kuwaiti fire fighters are able to enter Iraq and are able to extinguish one of the wellhead fires. Iraq's southern fields represent about 40% of the country's output. Damage is assessed to be relatively minimal. Some pockets of Iraqi resistance in the southern oilfields remain, however. Furthermore, heavy Iraqi resistance in some parts of Iraq gives rise to market speculation that the war could last longer than initially thought. The NYMEX near-month crude oil price rises 6.5%, to

24/03/2003 settle at \$28.66 per barrel, as the war in Iraq as well as the situation in Nigeria have traders concerned. (Reuters, DJ) Coalition forces continue to make progress against the regime of Saddam Hussein in Iraq, with the U.S. military capturing Baghdad's main international airport. Also, according to the U.S. military, 80%-90% of Iraq's southern

04/04/2003 oilfield production is under coalition control, as well as all related export facilities, as of this date. (Reuters) U.S. Secretary of Defense Donald Rumsfeld announces that the U.S. military has shut off an oil pipeline from Iraq to Syria that is alleged to have been carrying 100,000-150,000 barrels (24,000 m³) per day. "We have been told that they have shut off a pipeline," Secretary Rumsfeld told a Pentagon briefing. "Whether it's the only one and whether that has completely stopped the flow of oil between Iraq and Syria, I cannot tell you. ... I cannot assure you that all illegal oil

15/04/2003 flowing from Iraq into Syria is shut off. I just hope it is." (Reuters) According to the American military officer in charge of restarting Iraq's oil production infrastructure, Iraq's southern fields have begun to produce again. Four southern wells have begun producing a modest amount of crude oil, but according to Brig. Gen. Robert Crear of the Army Corps of Engineers, southern wells should soon be producing about 170 million barrels per day (27,000,000 m³/d). Initial production would go toward meeting domestic demand,

23/04/2003 especially as more refineries come back on line. The country's northern oilfields are still offline. (WSJ) The United Nations Security Council approves the immediate end of 13 years of economic sanctions on Iraq, dating from the time of Iraq's invasion of Kuwait in 1990. Resolution 1483 effectively grants the United States-led coalition forces control of Iraq until a new Iraqi government can be put in place. The end of the sanctions also makes it easier for Iraqi oil exports to resume without the auspices of the United Nations. Later, on May 27, the U.S. Department of the Treasury lifts most remaining sanctions on Iraq, thereby implementing U.N. Security Council Resolution 1483.

22/05/2003 Secretary of the Treasury John W. Snow states, "It is no longer a crime for U.S. companies and individuals to do The United States estimates that restoring Iraq's oil sector to its pre-war status will cost at least \$1.1 billion and take nine months to complete. Prior to the war, Iraq was producing around 2.5 million barrels (400,000 m³) per day and exporting around 2 million barrels (320,000 m³) per day. Current production is closer to 1 million barrels per day

07/08/2003 (160,000 m³/d), with exports of about 600,000 barrels (95,000 m³) per day. (LAT)) Libya reportedly agrees to compensate families of the 1988 Lockerbie airplane bombing with \$2.7 billion total. The money is to be released in three tranches, the first following a lifting of United Nations sanctions, the second after

14/08/2003 possible lifting of U.S. sanctions, and the third after Libya is removed from the U.S. State Department's state sponsors Iraq's crucial northern oil pipeline from Kirkuk to the Turkish port of Ceyhan is attacked, stopping flows on the line

15/08/2003 just two days after it reopened for the first time since the war. The pipeline had a pre-war capacity of 1.1 million Ibrahim Bahr al-Uloum, a former Iraqi exile, is appointed Iraq's first post-war oil minister by the country's Governing

01/09/2003 Council. Uloum replaces Thamir Ghadhban, who had been the acting oil minister since early May. (Reuters) The United Nations (U.N.) Security Council lifts 11-year-old sanctions against Libya. Development of Libya's sizeable oil resources has been hindered by the sanctions, which were imposed in 1992 in an effort to extradite two Libyans

12/09/2003 indicted for the 1998 bombing of an American plane over Scotland. (AP) The United Nations hands over the "oil-for-food" program in Iraq to the U.S.-led administration in Baghdad. The "oil-for-food" program was established by the United Nations in 1995, and used proceeds from the sale of Iraqi oil to buy food and medicine for Iraqis as well as to finance infrastructure and humanitarian projects. Iraqi oil exports reportedly

