



Maritime Choke Points and the Global Energy System

Charting a Way Forward

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Summary points

- The global energy transport system is vulnerable to disruption at key maritime choke points such as the Straits of Malacca and Singapore, Bab Al-Mandab, the Suez Canal, the Turkish Straits and the Strait of Hormuz.
- The impact of a disruption on energy supply, prices and markets depends on its extent and duration. Perceptions and the interaction of 'wet barrel' and 'paper barrel' markets play a major role in determining price level and volatility.
- Measures closing international straits are generally illegal in peacetime, and international law requires maintaining rights of transit passage during war.
- Establishing and maintaining legal and political norms around the security of maritime choke points – involving user states, consumer states and international bodies – are essential.
- Cooperative mechanisms between coastal states can enhance confidence, while the likelihood of deliberate disruptions would be reduced by industry and government measures to mitigate their effects.
- The security of maritime choke points ultimately rests on the observance of international law, and on the willingness and capacity of interested members of the international community to enforce it if necessary.

Introduction

The threat of disruption to key maritime choke points in the global energy transport system – the Straits of Malacca and Singapore, Bab Al-Mandab, the Suez Canal, the Turkish Straits and the Strait of Hormuz – has long been a fixation for strategic planners, energy companies and financial markets.

A broad range of disruption scenarios has been considered, whether in the context of political crisis and armed conflict or, latterly, stemming from international terrorism and piracy.¹ In particular, the vulnerability of sea-lanes to closure – and the ease or difficulty with which their security could be re-established – has been the subject of extended debate.² There is little doubt that the deliberate closure of internationally recognized maritime straits would in most cases be contrary to international law (the situation for man-made canals is more complex). Opinions as to the likely effectiveness of any attempted closure vary.

Maintaining free passage of energy products through maritime choke points is an explicit national interest of major global powers.³ Europe, Japan and the United States have traditionally been most dependent on oil imports vulnerable to disruption. This may change over time as the United States becomes less dependent on imports from outside the western hemisphere, and East Asia much more so. China, which only became a net oil importer in 1993, is already more dependent than the United States on oil supplies from the Middle East.⁴

There is no doubt that disruptions to key energy choke points – whether maritime or onshore, and whether

resulting from the actions of non-state actors, inter-state political tensions and conflict, or from industrial or maritime accidents – could have serious consequences for the level and volatility of energy prices. Major disruptions to particular choke points could, under some circumstances, lead to physical supply shortages of oil and gas in some markets.⁵ The salience of choke points in the global energy economy may increase over time if production or transport becomes more geographically concentrated, and if general market tightness weakens the resilience of the system to supply shocks.

The precise market and supply impact of any disruption depends on a range of factors: its particular location and nature, the market context at the time, and the extent and length of disruption.

This paper explores the issue of choke points in the global energy transport system and relates the vulnerability of choke points to the volatility of energy prices. It briefly discusses the international law dimensions of maritime choke points in times of peace and war, and outlines a range of policy options – beyond the purely military – which could, under certain circumstances, improve the resilience and integrity of the global energy transport system and maritime choke points in particular.

Which choke points?

The concept of a choke point derives from the military context, relating to terrain. It implies a narrow passageway that cannot easily be bypassed and that offers a ready opportunity to prevent the movement of military forces.⁶ When applied to energy trade, the concept

1 For a recent treatment of the Strait of Hormuz from a military perspective see Caitlin Talmadge, 'Closing Time, Assessing the Iranian Threat to the Strait of Hormuz', *International Security* 33: 1 (2008), pp. 82–117.

2 See, for example, Dennis Blair and Kenneth Lieberthal, 'Smooth Sailing: The World's Shipping Lanes are Safe', *Foreign Affairs* 86: 3 (2007), pp. 7–13; and Glenn Davis, Charles Dragonette and Randy Young, 'Dangers at Sea', *Foreign Affairs* 86: 5 (2007), pp. 194–95. On 5 January 2012 British Defence Secretary Philip Hammond told a policy-making audience in Washington, DC that any attempt by Iran to obstruct the Strait of Hormuz would be 'illegal and unsuccessful'.

3 In 1980, US President Carter declared the Persian Gulf a 'vital interest' of the United States. Freedom of navigation in the Persian Gulf, and through straits used for international navigation, has been a consistent US policy, enforced by US Navy Freedom of Navigation missions.

4 See John Mitchell, *More for Asia: Rebalancing World Oil and Gas*, Chatham House Report, December 2010. China imported 2.4m bpd from the Middle East in 2010, as against imports of 1.7m bpd by the United States (and 2.4m bpd by Europe, 2.6m bpd by India and 3.6m bpd by Japan): *BP Statistical Review of World Energy 2011*, 2011.

5 The complete shut-down of Libyan crude oil production in 2011 suggests one possible pattern of consequences for supply disruption, initially mostly affecting supply for southern Europe but having a broader price impact. The impact on refineries, dependent on a particular type and quality of crude oil, could be significant, with potential second-order impacts on the availability of particular oil products.

6 The classic example is the stand of 300 Spartans against the much larger Persian forces at Thermopylae in 480 BC.

rapidly becomes more complicated. There are relatively well-documented maritime choke points for the transport of oil, the most important of which are the Strait of Hormuz and the Straits of Malacca and Singapore.⁷

But other choke points in the global oil and gas system could also constrain the supply of products to the consumer market, provoking wider market instability. Any large-scale industrial system involving extraction, processing and distribution is bound to contain choke points which may affect the optimal functioning of the system as a whole. Refineries, in general, can act in this way (though the current global availability of refining capacity reduces that risk somewhat).⁸ Particular concentrations of assets may heighten the salience of such a choke point: the Abqaiq facility in Saudi Arabia, for instance, processes between 5 and 6 million barrels of crude oil per day.⁹ Other examples are the huge loading terminals at Ras Tanura in Saudi Arabia through which most Saudi exports normally pass, or at Kharg Island in Iran. Insufficient tanker capacity could be a key constraint if disruptions to a maritime choke point caused major re-routing of oil tankers to longer routes and hence reduced availability.

