nationalisation (Britain had nationalised its own coal industry five years earlier), and its effort to have the International Court of Justice declare Iran in violation of the concession agreement failed. In 1953 the CIA and the British intelligence services organised a coup, which removed Mossedegh from power and gave the Shah the power to defeat the nationalist movement and crush the labour movement and the left. The Anglo-US coup re-established foreign control over the country's oil – although Washington forced Anglo-Iranian, now renamed BP, to reduce its share of the oil monopoly to 40 per cent, with US and other foreign firms sharing the remainder.[73]

After the First World War, Britain had turned the doctrine of self-determination into a means for manufacturing a weakened but cost-effective mechanism of indirect rule in Iraq, securing for the handful of major international oil companies control of the region's oil. The oil firms delayed the development of the oilfields during the interwar period, protecting their monopoly control of world oil. After the Second World War, the construction of new energy networks replacing coal with oil was the basis for weakening the left in Europe and building there the corporatist forms of postwar democracy. Those networks had different political properties from the coal-centred energy arrangements they replaced. Although the oilfields, pumping stations, pipelines and refineries of the Middle East became sites of intense political struggle, they did not offer those involved the same powers to paralyse energy systems and build a more democratic order.

73 Ervand Abrahamian, 'The 1953 Coup in Iran', *Science and Society* 65: 2, Summer 2001: 185–215.

CHAPTER 5

Fuel Economy

We are learning to think of democracy not in terms of the history of an idea or the emergence of a social movement, but as the assembling of machines. Those who assembled the supply of coal into an apparatus for democratising the industrialised world had tried to extend its mechanisms to govern relations with non-European regions. Following the crisis of the First World War, they proposed devices to govern the international flow of finance and redirect its profits to beneficial ends. The imperial powers, in uneasy alliance with local forces, managed to forge an alternative device, one that replaced democratic claims with the process of 'self-determination' and substituted for the democratic control of international capital the emergent apparatus of 'development'.

The difficulty in governing the movement of money continued to be an obstacle to the growth of more egalitarian and democratic politics, an obstacle increasingly connected with the flow of oil. A generation later, in the wake of the failure of democratic governments in Europe and a second global war, another effort was made to devise a method for managing the international flow of finance, the arrangement known as the Bretton Woods system. Its development coincided with new forms of democratic politics in industrialised countries, based on the management of what had recently come to be called 'the economy'. Both the international financial arrangement and the apparatus of 'the economy' were devices for governing democracies; both systems, as we will see, were constructed in ways that took advantage of the rapidly increasing use of non-renewable carbon energy, which with the shift to the age of oil continued its exponential rate of growth. In order to grasp the changing relation between carbon energy and democracy in the second half of the twentieth century, we must explore the place of oil in these two machineries of government.

OIL TO DRIVE THE MONEY LENDERS FROM THE TEMPLE

The collapse of democracy in Europe in the 1920s and 1930s, the rise of fascism and the slide towards another world war were understood to have been caused by the collapse of methods for maintaining the value of money. In central and eastern Europe, countries were forced to abandon the attempt to base the value of their currencies on reserves of gold. One by one their domestic financial systems collapsed, middle classes were pauperised, the poor endured widespread unemployment, and interwar democracy was destroyed. 'The breakdown of the

international gold standard', Karl Polanyi wrote in 1944, was 'the mechanism which railroaded Europe to its doom'.[1]

During the Second World War, Britain and the United States made plans to engineer a new mechanism for managing the international movement of money. At a meeting in July 1944 at the Mount Washington Hotel in Bretton Woods, a faded New Hampshire resort built in 1902 with the fortune of a Pennsylvania coal magnate, the forty-four Allied states reached agreement on a plan, setting up the International Monetary Fund and International Bank for Reconstruction and Development, today known as the World Bank. The Bretton Woods agreement abandoned a system that had been built on the wealth and technologies of coal and replaced it with one based on the movement of oil.

To prevent a repeat of the interwar financial catastrophe and another collapse of democracy, governments had to control those whose actions had caused it – the currency speculators. The discovery of the Witwatersrand goldfields in southern Africa in the 1880s (see Chapter 3), and the consolidation there of the British gold-mining monopolies and their racialised labour regime, had allowed the expansion of international trade regulated by reserves of gold. It also encouraged the growth of large private banks, which profited from speculation in the value of national currencies. The goal of the Bretton Woods reforms was to eliminate the power of the bankers to speculate. In his address at the closing of the Bretton Woods talks, the Secretary of the US Treasury, Henry Morgenthau, said that the purpose of the new monetary system was to 'limit the control which certain private bankers have in the past exercised over international finance' and drive 'the usurious money lenders from the temple of international finance'.[2] To curb large-scale speculative movements of capital, the value of currencies was to be tied not to reserves of gold but to the exchange of goods, whose value reflected human and material wealth. Declaring that no people or government 'will again tolerate prolonged or wide-spread unemployment', Morgenthau argued that with the new international financial machinery 'men and women everywhere can exchange freely, on a fair and stable basis, the goods which they produce through their labor'.

The new system managed to limit the destructive power of private currency speculators for about two decades. It achieved this, however, by connecting the value of currencies not to the general flow of goods produced by the labour of men and women, but principally to the movement of oil. The speculators were able to weaken the mechanism in the late 1960s thanks to stresses created by the

1 Karl Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time*, New York: Farrar & Rinehart, 1944: 20.

2 'Address by the Honorable Henry Morgenthau, Jr., at the Closing Plenary Session' (22 July 1944), in Department of State, ed., *United Nations Monetary and Financial Conference: Bretton Woods, Final Act and Related Documents, New Hampshire, July 1 to July 22, 1944*, Washington DC: US Government Printing Office, 1944: 7–10, available at www.ena.lu.

movement of oil, and destroyed it in the 1980s when they devised new ways to speculate in currencies.[3]

Currency systems are always material as well as calculative devices, built out of technical processes. The gold standard, the previous mechanism, had been initially made possible by coal and steam power, in ways we will examine later. Gold reserves could no longer provide the instrument to secure international financial exchange, because the European allies had been forced to send all their gold bullion to America to pay for imports of coal, oil and other wartime supplies. By the end of the war the United States had accumulated 80 per cent of the world's gold reserves. At Bretton Woods, the United States agreed to fix the value of the dollar on the basis of this gold, at $35 per ounce. The other participating countries agreed that the dollar would be the only reserve currency convertible at a fixed rate to gold, and that the value of their own currencies would be tied to the dollar, and thus indirectly to the American gold monopoly. However, the circulation of dollars soon began to outpace American accumulations of gold, in part because the gold miners of South Africa could not increase their production of gold as fast as world trade, fuelled by the easier flow of oil, began to grow.[4] In practice, what sustained the value of the dollar was that countries had to use the American currency to purchase the essential materials that formed the bulk of international trade, above all oil.