21/11/2003 have reached around 1.5 million barrels per day (240,000 m³/d). (USAT, WMRC) news that U.S. military forces capture Saddam Hussein near his hometown of Tikrit, Iraq. (CBS, WMRC)

15/12/2003 Libya announces that it will abandon its weapons of mass destruction programs and comply with the Nuclear Non-Proliferation Treaty. The United States welcomes the move, but says that it will maintain economic sanctions until it sees evidence of compliance. (WMRC, NYT)

22/12/2003 The United States rescinds a ban on travel to Libya and authorizes U.S. oil companies with pre-sanctions holdings in Libya to negotiate on their return to the country if and when the United States lifts economic sanctions. The United States first imposed sanctions on Libya in 1986 following terrorist attacks in Rome and Vienna. Several U.S. oil

26/02/2004 companies were forced to abandon their assets in Libya when sanctions were imposed in 1986, including the "Oasis

A car bomb explodes outside a police building in Riyadh, Saudi Arabia, marking the first major attack by militants on governmental targets in the Kingdom. Four people are killed and 148 are wounded. The country's major export facilities are not harmed, but port authorities maintain a "heightened sense of security." Saudi Arabia is the world's largest oil producer and America's second largest foreign supplier of crude oil and petroleum products after Canada.

22/04/2004 Saudi militants attack a complex in Khobar, Saudi Arabia, housing foreign workers. After killing various Saudis and foreigners upon entering the compound on May 29, the militants take hostages, and later kill nine of them. Three of the militants are able to escape despite the efforts of the Saudi security forces. This attack, as well as earlier ones in the kingdom, has foreigners and foreign firms reconsidering their presence in Saudi Arabia. (Reuters)

31/05/2004 Near-month crude oil futures on the NYMEX reach a record nominal settlement high of \$42.33 per barrel reacting to the weekend terrorist attacks in Saudi Arabia on top of an already tight market. This is the highest nominal settlement price since the founding of the NYMEX crude oil futures market in 1983. (WSJ)

01/06/2004 President Bush lifts a variety of U.S. sanctions on Libya, paving the way for American oil companies to try to secure contracts or revive previous contracts for tapping Libya's oil reserves, estimated at approximately 36 billion barrels

20/09/2004 Saboteurs mount a large attack on Iraq's oil infrastructure by blowing up three pipelines in the north, thereby cutting exports at the Turkish port of Ceyhan. The first pipeline attack destroys a portion of the export route to Turkey, and other explosions occur in an area about 40 miles (64 km) southwest of the oil producing center of Kirkuk. The explosions affect oil supplies to Iraq's biggest refinery at Baiji and imports of refined products. Crude oil exports

02/11/2004 A U.S. Senate probe finds that Iraq illegally earned approximately \$21.3 billion by circumventing UN sanctions between 1991 and 2003. The figure is double the amount reported by the Duelfer Report that was released in October 2004. The Senate's Permanent Subcommittee on Investigations also releases details on the way in which Saddam

16/11/2004 Jul 7, Oil hit a fresh record high of \$75.78 a barrel, boosted by strong demand in the US and global tension ranging from Iran's nuclear work to North Korea's missile tests. (Reuters, 7/7/06)

07/07/2006 Jul 12, At about 9 a.m. local time Hezbollah launched an attack on the Lebanese border with Israel. Three Israeli soldiers were killed, two wounded, and two were captured and taken into Lebanon. Hezbollah claimed its objective is to free 10,000 Arabs captured by Israel. The United States condemned what they call Hezbollah's "unprovoked act of terrorism, which was timed to exacerbate already high tensions in the region and sow further violence"

12/07/2006 Jul 13, Israel imposes airspace and maritime blockade on Lebanon by various attacks on Beirut Rafic Hariri International Airport, Lebanon's only commercial airport, the main Beirut-Damascus highway and aerial attacks on Hezbollah's long range missile and rocket stockpiles, most of which were destroyed in the first days of conflict.

13/07/2006 Jul 24-Jul 24, U.S. Secretary of State Condoleezza Rice proposed the first ambitious plan in which international military forces would help the Lebanese government stabilize southern Lebanon. According to Lebanese political sources, the plan would involve putting an international force of up to 10,000 Turkish and Egyptian troops under a NATO or U.N. commander into southern Lebanon following a cease-fire. Another international force of up to 30,000 troops then would help the Lebanese government regain control over the region. The sources describe the plan as an outline or working proposal and said no one has agreed to it.