Beyond these physical choke points, other factors or potential supply restrictions could also contribute to price volatility. Politically inspired sanctions, from whatever source, may further restrict supply.¹⁰ Finally, in recent times, the recrudescence of piracy, particularly in an increasingly broad maritime area off the Horn of Africa, presents a threat to steady oil supplies, and could lead to additional costs.¹¹

Choke points are more difficult to define for gas, which can be transported either by pipeline or, increasingly, in the form of liquefied natural gas (LNG), by tankers. Seaborne LNG trade is as vulnerable as seaborne oil trade to potential maritime routing problems, and disruptions to maritime choke points.¹² The growth of LNG trade (e.g. from Qatar) may increase the salience of these choke points in the energy system as a whole.

Gas pipelines may also constitute serious choke points in the distribution system for natural gas. The number of pipelines required to supply a given volume of natural gas is smaller than the number of LNG ships, creating efficiencies in transport. But this greater concentration of assets also means supplies can less easily be diverted in the event of disruption. The fixed nature of their infrastructure may make pipelines additionally vulnerable to disruption.

Twice in the last five years, disruptions in pipelines carrying natural gas from Russia to the European Union via Ukraine have led to serious physical shortages of natural gas in southeast Europe. But while the impacts of disruption to gas pipelines can be severe, they tend to be regional rather than global, with limited contagion.¹³ While oil prices are truly international, with a complex system of arbitrage meaning that changes in one region will rapidly affect prices in others, natural gas prices are regionally based and the high cost of gas transport limits the arbitrage opportunities, thus representing a partial firewall between regional markets. The subsequent analysis of the importance of maritime choke points on markets will therefore be focused on oil.

7 The authors estimate oil transit through the Strait of Hormuz to be between 15.5 and 17.5 million bpd, and for oil transit through the Straits of Malacca and Singapore to be between 13.6 million bpd and 15 million bpd.

8 The availability of refining capacity globally does not eliminate the risk, however. This is particularly the case in the United States where there are strict product specifications that few refineries can manage.

9 In 2006 the Abqaiq facility was the subject of a broadly unsuccessful attack by al-Qaeda elements, which nonetheless caused oil prices to spike at \$2. See Khalid R. al-Rodhan, *The Impact of the Abqaiq Attack on Saudi Energy Security* (Washington, DC: CSIS, February 2006).

10 See Paul Stevens, 'An Embargo on Iranian Crude Oil Exports: How Likely and With What Impact?', EERG PP 2012/01, Chatham House, 2012.

11 See Roger Middleton, *Piracy in Somalia: Threatening Global Trade, Feeding Local Wars*, Chatham House Briefing Paper, October 2008. Middleton argues that disruption to the flow of oil off the Horn of Africa as a result of piracy could lead to additional increases in the price of oil, either through higher insurance premia for transport through the Gulf of Aden, or through re-routing of shipments along much longer routes to Europe and North America around the Cape of Good Hope.

12 Interestingly, the recent political upheaval in Egypt posed a greater threat to European gas supplies, through the possibility of the Suez Canal being closed to LNG tankers, than to oil supplies.

13 See Paul Stevens, *Transit Troubles: Pipelines as a Source of Conflict*, Chatham House Report, March 2009.

The importance of maritime choke points in global energy trade

As indicated by Figures 1 and 2, international trade for both oil and gas – much of it seaborne – has increased significantly in recent years.

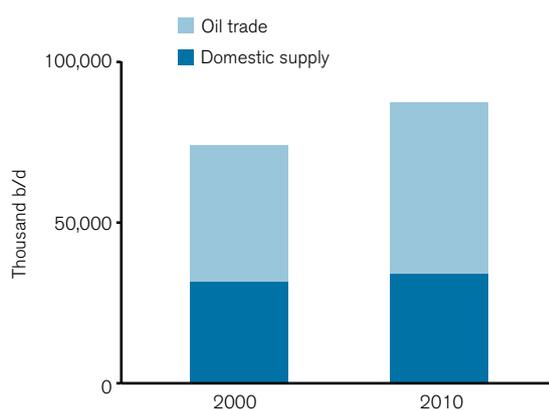
Table 1 provides estimates of daily crude oil and LNG volumes transiting several of the most critical maritime choke points: the Strait of Hormuz, the Strait of Malacca, Bab Al-Mandab, the Suez Canal, the Turkish Strait, the Panama Canal and the Danish Straits.

Overall, one-third of the world's total crude oil exports in 2010 passed through the Strait of Hormuz. There is an element of double-counting here because oil exports

from the Persian Gulf bound for the East Asian seaboard may transit both the Strait of Hormuz and the Straits of Malacca and Singapore.