In both value and volume, petroleum had become the largest commodity in world trade. In 1945 the United States produced two-thirds of the world's oil, and more than half of the remaining third was produced in Latin America and the Caribbean.[5] Under the arrangements that governed the international oil trade, the commodity was sold in the currency not of the country where it was produced, nor of the place where it was consumed, but of the international companies that controlled production. 'Sterling oil', as it was known (principally oil from Iran), was traded in British pounds, but the bulk of global sales were in 'dollar oil'. The rest of the world had to purchase the energy they required using American dollars. The value of the dollar as the basis of international finance depended on the flow of oil.

The place of oil in international finance escapes most standard accounts of the postwar financial system. Yet it was clearly understood in postwar planning documents.[6] John Maynard Keynes and Harry Dexter White, the

3 Donald A. MacKenzie, *An Engine, Not a Camera: How Financial Models Shape Markets*, Cambridge, MA: MIT Press, 2006.

4 Barry Eichengreen, *Global Imbalances and the Lessons of Bretton Woods*, Cambridge, MA: MIT Press, 2007: 40–1.

5 Degolyer & MacNaughton, *Twentieth Century Petroleum Statistics*, Dallas: DeGolyer & MacNaughton, 2009.

6 See for example Cornelius J. Dwyer, 'Trade and Currency Barriers in the International Oil Trade', Walter J. Levy Papers, Box 22, Folder 4, Laramie, Wyoming: American Heritage Center, University of Wyoming, 1949. Dwyer was assistant chief, Petroleum Branch, Economic

architects of the Bretton Woods system, had argued for a third institution alongside the International Monetary Fund and the World Bank, to manage trade in oil and other essential raw materials.[7] Their proposals for rebuilding the international financial system after the war included schemes to create stockpiles of oil, rubber, sugar and other commodities to prevent shortages, gluts and price swings. Even those opposed to Keynes – in particular the nascent neoliberal movement, which objected to the government regulation of international banking – accepted the need to reduce financial speculation by tying the movement of money to trade in key commodities such as oil. Drawing on Benjamin Graham's proposal for 'a modern ever-normal granary', Friedrich Hayek, the intellectual leader of the movement, argued for an 'international commodity standard' to replace the gold standard, in which currency would be issued in exchange for 'a fixed combination of warehouse warrants for a number of storable raw commodities'.[8] Both sides of the debate about preventing the speculative destruction of currencies believed that postwar financial stability, and thus the future of democracy, depended on managing the storage and exchange of key commodities. Increasingly the movement of just one commodity, petroleum, provided the mechanism that stabilised, or threatened to disrupt, the democratic order.

The concern with oil was visible in the sequence of meetings that established the new arrangements. Between the talks at Bretton Woods in July 1944, which created the postwar financial regime, including the IMF and the World Bank, and those at Dumbarton Oaks in the autumn of the same year, where the allied powers formulated arrangements for a successor to the League of Nations, a third meeting was held: representatives of Britain and the United States met in Washington in early August to draw up a postwar petroleum order. The meeting finalised plans to establish a permanent body to be called

Cooperation Administration (the US government agency that administered the Marshall Plan). The neglect of oil in standard histories of the international financial system can be seen, for example, in Barry Eichengreen, 'The British Economy Between the Wars', in Rodrick Floud and Paul Johnson, eds, *The Cambridge Economic History of Modern Britain*, Cambridge, UK: CUP, 2004, and *Globalizing Capital: A History of the International Monetary System*, 2nd edn, Princeton: Princeton University Press, 1996; and in Francis J. Gavin, *Gold, Dollars, and Power: The Politics of International Monetary Relations, 1958–1971*, Chapel Hill: University of North Carolina Press, 2004.

7 Harry Dexter White argued for an 'international essential raw material development corporation' whose function would be 'increasing the world supply of essential raw materials and assuring member countries of an adequate supply at reasonable prices'. Harry Dexter White, 'United Nations Stabilization Fund and a Bank for Reconstruction and Development of the United and Associated Nations', preliminary draft, March 1942, Chapter III: 30. Harry Dexter White Papers, 1920–55, Box 6, Folder 6, Public Policy Papers, Princeton: Seeley G. Mudd Manuscript Library.

8 F. A. Hayek, 'A Commodity Reserve Currency', *Economic Journal* 53: 210/211, 1943: 176–84; Benjamin Graham, *Storage and Stability: A Modern Ever-Normal Granary*, New York: McGraw-Hill Book Company, Inc., 1937.

the International Petroleum Council. Just as the IMF was intended to limit the chaos caused by the speculative dealings of international banks, the parallel organisation for petroleum was intended to limit the trouble caused by international oil companies – and to pre-empt the oil-producing countries, especially in the Middle East, from taking control of the oil themselves. In an echo of the mandates established under the League of Nations to obstruct the demand for political independence in the Arab world, the International Petroleum Council was envisaged as a form of 'trusteeship' to facilitate Anglo-American control of Middle Eastern oil.

A TRUSTEESHIP OF THE BIG POWERS

The major oil companies cooperated with the scheme for an international oil body as an alternative to Keynes's wider plans for the international control of commodities – plans that were to be discussed at the inaugural meeting of the United Nations in April 1945. The head of Shell's US subsidiary warned that if the companies failed to support the International Petroleum Council they risked a 'master agreement made in San Francisco that proposes to cover all sorts of commodities with all sorts of countries'. In the special oil agreement, he said, 'we have something we have had a hand in making'.[9] The impetus to create a new regime governing Middle Eastern oil also came from the weakened position of the American international oil companies in their main overseas region, Latin America. There was alarmist talk from oil executives about the depletion of US reserves and new military needs for petroleum, which helped them win subsidies from Washington for developing Middle East production. But the real problem they faced was to the south.

Immediately before the war, the 'rude expropriations' of American interests in Bolivia and Mexico, as the State Department's petroleum adviser put it, and the move towards state monopolies or much stiffer concession terms in the rest of Latin America, had made it more difficult for US firms to make large profits there.[10] Postwar profits would have to be obtained increasingly from the Middle East, where large undeveloped oil resources continued to pose a threat, but pressure for national control of oil resources seemed easier to prevent. US companies had acquired concessions there in the interwar years, but made little effort to develop them. With declining wartime need for oil from the Middle East, they were able to scale back their modest operations. In 1945 the Middle

9 Minutes of National Oil Policy Committee, 18–19 April 1945, cited in Stephen J. Randall, *United States Foreign Oil Policy, 1919–1948: For Profits and Security*, Montreal and Kingston: McGill-Queen's University Press, 1985: 206.

10 Herbert Feis, 'The Anglo-American Oil Agreement', *Yale Law Journal* 55: 5, 1946: 1,174–5; Michael B. Stoff, 'The Anglo-American Oil Agreement and the Wartime Search for Foreign Oil Policy', *Business History Review* 55: 1, Spring 1981: 59–74.

East produced only 7.5 per cent of the world's oil, two-thirds of which came from the British-controlled oilfields in Iran.[11]

In building oil industries in Venezuela, Mexico and other parts of Latin America, the oil companies had been obliged to deal with sovereign states, independent for more than a century and increasingly able to negotiate more equitable oil agreements. In the Middle East, sovereign states were still forming out of older local and imperial forms of rule. The oil companies could portray their role there as the 'development' of remote and backward peoples, and impose less equitable arrangements.