24/07/2006 They also said there are many hurdles to overcome before it could be implemented. July 27, Lebanon's Prime Minister Fouad Siniora proposes a peace-plan at the 15-nation conference in Rome on 27 July. Since July 12, at least 405 people—mostly civilians—have been killed in Israeli strikes, Lebanese security sources said. The fighting also wounded about 1,660 people the source said. The U.N. Security Council released a statement saying it was "deeply shocked and distressed" by the Israeli airstrikes that struck a U.N. bunker earlier this week, killing four peacekeepers. Israel decided not to expand its military offensive in Lebanon, but will call up troops to bolster its fight against Hezbollah. on **28 July** President Bush and British Prime Minister Tony Blair called for an international force to be sent to Lebanon to help ease the Mideast crisis. After talks at the White House, Bush told

27/07/2006 reporters that the two leaders "agree that a multinational force must be dispatched to Lebanon quickly." On **30 July**, August 4-6, Despite calls from U.N. Secretary-General Kofi Annan and many nations, the United States has not publicly endorsed an immediate cessation of hostilities. The United States has been roundly criticized for it. U.S. Secretary of State Condoleezza Rice says the United States does not oppose a cease-fire but does not want an agreement that "falls apart practically the minute it's in place" and would then result in a return "to the status quo ante,"

07/08/2006 or the relationship between the two sides before fighting began August 10, U.N. Secretary-General Kofi Annan pushed "very intensely" the Security Council to reach a resolution acceptable to both Israel and Lebanon for ending the conflict by week's end, August 12 to August 13. Diplomats meanwhile were trying to reconcile differences over a U.S.-France plan to end the conflict. A sticking point remains a

10/08/2006 Lebanese call for Israel's immediate withdrawal from southern Lebanon, a move Israel says it won't make without August 14, The ceasefire went into effect at 8 a.m. Hours after the cease-fire took effect, thousands of refugees started to return back to their homes. As many as 300,000 refugees are expected to return over the next few days to the area where many buildings, roads and bridges have been destroyed. The Lebanese army set up checkpoints along the main

14/08/2006 roads in an effort to control traffic.

19 August, Israeli commando raid deep inside Lebanon with the objective of, according to the Israeli military, trying to interdict Iranian weapons being smuggled to guerrillas from Syria. August 20, UN Secretary General Kofi Annan expressed his deep concern calling the raid a truce violation of Resolution 1701. The statement also cited the U.N. Interim Force in Lebanon as saying there have "also been several air violations by Israeli military aircraft. Israeli government defended the action by saying that "The cease-fire is based on (U.N. resolution 1701) which calls for an international arms embargo against Hezbollah,...In the absence of that presence, arms transfers to Hezbollah are a clear violation of 1701 and Israel is entitled to respond. When the international forces and the Lebanese Army are enforcing the embargo, Israeli action becomes superfluous.. Israel won't accept "a cease-fire in which Hezbollah can use that

21/08/2006 In Yemen unidentified saboteurs bombed an oil pipeline in Marib province. The attack halted the flow of oil and added to concerns in the world oil markets about adequate supplies for heating fuel. (AP, 11/8/07)

06/11/2007 Pirates in the Gulf of Aden fired on a Japanese oil tanker, unleashing hundreds of gallons of fuel into the sea. The attack took place 170 miles off the coast of Yemen while the 150,000-ton tanker was heading to Saudi Arabia. (AP, 21/04/2008

21/04/2008 Iraq's Oil Ministry said that it is close to signing contracts to build two new oil refineries in southern Iraq. Turkey's PM Recep Tayyip Erdogan became the first Turkish leader to visit Iraq in nearly 20 years. (AP, 7/10/08)

10/07/2008 Feb 24, South Korea signed a \$3.55 billion deal with Iraq to help rebuild the war-ravaged country in return for oil and gas. The deal was inked by South Korean President Lee Myung-bak and his Iraqi counterpart Jalal Talabani.

24/02/2009 Pakistan and Iran signed a \$7.6 billion deal in Turkey paving the way for the construction of a much-delayed pipeline pumping Iranian natural gas to the energy-starved South Asian country.

16/03/2010 Jun 12, Yemeni tribesmen blew up an oil pipeline outside the provincial capital, Marib, after the government recently bombed the area in retaliation for an attack on a military convoy.