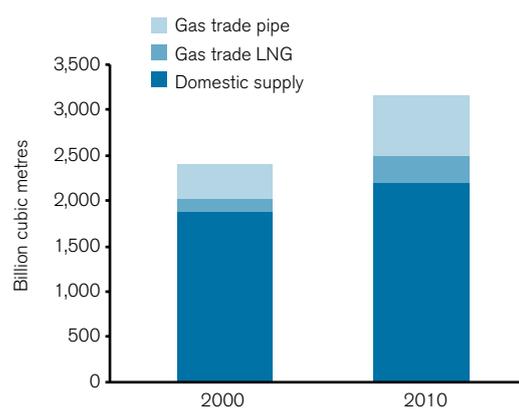
Whereas there are no alternative maritime routes to the Strait of Hormuz for oil exports from the Persian Gulf, shipments through the Straits of Malacca and Singapore could be re-routed, though at additional cost, through other waterways such as the Lombok Strait. Similarly, most oil shipments through Bab Al-Mandab subsequently transit the Suez Canal. Thus disruption to the Suez Canal would have a significant impact on shipments through Bab Al-Mandab. Were Bab Al-Mandab itself to be disrupted, some oil shipments could still be made

Figure 1: Increase in global oil trade from 2000 to 2010



Sources: BP Statistical Review of World Energy 2001 and 2011

Figure 2: Increase in global gas trade from 2000 to 2010



Sources: BP Statistical Review of World Energy 2001 and 2011

Table 1: Oil and gas transit through selected maritime choke points

Choke Point	Estimates of crude oil transit (millions of bpd)	Estimates of LNG transit (billions of cubic feet/day)
Strait of Hormuz	15.5-17.5	3.5
Strait of Malacca	13.6-15.0	n/a*
Bab Al-Mandab	3.2-3.5	3.5-4.0
Suez Canal	3.5-4.5	3.5-4.0
Turkish Strait	2.4-2.9	n/a
Panama Canal	0.8	n/a
Danish Straits	3.3	n/a

Sources: Various estimates by the authors; EIA

*Estimating the exact flow of LNG through the Strait of Malacca is complicated. Since the Fukushima nuclear accident, however, transit of LNG from Qatar to Japan has increased.

through the Suez Canal from Saudi Arabian facilities on the eastern coast of the Red Sea, north of Yemen. The availability of oil here would depend on an East–West pipeline through Saudi Arabia.

Likely future supply and demand trends suggest that the importance of these maritime choke points in energy trade will increase. The International Energy Agency's *World Energy Outlook* for 2011 projects crude oil supplies from the Middle East to grow from 2 million barrels per day (bpd) in 2010 to 36 million bpd by 2035, representing over 40% of global conventional oil supplies.¹⁴ The majority of this would pass through the Strait of Hormuz.¹⁵

Increasingly the destination of oil exports from the Middle East is likely to be the eastern seaboard of Asia, and China in particular.¹⁶ A large percentage of oil transiting the Strait of Hormuz could therefore also be expected to transit the Straits of Malacca and Singapore.

Disruption prolonged over several weeks could be expected to have a market and supply impact disproportionately greater than disruption of a few days. Optimization of the global energy system – as with the global economy in general – trades systemic efficiency for systemic vulnerability to the unexpected.¹⁷ The relative inelasticity of energy consumption to price would tend to exacerbate the impacts of disruption in the short to medium term. Over the longer term, a range of other factors could mitigate them.

Although the global economy is far less dependent on oil than a generation ago, supply disruptions would have broad economic consequences, largely as a function of the extent of any price increase and prevailing conditions in the global economy. In a period of weak economic growth – with several major consumer economies on the brink of recession – a sharp oil price spike could tip the global economy into a further slow-down.¹⁸ The specific GDP impacts would vary from country to country and from region to region depending on economic structure, but there would be many more losers than winners.¹⁹

Even before any actual physical disruption, however, expectations of insecurity and potential disruption to maritime choke points could drive paper markets for oil.²⁰ Fears of disruption to critical maritime choke points are a significant factor in local, regional and global politics. In the past, market reactions to the threat of disruption have been divergent, and sometimes contradictory. In December 2011, the day after Iranian Vice-President Mohammad Reza Rahimi warned that Iran would block the Strait of Hormuz if the European Union and the United States imposed further sanctions, the price of oil fell.²¹

The perceived risks of disruption at a particular maritime choke point depend less on physical geography and the hazards of navigation than on a range of other factors: the perceived stability and intentions of neighbouring states, the perceived ability of neighbouring states or

14 International Energy Agency, *World Energy Outlook 2011*, 2011. These figures are for the 'New Policies' scenario.

15 Not all oil exports from the Middle East need to transit the Strait of Hormuz. Saudi Arabia has existing pipeline capacity of 5 million bpd across the peninsula via the East–West pipeline. Iraq has the option to export oil to Ceyhan in southeastern Turkey, on the Mediterranean coast, via a pipeline with a capacity of some 1.5 million bpd. There is a further 1.6 million bpd capacity to export through the Iraq Petroleum Saudi Arabia (IPSA) pipeline, although this system has currently been cannibalized to transport gas within Saudi Arabia. Future investments in the pipeline network could, of course, further reduce the need to export through the Strait of Hormuz. The Hashban–Fujairah pipeline, circumventing the Strait of Hormuz from the west to the eastern coast of the United Arab Emirates (UAE) will have a capacity of 1.5 million bpd (40% of UAE's oil production) when it is expected to open in May/June 2012.

16 See Mitchell, *More for Asia*.

17 See, for example, Bernice Lee and Felix Preston, with Gemma Green, *Preparing for High-impact, Low-probability Events: Lessons from Eyjafjallajökull*, Chatham House Report, January 2012.

18 The economic consequences of an oil price spike depend on the starting point, some assumption about the period of price increase and assumptions about economic resilience generally and possible policy responses (e.g. an oil price increase in a period of general price inflation might encourage governments and central banks to increase interest rates). The IMF's 2011 *World Economic Outlook* pointed to four estimates by academic economists of the impact of a 10% oil price increase on US GDP growth. These ranged from -0.15% to -1%: IMF, *World Economic Outlook*, 2011, p. 122.