The State Department wanted to prevent the US oil companies from causing the same problems for themselves in the Middle East that they had created in Latin America. An international framework, in agreement with Britain, would give corporate oil operations the appearance of a trusteeship, the new term for the old idea of the mandate. A petroleum agreement could frame Anglo-US control of the oilfields of the Middle East as a means of making the oil available to every country that needed it, and present this 'equitable' management as a principle that disqualified the claims of producer countries to control their own oil. A report for the State Department by the Office of Strategic Services suggested, 'The principle of equitable distribution and exploitation overrides to some extent the sovereign rights of the oil producing countries and presupposes a kind of trusteeship of the big Powers over the world's oil resources.'[12]

Initially Washington intended to have a government agency play the role of trustee. In 1943, the US Petroleum Administration for War established a government oil company, the Petroleum Reserves Corporation, to assume control of the oil reserves of Saudi Arabia. It planned to take majority ownership of the California-Arabian Oil Company, the American joint venture that owned rights to the oil. Washington also extended wartime Lend Lease aid to Saudi Arabia (relieving US oil companies of the need to subsidise the rule of Ibn Saud), and drew up plans to construct a US government-owned pipeline to carry oil from the Saudi oilfields to the Mediterranean. By taking control of the oil of Saudi Arabia, the State Department hoped to do a better job than the oil companies in preventing nationalisation, in part by funnelling financial support to the region's ruling families to use for 'development'.[13] After the First World War, the British government had envisioned its mandate over Iraq as a scheme for the 'development' of the country's material resources, to create a new form of protectorate and encourage the oil companies to invest in the stability of imperial power. Washington's plans for trusteeship were a new version of imperial development.

11 DeGolyer & MacNoughton, *Twentieth Century Petroleum Statistics*.

12 OSS, Research and Analysis Branch, 'Comments on a Foreign Petroleum Policy of the Unites States', cited in Randall, *United States Foreign Oil Policy*: 147.

13 Robert Vitalis, *America's Kingdom: Mythmaking on the Saudi Oil Frontier*, 2nd edn, London: Verso, 2009: 62–125.

The American owners of the Saudi rights, Standard Oil of California (later renamed Chevron) and Texaco (now merged with Chevron), blocked Washington's attempted takeover. To create the impression of an official American partnership with the Arab state, they changed the name of their joint venture from the California-Arabian to the Arabian-American Oil Company (Aramco). Rather than allowing the government to invest in the company, they raised the capital they needed for postwar expansion by arranging for the Standard Oil Companies of New Jersey and New York (now ExxonMobil) to buy a 40 per cent share in Aramco. They also defeated the pipeline plan, but then demanded government support for building themselves (see map overleaf).

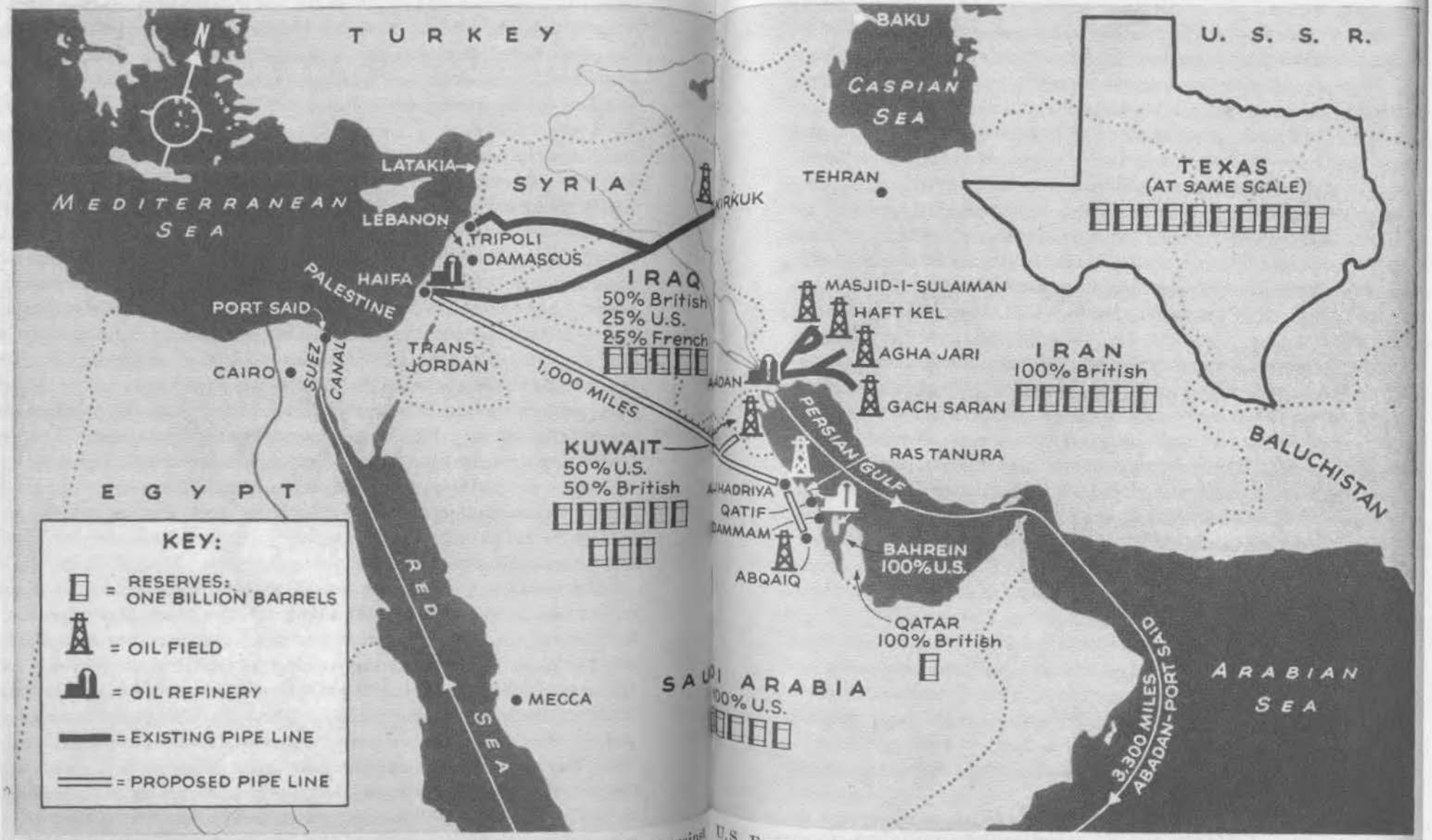
Similar American plans for a 'trusteeship' over oil were unfolding in Iran, which Britain and Russia had occupied during the war. Attending a meeting with Churchill and Stalin in Tehran at the end of 1943, at which a tentative plan for creating the UN was agreed, President Roosevelt took up State Department ideas for framing the US role in postwar Iran as an international trusteeship. He described the team of fifty US administrative advisers already working in Iran as a 'clinic' that was 'demonstrating the practicability, and something of the form of the projected new "trusteeship"'.[14] Like the mandate for Iraq after the First World War, the trusteeship idea for Iran offered a way for the United States to challenge Britain's control of the oil, while pushing the American oil companies to take steps towards the country's broader 'development.' The State Department pressed the Standard Oil companies and another US firm to bid for oil concessions, but when American petroleum geologists failed to find good prospects in the south-east, and began surveying in the north near the border with the Soviet Union, Moscow responded by asserting its own claims to an oil concession in the north.