13/07/2010 Aug 11, Turkey said it will support petrol sales by Turkish companies to Iran, despite US sanctions that aim to squeeze the Islamic Republic's fuel imports.

11/08/2010 Oct 1, European oil majors resisted pressure from the US to stop all business with Iran, in spite of Washington's drive to isolate Tehran over a nuclear program the West suspects is aimed at making bombs.

01/10/2010 Feb 21, Spreading unrest in Libya shut down 6 percent of oil output in Africa's No.3 producer and prompted a host of energy firms to pull out international staff, sending oil prices to above \$105 a barrel. Al Jazeera television said military

21/02/2011 Feb 24, In Libya forces loyal to Muammar Gaddafi launched a counter-attack, fighting fierce gun battles with rebels who have threatened the Libyan leader by seizing important towns close to the capital. A doctor at a mosque in Zawiya

24/02/2011 Mar 1, Pakistan hiked oil prices by 9.9%, a move that threatens the stability of the fragile, US-allied civilian government at a time of economic turmoil in the impoverished country.

01/03/2011 May 9, In Libya NATO planes pounded government weapons depots southeast of the town of Zintan, in a sign of widening conflict in the Western Mountains region as rebels battled to unseat Muammar Gaddafi. Rebels were reported

09/05/2011 Jul 4, In Egypt saboteurs bombed a gas pipeline in the Sinai peninsula, sending flames into the sky and cutting supplies to Israel and Jordan. 7 policemen charged with killing protesters were ordered released on bail. Angry families stormed

04/07/2011 a station where the suspects from Ezbet Abu Qarn were being held, triggering clashes with security forces in which an Sep 11, Iraq's autonomous Kurdistan region halted crude exports, nearly a week after it rejected a new oil and gas law

12/09/2011 approved by the central government.

Sep 27, In Egypt assailants in two pickup trucks struck a pumping station on a gas pipeline to Israel about 15 miles (25

27/09/2011 km) west of the region's main city of el-Arish before, causing a loud explosion and fire.

Oct 8, Production at Iraq's biggest oil field was partially halted after two bombs at the Rumaila field damaged a

10/10/2011 pipeline transporting crude. Iraq currently produces around 2.9 million bpd, and says it will be capable of output of 12

Oct 27, Tens of thousands of Syrians held a mass rally in Latakia in support of embattled President Bashar Assad, but the regime's crackdown on dissent continued in opposition areas as security forces killed at least four people. Oil

27/10/2011 Minister Sufian Allaw acknowledged Damascus was having difficulty selling its oil after the European Union banned

Oct 28, In southern Iran an explosion at a state-run oil field killed a worker and injured three others. A refinery in

28/10/2011 central Iran was hit by a fire.

Nov 21, The US approved extra curbs on Iran's banking system and oil industry in an ongoing effort to thwart the

21/11/2011 country's nuclear program.

Dec 8, Syrian activists launched a campaign of civil disobedience to pile pressure on President Bashar al-Assad, after

08/12/2011 he drew a stinging rebuke from the US for denying he ordered a deadly crackdown. A major Syrian pipeline carrying

Dec 13, In Iraq pumping from the southern Rumaila field fell following two explosions to 700,000 barrels per day,

13/12/2011 down from 1.4 million barrels. Oil exports were not affected. The pipelines were expected to be repaired in about a

02/01/2012 EE.UU. impone sanciones a quien haga transacciones con el Banco Central de Irán

03/01/2012 Irán amenazó con el bloqueo del tránsito naviero por el estrecho de Ormuz

Jan 13, Japan's PM Yoshihiko Noda said the government has yet to decide on whether it will reduce oil imports from

13/01/2012 Iran in line with US sanctions, saying businesses implications need to be considered.

Jan 17, India said it was continuing to buy oil from Iran, despite an intensifying US campaign to smother Tehran's vital

17/01/2012 oil exports until it abandons its nuclear program.

Jan 23, The EU and Iran raised the stakes in their test of wills over the Islamic republic's nuclear program, with the

23/01/2012 bloc banning the purchase of Iranian oil and Iran threatening to retaliate by closing the Strait of Hormuz.

15/02/2012 Irán amenaza con interrumpir suministro de crudo a 6 países europeos (Francia, Grecia, Italia, Holanda, Portugal y

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