19 World Bank simulations in 2011 suggested a \$50 oil price spike lasting for one year would reduce GDP by 0.4% in 2012 in middle-income countries and by 2.4% in low-income countries. Globally, while oil-exporting countries would boost their GDP by an average of 0.5%, oil-importing countries would see it reduced by an average of 1.3%. Available at: <http://blogs.worldbank.org/prospects/gdp-impact-of-oil-price-shock>.

20 In contrast to 'wet barrel' markets where physical oil is traded, 'paper barrel' markets are those where promises to deliver or take delivery of oil are exchanged.

21 WTI oil prices rose slightly on 27 December and fell on 28 December. Nonetheless, prices over the first two weeks of January 2012 have been relatively elevated compared with those of the previous two weeks. This can be partly ascribed to political uncertainties relating to the Middle East.

the international community at large to prevent or deter disruption in the first place, or to mitigate it should it occur, and the applicability of legal regimes of free passage of commercial shipping in the event of some wider geopolitical instability, potentially involving one or more of the neighbouring coastal states. The fundamental challenge lies between the unpredictability on which some states may thrive, and the predictability of supply on which the global economy depends.²²

Choke points and price volatility

Two markets effectively determine the price of oil. The ‘wet barrel’ markets are where real barrels of oil are bought and sold on a spot or term contract basis. The ‘paper barrel’ markets are where promises to deliver or take delivery of paper barrels of oil are exchanged. The key determinants of oil prices overall are the interactions of perceptions within and across these two markets. The wet barrel market looks to prices in the paper barrel market for guidance on what prices might be. The paper barrel market looks to the wet barrel market to see if there is an expected shortage or surplus, and reacts accordingly.

Problems with maritime choke points, real or expected, have an impact on both markets. A loss of physical supply would affect the wet barrel market by creating shortages. The effect in terms of price and price volatility would depend on how much and what type of crude oil has been lost from supply, and how much spare capacity

and/or what stocks exist elsewhere to replace the loss, and the time-frame needed to do so.²³

However, at the same time, a crisis situation around a choke point will influence perceptions and expectations in paper barrel markets. This could in itself change oil prices dramatically. The uncertain role and impact of perceptions make it very difficult to predict the precise price impact of political instability or disruption of maritime choke points.²⁴ But that very uncertainty can increase the likelihood of price volatility as a result of feedback within paper markets.

Historically, episodes of instability around maritime choke points have indeed led to supply disruptions. The 1956 Suez crisis, leading to closure of the canal, and the 1980–88 Iran–Iraq war, particularly with the outbreak of the so-called Tanker War in 1984, both threatened oil supplies.²⁵

In both cases the impact on prices was initially minimal. In 1956 this was largely because the price of oil was administered and there were no paper markets, which emerged only in the mid-1980s.²⁶ Furthermore, in the case of the Tanker War, both the United States and the Soviet Union intervened to provide naval escorts to Kuwaiti tankers – and the United States allowed Kuwaiti tankers to be reflagged as American in order to allow for the right of convoy to be asserted.

Interestingly, when Somali pirates captured three Ultra Large Crude Carriers (ULCCs) in 2009–10 there was almost no impact on the oil price even though all three tankers had been loaded at Ras Tanura in Saudi Arabia

22 It should be borne in mind that in some scenarios where a maritime choke point was closed by a state, the responsible state would lose the possibility of exporting oil and gas itself. For example, in the case of Iran, which is highly dependent on oil exports in its balance of payments and in supporting government revenues, an inability to export would tend to count against economic and political stability. To the extent that an externally imposed embargo on oil exports is successful, however, the additional costs of attempting to block the Strait of Hormuz would be lowered.

23 A good example of this point comes from recent events in Libya. The wet barrel market lost some 1.4 million bpd of Libyan light sweet crude used in southern Europe, principally Italy. The spare capacity brought on-stream in Saudi Arabia to respond to this was some 900,000 bpd of heavy sour crude in the Persian Gulf. This created a significant price differential between light sweet crude and other crude oil prices, prompting the IEA to release 60 million barrels of oil from June 2011 in an attempt to moderate price increases.

24 Prices will be affected before there is any actual disruption, in the expectation or anticipation of disruption. There may be a price response in global oil markets linked to rising tension around Iran's nuclear programmes, for example, because of fears that the Strait of Hormuz could be affected by the consequences of any military action taken against Iran's nuclear infrastructure.

25 The Suez crisis led to supply shortages in Europe not so much as a consequence of oil itself being in short supply globally, but because the capacity to transport the same volume of oil to consumer markets was now curtailed. P. H. Frankel, ‘Oil Supplies During the Suez Crisis: On Meeting a Political Emergency’, *Journal of Industrial Economics* 6: 2, (1958), pp. 85–100. Frankel pointed out that the weighted average distance of oil shipments from the Persian Gulf to Europe was now forcibly increased from 4,900 miles to 11,200 miles. Europe was thus ‘faced with the problem of a man who had to buy some new shirts because his laundry has changed over from a weekly to a fortnightly delivery schedule’ (p. 86). In the case of the Iran–Iraq war there had been a number of attacks on vessels related to oil trade between 1980 and 1983, all of which were the result of Iraqi actions, and which mostly targeted Iranian or presumed Iranian exports. From 1984 to 1988 there were a far greater number of attacks, many of them on international shipping, of which over two-thirds were the result of Iranian action.