The reason why Middle Eastern oil should be placed under American control was sometimes hard to clarify. Herbert Feis, a former economic adviser at the State Department who had chaired its Committee on International Oil Policy in 1943, tried to explain to the public the need for the international oil agreement. 'Nations that lacked oil had to bargain or barter for it; they became dependent on the will and bounty of others', he wrote, adding with barely veiled sarcasm: 'the United States was unused to the idea'.[15] A senior economic policy-maker may have enjoyed pointing out, after leaving office, that for oil companies the principle of market exchange – bargaining for something and depending on this interaction with others – was an unfamiliar idea. The Cold War soon provided the oil companies with a way to deflect such cynicism.

14 Arthur Millspaugh, *Americans in Persia*, Washington, DC: Brookings Institution Press, 1946: 8, cited in Simon Davis, '"A Projected New Trusteeship"? American Internationalism, British Imperialism, and the Reconstruction of Iran, 1938–1947', *Diplomacy & Statecraft* 17: 1, 2006: 31–72.

15 Feis, 'Anglo-American Oil Agreement': 1,174.

Middle East Oil CONTINUED



Middle East oil in proven reserve is estimated at more than 26,000,000,000 barrels, as against U.S. reserve of 20,000,000,000, enough to last 15 more years at present rate of consumption. Britain monopolizes all the working Iran fields. Russia would like north Iran oil and Dutch have a great unexplored concession in northwest Iran. Britain controls Iraq oil (*see next page*) but U.S., French and Dutch have interests there. U.S. operates Bahrein (*see pp. 32–33*), has inside track in Saudi Arabia (*pp. 34–37*) and shares the new Kuwait field with British. Only fields shown above are those explored and working (but nonproducing Qatar and Kuwait are shown because of importance). Proposed U.S. pipeline across Arabia is far shorter than water route.

'Middle East oil: Trouble erupts as great powers jockey for the power that petroleum provides', *Life*, 11 June 1945

The ambition of the State Department in establishing an oil agency to stand alongside the IMF and the World Bank, in the words of a departmental memo, was to create a 'worldwide system of actual administrative control of the world's petroleum resources'.[16] The Anglo-American Petroleum Agreement, drawn up in 1944 to provide the framework for the post-war petroleum order, called for 'the efficient and orderly development of the international petroleum trade', and said this required 'international agreement' among producing and consuming countries – a clear alternative to the unilateral actions of the Latin Americans. Article 1 of the agreement laid out the new formula for the defeat of any further efforts by producer countries to control their own oil: supplies of petroleum should be made available in international trade to all countries 'on a competitive and nondiscriminatory basis' and 'within the framework of applicable laws and concession contracts'; thereby, 'the interests of producing countries should be safeguarded with a view to their economic advancement'. In other words, the large oil companies would represent the interests of all countries in managing access to oil, on the basis of the existing system of concession agreements, while compensating producer countries by contributing to their development. To further these goals the agreement proposed the creation of a body called the International Petroleum Commission, to collect statistics and publish reports. Feis, the former economic adviser, dismissed the agreement as a proposal 'to create no more than a continually active conference room, attended by a staff of experts, and supplied with a multigraph machine'.[17] He was right, but failed to note that holding multilateral meetings and duplicating endless statistical reports would help make oil 'international', countering any claims that producer countries might make to treat the oil as a national resource.

FAILURE OF LONG-RANGE PLANS

The international petroleum agreement was never implemented. The rivalry between Britain and America over the control of oil was unresolved. The major oil companies forced the revision and weakening of the agreement, and domestic US oil companies blocked its ratification in the Senate. Meanwhile the plans for trusteeships over the oil of Iran and Saudi Arabia were dropped, and the United States found a simpler way to claim control of the region's oil, and thus secure the circulation of dollars.

The British had one main goal in the oil negotiations: to organise the production and flow of oil in a way that would rebuild the value of the pound sterling, as a second international reserve currency alongside the dollar. Britain wanted an agreement that would allow it to exclude American oil imports from

16 Randall, *United States Foreign Oil Policy*: 138.
17 Feis, 'Anglo-American Oil Agreement', 1,187.

British markets (the so-called sterling area, consisting of most countries of the British Empire, plus Iraq, Kuwait, and other Persian Gulf territories). It also hoped to strengthen the pound by increasing postwar British oil production in the Middle East. Since there was, as usual, more oil available than could be produced without lowering prices and reducing the large flows of company income on which the value of sterling increasingly depended, it also sought to limit any postwar expansion of US production in the Middle East.

Britain's attempt to defend the pound sterling as a rival international currency was a struggle over oilfields. When the heads of the Trans-Arabian Pipeline Company, the non-profit joint venture set up by the US oil companies to ship Saudi oil to Europe, were deciding the route for the pipeline, they initially planned to terminate it in Palestine, a state to which Britain, before the war, had promised independence by 1949. After the UN voted instead to partition Palestine into three states (one Arab, one Jewish, and an internationalised city of Jerusalem), but provided no way to carry out the break-up of the country or the eviction of the Arab population from the Jewish state, allowing the Zionist movement to seize most of it by force, the oil companies changed their minds. They briefly considered a southerly route terminating on the northern coast of the Sinai Peninsula, in Egypt. Egypt, however, remained within the British sphere of influence. That raised a further problem besides the question of the troubles in Palestine. Egypt was a member of the sterling area. In fact, Egypt and Iraq were the only non-Commonwealth members of this exchange mechanism.[18] The American oil companies wanted to use the route of the pipeline to undermine the sterling area. To assist with this financial engineering, they diverted the pipeline north into Syria and Lebanon. Meanwhile the British built a rival pipeline at the same time, to increase the flow of sterling oil from Iraq to the Mediterranean. But whereas the Americans built a thirty-inch line, the British line was half that size (carrying about one-third as much oil), 'the limitation of diameter to 16-inch being enforced by the inability of sterling-area manufacturers to produce larger pipe and the equal impossibility of obtaining dollars'.[19] The battle over the postwar international monetary system was being fought in pipeline routes and in rival diameters of pipe.

Oil was so large a component of its international trade that a 1955 report on the treatment of oil in Britain's trade accounts suggested that 'the international

18 For an explanation of the currency mechanism see Elliot Zupnick, 'The Sterling Area's Central Pooling System Re-Examined', *Quarterly Journal of Economics* 69: 1, February 1955: 71–84. Egypt agreed to leave the sterling area in July 1947, hoping to convert its sterling balances, accumulated in London during the Second World War, into dollars. Shortly after, however, Britain broke the terms of the agreement by suspending the convertibility of Egypt's sterling balances. Frederick Leith-Ross, 'Financial and Economic Developments in Egypt', *International Affairs* 28: 1, 1952: 29–37.
19 Stephen Longrigg, *Oil in the Middle East: Its Discovery and Development*, 3rd edn, London: OUP, 1968: 79–80.

ramifications of the oil industry (including its tanker operations) are so large and so complex as almost to constitute oil [as] a currency in itself'.[20] Europe and other regions had to accumulate dollars, hold them and then return them to the United States in payment for oil. Inflation in the United States slowly eroded the value of the dollar, so that when these countries purchased oil, the dollars they used were worth less than their value when they acquired them. These seigniorage privileges, as they are called, enabled Washington to extract a tax from every other country in the world, keeping its economy prosperous and thus its democracy popular.

In February 1945, on his way home from a second conference of the Big Three powers, at Yalta, President Roosevelt stopped in Egypt and held meetings with three regional monarchs – the rulers of Saudi Arabia, Egypt and Ethiopia. The meeting with Ibn Saud is taken to mark the sealing of a special relationship with Saudi Arabia, concerned with Middle Eastern oil. This was not the reaction of William Eddy, the agent in the Office of Strategic Services (a forerunner of the CIA) who helped arrange the meeting and went on to a career in the CIA under the cover of working as a political agent for Aramco. Six months later, a fellow US agent in the region was bemoaning to Eddy the failure of their hopes for 'a long range plan for Saudi Arabia' after 'we all worked like dogs on it in Washington' – a reference to their failure to win large-scale US support for the country.[21] The programme of Lend Lease aid enjoyed by Saudi Arabia and Iran during the war was cancelled, the Saudi request that America not support the Zionist programme for making Palestine into a Jewish state was ignored, and wartime plans for trusteeships and large-scale development programmes for Iran and Saudi Arabia were dropped.[22]

Later on, President Truman would refuse to extend a programme of Marshall Aid to the Middle East, offering instead the Point IV programme. America would not be able to share capital or material wealth with the world's 'underdeveloped areas', Truman explained, for those resources 'are limited'. As a consolation, Washington would offer them ideas. US businesses would be encouraged to share their 'imponderable resources in technical knowledge', which 'are constantly growing and', in contrast to material wealth, 'are inexhaustible'. Technical knowhow would enable countries to use their existing material resources to produce more food, clothing and mechanical power.[23] The idea of

20 Steven Gary Galpern, *Money, Oil, and Empire in the Middle East: Sterling and Postwar Imperialism, 1944–1971*, Cambridge, UK: CUP, 2009: 15.

21 'Letter to Eddy from Paul H. Alling, Legation of the United States of America, Tangier, Morocco, August 9, 1945', William A. Eddy Papers, Box 8, Folder 6, Public Policy Papers, Department of Rare Books and Special Collections, Princeton University Library.

22 See Vitalis, *America's Kingdom*: 79–86; Simon Davis, '"Projected New Trusteeship"'.

23 Harry S. Truman, 'Inaugural Address', 20 January 1949, available at the American Presidency Project, www.presidency.ucsb.edu. Linda Wills Qaimmaqami argues that Truman's business-led model of development helped precipitate the nationalisation of oil in Iran: 'The Catalyst of Nationalization: Max Thornburg and the Failure of Private Sector Developmentalism in Iran, 1947–51', *Diplomatic History* 19: 1, 1995: 1–31.

development would play a subsidiary but important role in US relations with the non-West, but its role would be to manage the difference between extraordinary levels of affluence for some and modest levels of living for the vast majority of the world, rather than to offer effective means of addressing those differences.

Meanwhile, another way of managing relations with the non-West, including the oil states of the Middle East, was emerging. Following the Yalta talks, the US had begun planning to move armed forces rapidly from Europe to the Pacific theatre, and wanted arrangements for landing rights and refuelling in the Middle East. This concern, rather than cementing a new relationship over oil, was the main reason for Roosevelt's meeting with Ibn Saud. Unable to get further large-scale financial support from Washington, Aramco and Ibn Saud settled for the building of an airport at Dhahran, which was to serve as a US air base. By the time the funds for the base were approved, the war in the Pacific was over and the US Department of War had decided that the airfield was 'of doubtful military usefulness'. Aramco, however, realised that playing on fears of military vulnerability offered a method for securing continued subsidies from Washington.[24] With the abandoning of larger development plans, oil companies could now begin to recast their interests not as a 'trusteeship' over the world's oil but, in a parallel language, as necessary for securing 'strategic' concerns.

A larger opportunity soon emerged for creating a strategic frame in which to place American oil interests, and thus to organise postwar international finance. As the Second World War ended, the dispute with the USSR re-emerged over oil concessions in Iran, triggered by American oil prospecting near the Soviet border. Over the following months, the United States turned the dispute over Iranian oil into an international crisis. This gave American officials the opportunity to make Iran into a different kind of clinic – a place in which to incubate a new context to support American oil policy in the Middle East, and an expansion of American power more generally. At the height of the Iranian oil concession crisis, in February 1946, George Kennan dispatched the famous Long Telegram from Moscow, his 'psychological analysis' arguing that the Soviet Union acted not on the basis of rational calculation of its interests but through the complex psychology of a paranoid commitment to absolute power, and thus to filling 'every nook and cranny available to it in the basin of world power'. To counter this threat, Kennan argued, democratic states had to become, in effect, less democratic, and operate more like the state that was said to threaten them. This pervasive threat could not be effectively countered by 'the sporadic acts which represent the momentary whims of democratic opinion', but only by policies that were 'no less steady in their purpose, and no less variegated and resourceful in their application' than those of the paranoid Russian state. The threat required 'the adroit and vigilant application

24 Vitalis, *America's Kingdom*: 82.

of counter-force at a series of constantly shifting geographical and political points'. The feeble whimsy of democratic politics was to be replaced by an all-encompassing imperial vigilance. Democratic weakness was also to be countered at home, by taking incisive measures 'to solve internal problems of our own society, to improve self-confidence, discipline, morale and community spirit of our own people'.[25]

Opponents of this programme to transform American rivalry with the Soviet Union into a global political, cultural and psychological battle labelled it the 'Cold War' – the term that the neoliberal critic Walter Lippmann had borrowed from George Orwell's essay warning of the oligarchic and technocratic state that would emerge from a condition of permanent war.[26] The critics lost, the Cold War was constructed, and ordinary corporate ambition to control resources overseas, in the increasingly difficult context of postwar decolonisation and the assertion of national independence, could now be explained by invoking and elaborating this global 'context'. In the Middle East, devices like the mandate and the trusteeship, and grandiose plans for development, were no longer necessary. US officials and oil executives could explain why American oil companies needed to control production in the region by referring to its 'strategic importance' in a situation of permanent war, without mentioning corporate profits or the need to restrict the supply of oil from the Middle East. Academic analysis could then repeat the language of strategic necessity, helping to build the Cold War into a long-term device for managing American interests overseas, for organising financial flows through the control of oil, and for countering democratic threats to social discipline and community spirit at home. This way of talking about oil continues even today.

I concluded Chapter 1 with the Marshall Plan and the construction of the Cold War in Europe. After networks of coal production had enabled the assembling of forms of democratic agency that allowed the advancement of new claims for political justice, the Marshall Plan helped engineer a political and financial setup in Western Europe that was less vulnerable to such claims, by making Europe increasingly dependent on oil and the dollar. These arrangements were to be based on the development and control of Middle Eastern oil, and the trading of that oil in dollars. Thus the sites of democratic contestation and vulnerability were shifted to the Middle East.