26 The first of the proper paper markets, NYMEX, only began trading crude oil in 1987.

and were bound for the American market. Thus this direct threat to Western oil supplies went effectively unnoticed by the paper markets.²⁷

Choke points and international law

The commercial and strategic importance of maritime mobility in general, and of maritime choke points in particular, has been a driving force in the evolution of the international law of the sea – both customary and treaty-based – which tends to emphasize the presumption that shipping should be relatively unimpeded, and that geographic choke points should not become choke points in the international trading system.

The maintenance of the freedom of the high seas, or a *mare liberum*, articulated in 1608 by Hugo Grotius, has long been at the heart of the customary international law of the sea.²⁸ The principle has traditionally been upheld by trading nations and naval powers – successively the Netherlands, Great Britain and the United States – which saw their own best interests served by the limitation of state sovereignty, including their own, to relatively narrow strips of seas and oceans near to shore, and by affording unimpeded free movement to all-comers – both merchant and naval vessels – beyond this limit (typically three nautical miles).²⁹

Practically, the impact of such limits was that few geographic straits or natural choke points fell entirely within the territorial sea of one or more coastal states. Even in relatively constricted seas, freedom of navigation prevailed as a matter of customary international law. In cases where a strait was narrower than six nautical miles a specific legal regime could be introduced, as with the Montreux Convention (1936) governing the Turkish

Straits between the Black Sea and the Mediterranean, long a point of acute geopolitical anxiety for Russia.³⁰

Other conventions served to strengthen the presumption of free and unimpeded transport through international straits; for instance, the Copenhagen Convention (1857) abolished tolls on shipping through the Danish Straits between the Baltic Sea and the North Sea. While coastal states retained some rights, subject to some interpretation in time of war, the balance of these conventions clearly favoured the rights of shipping. The principle and practice of *mare liberum* was key.

Though international canals are not natural maritime waterways – and consequently not governed by customary international law on the freedom of navigation – legal regimes governing canals tend to reflect the principles applying to straits. The 1888 Constantinople Convention internationalized the Suez Canal, allowing free passage for shipping in both peace and war (though the canal was, in fact, closed from 1967 to 1975). Two treaties signed between the United States and Panama in 1977 established the Panama Canal as a neutral waterway open to the shipping of all countries, coming under full Panamanian control in 2000 but with the stipulations of the US–Panama treaty on neutrality and the operation of the Panama Canal still in place.³¹

From the middle of the twentieth century, an increase in the number of coastal states, and more expansive unilateral claims made by coastal states about the extent of their territorial seas – or, in the case of a declaration made by President Truman in 1945, about the continental shelf³² – led to concerns that the sea was being transformed, quite rapidly, from a single, free and open highway for commerce and mobile naval forces, to a fragmented domain, with different rules and different claims to sovereignty which

27 Though this should perhaps come as no great surprise. Many of the players in the paper markets simply do not understand the international oil industry. Their responses to new information as it comes on to the market are hard to warrant. This makes predicting the price response to any threat to a maritime choke point virtually impossible. To take one example, an attack on the Abqaiq processing facility in February 2006 produced a relatively small price response because paper market traders were unaware of the central importance of the facility to Saudi exports.

28 Natalie Klein, *Maritime Security and the Law of the Sea* (Oxford University Press, 2010).

29 Grotius himself articulated the *mare liberum* principle in the context of his assertion of the rights of the Dutch to trade with the East Indies via the Indian Ocean, then claimed by Portugal.

30 The Montreux Convention, replacing the terms of the Lausanne Treaty (1923) which had demilitarized the Dardanelles, guarantees 'complete freedom of passage and navigation in the Straits, by day and by night, under any flag with any kind of cargo' (Article 2), but allows Turkey to close the Straits to warships in time of war, and to merchant ships from enemy nations in time of war. To some degree it also restricts the passage of warships, though this condition applies less to Black Sea states than to others.

31 See, for example, Mark P. Sullivan, 'Panama: Political and Economic Conditions and U.S. Relations', Congressional Research Service, May 2011.

32 US Presidential Executive Order 9633, 'Reserving and Placing Certain Resources of the Continental Shelf Under the Control and Jurisdiction of the Secretary of the Interior', 28 September 1945.

could ultimately destabilize the global system as a whole and place the movement of naval forces and increasingly important sea-borne commerce at the mercy of coastal states.³³

The number of geographic straits falling entirely within the territorial sea of coastal states – and legal uncertainty around the rights of third-party navigation through those straits – would inevitably increase as states extended their territorial sea claims from three to six nautical miles, or twelve, or even more. Without international agreement on the legal status of geographic straits traditionally used for navigational purposes, the principle of *mare liberum* and the practice of free navigation of commercial and naval vessels could progressively be curtailed. Disagreement between states was likely to lead to greater international tensions and potentially conflict, as highlighted in the 1949 Corfu Channel case.³⁴

In this context, coastal states and maritime states in effect struck a bargain, enshrined in the UN Convention on the Law of the Sea (UNCLOS), signed in 1982 and coming into force in 1994. Most, but not all, of the coastal states of key maritime choke points discussed above have ratified this convention. To the extent that UNCLOS codifies customary international law of the sea, however, its provisions still apply.