25 George Kennan, 'The Chargé in the Soviet Union to the Secretary of State', 22 February 1946, US Department of State, *Papers Relating to the Foreign Relations of the United States, 1946*, Washington DC: US Government Printing Office, 1946, 6: 696–709, and (revised and published under the pseudonym 'X'), 'The Sources of Soviet Conduct', *Foreign Affairs* 25: 4, 1947: 566–82, at 575, 576.

26 George Orwell, 'You and the Atomic Bomb' (1945), in Sonia Orwell and Ian Angus, eds, *The Collected Essays, Journalism and Letters of George Orwell*, New York: Harcourt, Brace & World, 1968; Walter Lippmann, *The Cold War: A Study in US Foreign Policy*, New York: Harper, 1947.

The Anglo-American Petroleum Agreement, envisioned as the basis for an international petroleum commission to operate alongside the Bretton Woods institutions, had attempted to extend this engineering of democratic politics by providing the Anglo-American control of Middle Eastern oil with a collective international framework. The 1945–46 crisis in Iran, emerging as the US tried to challenge Britain's dominant position in Middle Eastern oil and consolidate the dollar-oil mechanisms, allowed the extension of an alternative framework to govern the control of oil and the management of democracy: the Cold War.

Postwar democracy in the West appeared to depend upon creating a stable machinery of international finance, an order assembled with the help of oil wells, pipelines, tanker operations and the increasingly difficult control of oil workers. The fact that flows of oil were the basis for intersecting networks of global energy supply and global currency movements helped introduce a disjuncture that would become increasingly apparent by the end of the 1960s, leading to the energy, dollar and Middle East crises of 1967–74. The following chapter will consider those interlocking crises. Before that, let us explore a second dimension of postwar carbon democracy, a dimension that was also linked to oil and would also be transformed in the 1967–74 crises: the mid-twentieth century politics of 'the economy'.

THE CARBON ECONOMY

John Maynard Keynes, the economist who played a leading role in devising the postwar apparatus for tying the value of money to the movement of oil, helped formulate and describe another innovation of the mid-twentieth century: the modern apparatus of calculation and government that came to be called 'the economy'. A further set of connections between oil and mid-twentieth-century democratic politics concerns the role of economic expertise. Like twentieth-century democracy, twentieth-century economic expertise developed in a specific relationship to the hydrocarbon age.

Keynes's main contribution to the making of this object was to devise new ways of describing and managing the domestic circulation of money. In a memorable passage in *The General Theory*, his classic treatise of 1936, he explained the difference between the market devices of *laissez-faire* economics and the modern need for government to organise the circulation of money by picturing banknotes buried in disused coalmines:

> If the Treasury were to fill old bottles with bank notes, bury them at suitable depths in disused coal mines which are then filled up to the surface with town rubbish, and leave it to private enterprise on well-tried principles of *laissez-faire* to dig the notes up again . . . there need be no more unemployment and, with the help of the

repercussions, the real income of the community, and its capital wealth also, would probably become a great deal greater than it actually is.[27]

British coal production peaked in 1913. By the time Keynes began writing *The General Theory*, twenty years later, the country's coal mines were being exhausted at an unprecedented rate. William Stanley Jevons, the author of an earlier revolution in British economic thinking, the mathematical calculation of individual utility of the 1870s, had published a book warning of the coming exhaustion of coal reserves. Keynes was reading that book as he published *The General Theory*, and gave a lecture on Jevons in 1936 to the Royal Statistical Society.[28] It is indicative of the transformation in economic thinking in which Keynes played a role that the exhaustion of coal reserves no longer appeared as a crisis. The management of coal reserves could now be replaced in the mind, and in the textbooks of economics, with reserves of currency. In the era that Keynes's thinking helped to define, the supply of carbon energy was no longer a practical limit to economic possibility. What mattered was the proper circulation of banknotes.

The shaping of Western democratic politics from the 1930s onwards was carried out in part through the application of new kinds of economic expertise: the development and deployment of Keynesian economic knowledge; its expansion into different areas of policy and debate, including colonial administration; its increasingly technical nature; and the efforts to claim an increasing variety of topics as subject to determination not by democratic debate but by economic planning and knowhow. The Keynesian and New Deal elaboration of economic knowledge was a response to the threat of populist politics, especially in the wake of the 1929 financial crisis and the labour militancy that accompanied it and that re-emerged a decade later. Economics provided a method of setting limits to democratic practice, and maintaining them.

The deployment of expertise requires, and encourages, the making of socio-technical worlds that it can master. In this case, the world that had to be made was that of 'the economy'. This was an object that no economist or planner prior to the 1930s spoke of or knew to exist. Of course, the word 'economy' existed prior to the 1930s, but it referred to a process, not a thing. It meant government,

27 John Maynard Keynes, *The General Theory of Employment, Interest, and Money*, London: Macmillan, 1936: 129.

28 William Stanley Jevons, *The Coal Question: An Inquiry Concerning the Progress of the Nation and the Probable Exhaustion of Our Coal-Mines*, London: Macmillan, 1865. Jevons's son, H. Stanley Jevons, returned to the question of the exhaustion of coal reserves in *The British Coal Trade*, London: E. P. Dutton, 1915. He revised his father's estimate of the date of the possible exhaustion of British coal mines from one hundred years to 'less than two hundred years' (756–7). John Maynard Keynes, 'William Stanley Jevons 1835–1882: A Centenary Allocation on his Life and Work as Economist and Statistician', *Journal of the Royal Statistical Society* 99: 3, 1936: 516–55. Lecture delivered on 21 April 1936. *The Coal Question* is quoted on p. 517.

or the proper management of people and resources, as in the phrase 'political economy'.[29] The economy would now become the central object of democratic politics in the West – a process that paralleled the emergence of 'development' outside the West. The economy became an object whose management was the central task of government, requiring the deployment of specialist knowledge.

CIVILISATION IS THE ECONOMY OF POWER

Most thinking about the relationship between economics and the economy continues to reflect the influence of the great Austrian-born social theorist Karl Polanyi. Polanyi argued that the economy emerged as an institutional sphere separate from the rest of society in the nineteenth century. Before this moment of separation, the economy was absorbed or embedded in wider social relations. It follows, he argued, that the formal rules of classical, Ricardian economics relate only to a particular historical period, when market exchanges ceased to be a minor aspect of broader social relations and became an apparently self-regulating system to which other social spheres were subordinated. Moreover, he argued, classical political economy helped to achieve this separation of the market system from society, in particular by formulating ways of treating land, labour and money as though they were merely commodities – a set of fictions that were essential to the formation of the economy as its own institutional sphere.[30] Treating money, in particular, as though it were a commodity, in which speculators could trade, Polanyi suggested, had later led to the collapse of European democracies.

The consensus that the economy became a distinct object of intellectual knowledge and government practice in the late eighteenth or the nineteenth century overlooks a surprising fact. No political economist of that period refers to an object called 'the economy'. In the sense of the term we now take for granted, referring to the self-contained structure or totality of relations of production, distribution and consumption of goods and services within a given geographical space, the idea of the economy emerged more than a century later, in the 1930s and 1940s. Both in academic writing and in popular expression, this meaning of the term came into common use only during the years around the Second World War.

29 This and other sections of this chapter draw on Timothy Mitchell, 'Economists and the Economy in the Twentieth Century', in George Steinmetz, ed., *The Politics of Method in the Human Sciences: Positivism and Its Epistemological Others*, Durham, NC: Duke University Press, 2005: 126–41.

30 *In The Great Transformation* (1944), Polanyi describes the emergence of 'society' in the nineteenth century as a system of regulations and controls attempting to limit the spread of market relations. In later writings, he describes the latter as the emergence of 'the economy'. Karl Polanyi, Conrad M. Arensberg and Harry W. Pearson, *Trade and Market in the Early Empires: Economies in History and Theory*, Glencoe: Free Press, 1957.

From the works of Thomas Mun and William Petty in the seventeenth century to Adam Smith in the late eighteenth, political economy was not concerned with the structure of production or exchange within an economy. In *The Wealth of Nations*, Adam Smith never once refers to a structure or whole of this sort. When he uses the term 'economy', the word carries the older meaning of frugality or the prudent use of resources: 'Capital has been silently and gradually accumulated by the private frugality and good conduct of individuals . . . It is the highest impertinence and presumption . . . in kings and ministers, to pretend to watch over the oeconomy of private people.'[31] The objects of political economy were the proper husbanding and circulation of goods and the proper role of the sovereign in managing this circulation. An earlier tradition of writing on the economy or management of the large household or estate was extended to discussions of the management of the state, imagined as the household of the sovereign. The term 'economy' came to refer to this prudent administration or government of the community's affairs.[32] Political economy referred to the economy, or government, of the polity, not to the politics of an economy.

As countries moved from the agrarian world of the eighteenth century to an increasingly industrial and urban life in the nineteenth, the phrase 'political economy' continued to refer to the management or government of a polity, even as writers debated the need for new forms of government. The German-American journalist Friedrich List, whose *National System of Political Economy* (1856) is sometimes read as a precocious study of 'the national economy' in its twentieth-century sense, wrote in these terms. Popularising American arguments about the need for government policies to encourage and protect the development of industry, List contrasted 'the financial economy of the state', which referred 'to the collection, to the use, and the administration of the material means of a government', with 'the economy of the people', which referred to 'the institutions, the regulations, the laws, and the circumstances which govern the economical conditions of the citizens'. The term 'economy' denoted the forms of administration, regulation, law and social circumstance that defined the processes known as government.[33]

The book Keynes had been reading on the coal question, published by William Jevons in 1865, illustrates the meanings of economy before the twentieth-century invention of 'the economy', and their relation to the growth of coal and

31 Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, London: Methuen, 1950 [1776]: 327–8.

32 Keith Tribe, *Land, Labour, and Economic Discourse*, London: Routledge & Kegan Paul, 1978: 80–109; Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France 1977–1978*, London: Palgrave Macmillan, 2007.

33 Friedrich List, *Das Nationale System der Politischen Oekonomie*, Stuttgart and Tübingen: J. G. Cotta'scher Verlag, 1841. English translation, *National System of Political Economy*, transl. G. A. Matile, Philadelphia: J. B. Lippincott & Co., 1856: 281.

steam power. Jevons suggested that the economy or prudent management of resources applied especially to the resource that had made industrial civilisation possible. He contrasted the vast dissipation of force and matter that occurs in nature with the tiny fraction of power whose economy was the basis of civilisation. 'Material nature presents to us the aspect of one continuous waste of force and matter beyond our control', he wrote. 'The power we employ in the greatest engine is but an infinitesimal portion, withdrawn from the immeasurable expanse of natural forces.' However, he continued, 'while the sun annually showers down upon us about a thousand times as much heat-power as is contained in all the coal we raise annually, yet that thousandth part, being under perfect control, is a sufficient basis for all our economy and progress'. Quoting the German chemist Justus von Liebig, he described this efficient management and control of the power of fossil fuels as the basis of the work of civilisation. 'Civilization, says Baron Leibig, is *the economy of power*, and our power is coal. It is the very economy of the use of coal that makes our industry what it is; and the more we render it efficient and economical, the more will our industry thrive, and our works of civilization grow.'[34]

CALCULATION IN THE AGE OF COAL

Nineteenth-century writing about political economy reflects the world of coal mines and steam engines. The mines and the engines, however, did more than provide objects of reflection. They helped form a world of calculation, circulation and control of which the doctrines of political economy became a part. The gold standard provides a good example of this. As Britain's overseas empire grew, and with it the national debt that funded colonial wars, the country needed a system of money that could increase greatly in quantity and travel over large distances, yet retain its value. The solution was to introduce token money: coins whose value resided not in the metal itself, of which the actual worth was slightly less than the value the coin represented, but in stores of gold held by the government that issued them. Token coinage had to be too expensive to counterfeit, yet affordable enough to manufacture in large quantities. The development of coal-powered, steam-driven rolling mills and presses made it possible to solve this problem. In the Great Recoinage of 1816–17, which inaugurated the use of silver coins as token money, the eight coining presses at the Royal Mint in London produced up to 250,000 coins per day.[35] Steam-powered coinage allowed Britain gradually to implement the gold standard (the rest of

34 Jevons, *Coal Question*: 122, 125; emphasis in original.

35 Great Britain, Committee on the Royal Mint, Report from the Select Committee on the Royal Mint, London: HMSO, 1849: 74; Angela Redish, 'The Evolution of the Gold Standard in England', *Journal of Economic History* 50: 4: 789–805.

Europe followed only after 1870), which contributed to the dominant role of British finance in world trade. It also contributed to the development of new ways of knowing about questions of money and wealth. The coining and circulation of money on a large scale produced new problems, including inaccuracy in striking coins and coins losing weight through usage. The problems were the object of repeated investigation, including a Royal Commission of 1849, and of an innovative statistical study by Jevons, who organised a survey of the age and weight of coins held by banking houses from which he calculated the average rate of wear.[36] In other words, an industrial, coal-fired coinage system generated forms of circulation, storage, accounting and investigation, one of several such developments though which an empirical science of political economy could emerge.