The UNCLOS bargain accepted twelve nautical miles as the maximum extent of a state's territorial sea but, in order to ensure freedom of navigation through key international straits, UNCLOS established a regime of 'transit passage' applicable to 'straits used for international navigation'.³⁵

This is the basic legal regime that applies to the major geographic choke points assessed here, bar international canals such as the Suez Canal (which do not fall under the definition of a strait) and the Turkish Strait (which is subject to its own pre-existing regime of navigation).³⁶

The right of transit passage through international straits under UNCLOS is articulated in Article 38 of the convention.³⁷ Although shipping exercising transit passage

Table 2: Status of ratifications of UNCLOS for coastal states of particular international straits

Strait/Country	Ratification status	Year
<i>Turkish Strait</i>		
Turkey	Not ratified	
<i>Malacca and Singapore Straits</i>		
Indonesia	Ratified	1986
Singapore	Ratified	1994
Malaysia	Ratified	1996
<i>Bab Al-Mandab</i>		
Yemen	Ratified	1987
Djibouti	Ratified	1991
Eritrea	Not ratified	
<i>Strait of Hormuz</i>		
Oman	Ratified	1989
Iran	Signed, but not ratified	1982 (Signed)*

Note: The United States has not signed or ratified UNCLOS, but considers it a restatement of customary international law, thereby enjoying its benefits and acting in accordance with it in practice.

*In signing UNCLOS in December 1982, Iran claimed that the benefits of UNCLOS, such as 'transit passage', did not apply to non-signatory states. In 1993 Iran introduced a Marine Areas Act, parts of which could be considered inconsistent with the law of the sea. See US Department of State Bureau of Oceans and International Environmental and Scientific Affairs, 'Iran's Maritime Claims', No. 114 in series 'Limits in the Seas', 16 March 1994.

is subject to a number of duties, these are fairly limited (Article 39). States bordering straits can adopt various practical measures – such as the traffic separation scheme that exists in the Strait of Hormuz – to improve 'safe passage' (Article 41). They can also adopt a number of laws and regulations in the part of a strait that is within their territorial waters, as long as these are non-discriminatory and, crucially, do not have the 'practical effect of denying, hampering or impairing the right of transit passage as defined in this section' (Article 42).

33 See Elliot L. Richardson, 'Power, Mobility, and the Law of the Sea', *Foreign Affairs* 58: 4 (Spring 1980), pp. 902–19.

34 The first case before the International Court of Justice, in which the ICJ held that the right of innocent passage existed in international straits.

35 UNCLOS (1982), Part III, 'Straits Used for International Navigation'.

36 Article 35 (c) of UNCLOS expressly notes that Part III of the convention does not affect 'the legal regime in straits in which passage is regulated in whole or in part by long-standing international conventions in force specifically relating to such straits'. Article 37 further defines a strait as being 'between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone'.

37 Although Iran, which signed UNCLOS in 1982 but has not ratified it, stated that it considered that the right of 'transit passage' only applied to states that had ratified UNCLOS, it is widely considered that most provisions of UNCLOS represent customary international law, confirming rights and duties beyond those states that have formally ratified it. 'Innocent passage' would in any case apply.

The emphasis on ‘practical effect’, as opposed to reference to legal principle, makes it hard for any state bordering a strait to use frivolous regulations to impede shipping through an international strait without finding itself on the wrong side of international law. Article 44 re-emphasizes the point and establishes that ‘there shall be no suspension of transit passage’.³⁸ Overall, the balance of rights and duties afforded to maritime states and states bordering the straits under UNCLOS is clearly weighted towards maintaining free passage through international straits, as against allowing coastal states to exercise unilateral control over parts of their territorial waters that constitute straits used for international navigation.

There is some debate over the extent to which environmental considerations could allow a state bordering a strait to establish potentially more constraining rules with respect to ‘transit passage’, in accordance with Part XII of UNCLOS³⁹ and, since UNCLOS was negotiated thirty years ago, a growing sensitivity globally to environmental concerns.

For example, states bordering the Malacca Strait have backed Malaysia’s insistence that Japanese plutonium should not be shipped through it.⁴⁰ At the same time, however, some have questioned the legality under international law of Australia’s compulsory pilotage regime in the Torres Strait between Australia and Papua New Guinea. It is highly doubtful whether this regime could, in any case, be taken as a precedent for other straits used for international navigation.⁴¹

But UNCLOS is not necessarily the final word, and while it creates the framework of the international law of the sea – the constitution of the oceans – it does not exclude regional

or other cooperation within that framework. Indeed it encourages the establishment of cooperative mechanisms between user states and states bordering straits to improve navigation and prevent pollution (Article 43).⁴²

This provides the basis in international law for the Cooperative Mechanism for the Straits of Malacca and Singapore, established in 2006, between Indonesia, Malaysia and Singapore.⁴³ Building on several decades of cooperation, these three coastal states opted not to adopt a Regional Maritime Security Initiative (RMSI) proposed by the United States (towards which Singapore was reported as being favourable).⁴⁴ While affirming coastal state sovereignty over the waters of the straits, the Cooperative Mechanism builds confidence in the effective management of the straits as a choke point in the global maritime economy. It provides limited means for financial burden-sharing with users.⁴⁵

Maritime choke points in an age of insecurity

The applicability of UNCLOS – and therefore the transit passage regime in straits used for international navigation – in time of war is debated. As noted above, the situation for international canals, not being subject to the UNCLOS transit passage regime, is somewhat different, depending on the relevant provisions of their specific governing treaties. Clarity on how different states view rights and duties concerning transit in time of war, and most particularly clarity on the part of states bordering straits, would be welcome as a means of building confidence among both user states (countries whose ships use straits for international navigation) and energy

38 Article 44 reads: ‘States bordering straits shall not hamper transit passage and shall give appropriate publicity to any danger to navigation or overflight within or over the strait of which they have knowledge. There shall be no suspension of transit passage.’

39 Part XII of UNCLOS is entitled ‘Protection and Preservation of the Marine Environment’.

40 J. M. Van Dyke, ‘Sea Shipment of Japanese Plutonium under International Law’, *Ocean Development and International Law* 24 (1993), pp. 399–403.

41 Sam Bateman and Michael White, ‘Compulsory Pilotage in the Torres Strait: Overcoming Unacceptable Risks to a Sensitive Marine Environment’, *Ocean Development and International Law* 40 (2009), pp. 184–203. Given the specific and widely recognized environmental conditions of the Torres Strait, including by the IMO, Bateman and White contend that compulsory pilotage here, which is in any case limited in application and enforcement, does not entail a unilateral right on the part of a state bordering a strait to insist on compulsory pilotage elsewhere.

42 Article 43 reads: ‘User States and States bordering a strait should by agreement cooperate: (a) in the establishment and maintenance in a strait of necessary navigational and safety aids or other improvements in aid of international navigation; and (b) for the prevention, reduction and control of pollution from ships.’

43 At the Batam ministerial meeting in 2005, the three states emphasized the provisions of Article 43 of UNCLOS.

44 See Natalie Klein, *Maritime Security and the Law of the Sea*, p. 86; and Joshua Ho, ‘Operationalising the Regional Maritime Security Initiative’, IDSS Commentaries, May 2004. Japan was apparently prepared to contribute naval forces to the area as a means of securing a strait through which 80% of its oil from the Middle East passes.

45 The Aids to Navigation Fund in the Malacca and Singapore Straits has received support from the Nippon Foundation (a private Japanese foundation) and, both directly and indirectly, through the International Maritime Organization and the governments of South Korea, China, Greece and the United Arab Emirates.

consumer states (recipients of oil and gas exported through straits used for international navigation).

Building on various conventions and treaties on the laws of naval warfare, and customary international law, the San Remo Manual on International Law Applicable to Armed Conflict at Sea (1994)⁴⁶ is itself explicit, considering that: ‘the rights of transit passage [through straits used for international navigation] ... in peacetime continue to apply in times of armed conflict’.⁴⁷

In line with the traditional protections afforded to neutrals in the laws of war, neutral shipping receives particular attention throughout the San Remo Manual. Neutral merchant vessels ‘may not be attacked’ unless they are ‘believed on reasonable grounds to be carrying contraband or breaching a blockade’ (Article 67).⁴⁸ The imposition of blockades or military zones – a potentially legal measure for one belligerent to take against another in time of war – should not impede access to the ports and coasts of neutral states.⁴⁹ As a general proposition, transit passage through international straits should not be impeded by mines ‘unless safe and convenient alternative routes are provided’, which is rarely the case in international straits (Article 89).⁵⁰

Further to the San Remo Manual it can be argued that the failure of a state to prevent acts that led to a terrorist group exploding a ship in an international strait would violate Article 2 (4) of the UN Charter.⁵¹ If a strait used for international navigation were to be deliberately impeded, or if neutral shipping in a strait were attacked, there would be various potential practical and legal responses. Shipping could

be re-flagged, as occurred during the 1980–88 Iran–Iraq war, to help prevent further action being taken, and to allow naval vessels of the same nationality as commercial vessels to protect them in convoy (including in the exercise of transit passage).⁵²

Depending on the nature and frequency of the attacks on its shipping, a neutral state could have a right to self-defence either singly or, in accordance with the right of collective self-defence, with its allies (Article 51 of the UN Charter).⁵³ The United Nations Security Council could deem an armed intervention necessary under Chapter VII of the UN Charter, and request members of the United Nations to enforce it.⁵⁴

There could potentially be a claim for liability after a conflict, to be determined either under the terms of a subsequent peace agreement (such as the Eritrea Ethiopia Claims Commission established by the Algiers peace agreement between those two states) or under the UN Security Council (such as the UN Compensation Commission set up following the first Gulf War).

The United Nations Security Council has, in recent years, acted to promote maritime security in the non-conflict context of multilateral anti-piracy operations off the coast of Somalia (under UNSC Resolution 1816 and then 1851 passed in December 2008).⁵⁵ And while these resolutions have been very clear in emphasizing that these actions do not create any new customary international law – and in any case apply against a non-state actor against which there is universal jurisdiction – they do demonstrate the increasing willingness of the international community to act multilaterally to protect international shipping.

46 Though the San Remo Manual is a non-binding document it is widely considered to be the best expression of current law on this issue.

47 Article 27, San Remo Manual. Article 32 further states that ‘Neutral vessels may likewise exercise the right of innocent passage through belligerent international straits and archipelagic waters.’ Article 33 states that ‘The right of non-suspendable innocent passage ascribed to certain international straits by international law may not be suspended in time of armed conflict.’

48 Contraband is defined in Article 148 as goods that are ‘ultimately destined for territory under the control of the enemy and which may be susceptible for use in armed conflict’.

49 San Remo Manual, Part IV, Section II.

50 Neutral states would additionally be able to clear mines without committing ‘an act inconsistent with the laws of neutrality’ (Article 92).

51 Article 2 (4) of the UN Charter reads: ‘All Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the purposes of the United Nations.’

52 The neutral nationality of a vessel in time of war, however, may not only depend on its flag, and cannot by itself afford protection. Other considerations, such as its ownership and destination and the nature of its cargo, will certainly come into play in determining the legality or otherwise of actions taken against it. See George K. Walker, *The Tanker War, 1980–1988: Law and Policy*, International Law Studies, Vol. 74 (Newport, RI: US Naval War College, 2000).

53 The Oil Platforms case (ICJ)(2003) concluded that, in the context of the Tanker War (1984–88), the US was not justified in actions to destroy various on-shore Iranian oil installations as ‘self defence’ in response to a missile attack on a US-flagged Kuwaiti tanker.

54 Article 39 of the UN Charter allows the UN Security Council ‘to determine the existence of any threat to the peace, breach of the peace, or act of aggression’.

55 These resolutions also reaffirmed UNCLOS as the framework for dealing with piracy at sea, specifically stated that these resolutions should be seen as creating customary international law, and further affirmed that authorizations provided by the UN Security Council had been provided only after a letter conveying the consent of the Transitional Federal Government (of Somalia) had been received (Article 10, UN Security Council Resolution 1851).

Policy options

The economic and strategic significance of maritime choke points to the global energy economy makes confidence in their security a key issue for international policy. A number of non-exclusive policy options are discussed briefly here.

In general, the risks of disruption are likely to be lowered if the expected disruption to global energy markets is itself reduced, since this would minimize the attractiveness of disruption as a strategy of state or non-state actors.

- **Alternative routes:** Making maritime choke points less salient to the overall global energy economy by building alternative means of transporting oil and gas, such as a spur line from Abu Dhabi to Oman to avoid the Strait of Hormuz,⁵⁶ or upgrading existing infrastructure and increasing its capacity.⁵⁷ The key question here is who would be expected to bear the cost for additional redundancy in the distribution system, and whether new infrastructure might create new vulnerabilities. Alternative routing, were it to reduce the risk of maritime accidents, would also potentially have a positive environmental impact.
- **Strategic stocks on a regional or global basis:** Although this is widely considered a means of enhancing the resilience of the global energy system, the record of stock releases by the International Energy Agency has tended to aggravate rather than dampen price volatility. However, a 'ticketing' system for the provision of emergency supplies might help overcome the characteristics, exhibited in the first and second oil shocks, of a price shock becoming generalized because of aggressive bidding on the part of companies facing well above average supply shortages.⁵⁸
- **More regular convoy protection in times of heightened tension:** This would require some collective management, perhaps by NATO or under a UN Security Council mandate. Such a plan could, however, limit the flexibility that currently characterizes the oil tanker trade. Establishing and enforcing freedom of passage would ultimately depend on the willingness of UN member states to provide the means to do so. In the past this has chiefly been through US naval deployments, though given the changes in dependence on oil supplies transiting maritime choke points in recent years, other existing and emerging naval powers might now be willing to contribute to such protection.
- **Controlling the paper barrel markets:** This is a constant refrain and has attracted a lot of attention since 2008 when there was extreme price volatility. To date, the authorities have found it difficult to regulate or control such markets beyond minor changes to limit certain types of trading. The fear is that if the formal paper markets are too harshly regulated they will simply disappear into cyberspace outside regulatory control. To some extent this has already happened with the development of 'over-the-counter' trades directly between two parties.
- **Political declaration from user states, including China:** An international declaration of user states on the rights of shipping in international straits could change the calculus of any state considering an attempt to shut an international strait to neutral shipping in a time of crisis or war. Clearly the deterrence effect would depend on the precise wording of such a declaration and the identity of the signatories. A declaration issued by G20 states (a group that includes all five permanent members of the United Nations Security Council), while not binding those states to a particular course of action, would nonetheless indicate that the impact of shutting an international strait in a time of war was likely to be limited by a coherent international response (potentially involving UN Security Council action), and the political and diplomatic cost to the instigator would be high. China, as a major importer of oil and gas through straits used for international navigation, has a strong potential interest in supporting such a declaration.

56 Dagobert Brito and Amy Myers Jaffe, 'Reducing Vulnerability of the Strait of Hormuz' in Henry Sokolski and Patrick Clawson (eds), *Getting Ready for a Nuclear-Ready Iran* (Carlisle, PA: US Army War College, 2005).

57 The Hashban–Fujairah pipeline across UAE is expected to come into service in May/June 2012.

58 See John V. Mitchell, 'Anatomy of an Oil Crisis', *Zeitschrift für Energiewirtschaft*, June 1982.

- **Political declaration from coastal states:** Coastal states of choke points could themselves reaffirm the provisions of UNCLOS on transit passage and reiterate that these would continue to apply in time of tension or war. While this would be a political commitment confirming current international law, rather than a treaty with legal effect, it could help build confidence in the security of the straits, if only by demonstrating coastal states' recognition of, and therefore acceptance of, legitimate user concerns. For such a declaration to be convincing, those coastal states that have so far failed to ratify UNCLOS (see Table 2) would need to do so. However, if the perceived option of harassing shipping in the event of tension or conflict is seen by one or more coastal states as having its own deterrent effect on others, then such a political declaration to uphold transit passage may be difficult to elicit.
- **Cooperative mechanisms:** If the political environment were more permissive, cooperative arrangements could be made between the littoral states of a strait used for international navigation, which could in turn be supported by user states. While littoral states would be likely to oppose the internationalization of straits on the grounds that this runs counter to their sovereign rights under international law, cooperative mechanisms on the model of the Straits of Malacca and Singapore could reassure user states and global oil and gas markets.
- **Support for international cooperation outside regional or individual strait frameworks:** The work of the International Maritime Organization in establishing 'soft law' can serve to build confidence around maritime regimes.
- **A specific convention on maritime choke points:** While UNCLOS will remain the fundamental framework for the law of the sea, a specific convention on maritime choke points could more explicitly recognize their importance to the global economy, and establish more clearly the rights of different parties. This would take a long time to negotiate, however, and might be viewed as actually detracting from the broader balance established in UNCLOS.

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