Other forms of steam-powered machinery laid out other forms of circulation, calculation and control. During his stay in America in the 1820s, Friedrich List became briefly involved in coal mining in Pennsylvania, and joined a venture to build a rail line to carry coal to its consumers. On his return to Germany, he began to champion an expanded use of railways, not just as lines connecting two points, but as webs of commerce and communication that could engineer a common space of exchange. 'The needs of industry and communication', he wrote in 1836, 'will compel the railway systems of the larger Continental nations to form a net-like shape, concentrating on the main points in the interior and radiating from the centre to the frontiers'.[37]

Coal production itself generated a new space of calculation and debate. Jevons wrote his study of the rate of exhaustion of coal supplies to draw popular attention to the use of statistical methods, by showing how the new tools he had helped develop to analyse tables of statistical information could be applied to questions of the day.[38] He wanted to show that statistics could be used to measure a natural law, the Law of Social Growth. He took estimates of remaining supplies of coal in Britain published by the geologist Edward Hull and statistics from the Mining Record Office to estimate the annual rate at which British coal consumption was increasing. Hull had estimated that, at the current consumption rate of 72 million tons a year, the country's recoverable coal was sufficient to last more than a thousand years. While acknowledging that consumption had doubled over the last twenty years, and that if it continued to increase at the same rate supplies would be exhausted in only 172 years, Hull argued that

36 See Sandra J. Peart, '"Facts Carefully Marshalled" in the Empirical Studies of William Stanley Jevons', *History of Political Economy* 33, 2001, annual supplement: 252–76.

37 List, 'Deutschlands Eisenbahnsystem in militärischen Beziehung' (1836), cited in Keith Tribe, *Strategies of Economic Order: German Economic Discourse, 1750–1950*, Cambridge, UK: CUP, 1995: 63; translation of the term netzartig ('net-like') modified.

38 Peart, '"Facts Carefully Marshalled"'; Margaret Schabas, 'The "Worldly Philosophy" of William Stanley Jevons', *Victorian Studies* 28: 1, 1984.

supplies from America and 'greater economy' in 'the getting and using of the mineral' would extend Britain's supply, and that one should not suppose 'that any part of the Creator's universe has been regulated on so short-sighted a plan, that it shall become disorganized because some of the elements necessary to its economy have failed'.[39]

Jevons set out to dispel these 'plausible fallacies' of the geologists. To understand and measure progress, he argued, what matters is not the absolute amount by which production of a good increases, which tells us nothing, but the rate – the increase relative to the increase in a previous period. If the amount of coal a country produces increases in one year by a million tons, but that increase is smaller than the increase in the preceding year, then although its total production has increased, the rate of increase has declined. 'In statistical matters', he explained, one must cultivate the habit of treating all quantities 'relatively to each other'. The rate of growth indicated not a fixed annual increase of consumption, but a geometric process of growth, in which the amount of each year's increase would be greater than the previous year. Describing the novel social experience that coal and steam power had created, the experience that today we would call 'exponential growth', in which practically infinite values are reached in finite time, Jevons showed how quickly even very large stores of coal might be depleted. Applying his methods to the consumption data of the Mining Record Office, Jevons arrived at a figure by logarithmic calculation of 3.5 per cent annual growth. At that rate, the supplies of coal identified by Hull would last not for a thousand years, but only for one hundred.[40]

Jevons then showed that problems would arise much sooner, perhaps within twenty or thirty years. It was erroneous to think that 'some day our coal seams will be found emptied to the bottom, and swept clean like a coal-cellar', or that the country's fires and furnaces would 'be suddenly extinguished, and cold and darkness will be left to reign over a depopulated country'. Long before that, the rising cost of coal as its recovery became more difficult would cause 'the climax of our growth' and 'the end of the present progressive condition of the kingdom'.

From these calculations he drew an immediate and practical conclusion. In the few remaining decades while the country's revenue was expanding and wealth accumulating, efforts had to be made 'to raise the character of the people'. Pointing out the undeniable fact that 'the whole structure of our wealth' was built upon 'a basis of ignorance and pauperism and vice', he argued for a reduction in the employment of children in manufacture and a general system of education to dispel 'the ignorance, improvidence, and brutish drunkenness of our lower working classes'. Instead of spending current material wealth on 'increased

39 Edward Hull, *The Coal-Fields of Great Britain*, 2nd edn, London: Edward Stanford, 1861: 236, 238–9, 243.

40 Jevons, *Coal Question*: 4, 170, 236–40.

luxury and ostentation and corruption', the country should spend it on creating 'the increased efficiency of labour in the next generation'. He concluded with the warning that 'we are now in the full morning of our national prosperity, and are approaching noon. Yet we have hardly begun to pay the moral and social debts to millions of our countrymen which we must pay before evening.'[41]

Three themes emerge from Jevons's writing on coal, which we will follow forward to understand what was different for the making of the economy under the subsequent dominance of oil. First, the supply of carbon energy, like the industrial circulation of coinage and the development of railway lines, formed a concentrated movement of materials that, as a process, was reported, measured, tracked across time and compiled into tables. As problems and disputes arose, methods of inspection and information-gathering increased. The Mines Inspection Act of 1850, for example, led to the appointment of government inspectors of coal mines, who in 1854 began to compile the system of Mining Records, making available the statistics on which Jevons based his work. Second, these statistics made possible the mathematical measurement of progress, rates of growth, and the depletion of resources. The questions of material limits, the exhaustion of nature and future decline became matters of increasing concern. Third, with the consequences of modern industrial and urban life, a parallel concern developed with the measurement and amelioration of the moral condition of the poor, and its relationship to the efficiency of labour.

Following Jevons, the development of social statistics took two different paths. One was research on the measurement of poverty, the living conditions of the poor, and industrial accidents. By the end of the nineteenth century, almost all industrialised states had bureaus of labour statistics, created in response to the economic crises of 1873–95 and to the growing political strength of labour organisations. The information they collected on the life of the working classes shaped the new measures of social welfare, such as retirement pensions and various forms of industrial and medical insurance, and helped to implement the new programmes. The wartime campaign to generalise these measures, as we saw in Chapter 3, led to the creation of the International Labour Office as part of the Treaty of the Versailles at the end of the First World War.

The second path was research on race development and eugenics. The work of Francis Galton on the statistical analysis of heredity, inspired by the evolutionary theory of his half-cousin Charles Darwin, first appeared in 1865, but was unable to win wider support until the 1890s. Towards the end of the century, governing classes in Europe and America became alarmed by evidence of what was considered the deterioration of racial quality, revealed in Britain by the difficulty of recruiting physically healthy soldiers for the South African war, and elsewhere by fears that the poor and the less physically fit were reproducing

41 Ibid.: v, xxiii–xxvi.

faster than the racially strong part of the population, leading to the risk of 'race suicide'.[42] Galton and his followers proposed controlled breeding to improve racial quality, and to counter the effects of the widening of voting rights. People are not 'of equal value, as social units', Galton warned, 'equally capable of voting, and the rest'.[43] To advance the study and improvement of racial quality, Galton developed new statistical methods. In fact, modern, mathematical statistics with its methods of correlation, regression and error analysis, was developed for the purpose of the eugenics movement.[44] The work was continued by Galton's student, Karl Pearson, whose drive to universalise mathematical statistics was particularly successful in its influence in economics in the early twentieth century, where Irving Fisher and others 'were soon refining the method of correlation to use it as a test of the quantity theory of money'.[45] The monetarists simplified their theories to fit the ultra-empiricism of statistical correlation, looking for a single indicator that could reveal the role of the money supply in determining economic cycles. By the 1920s American economists were 'correlating furiously and indiscriminately and with an inverse correlation between zeal and discretion', wrote Jacob Viner. 'As might have been anticipated in a world full of nonsense correlations, the results were grotesque.'[46]

NATURAL RESOURCES AND RACIAL VIGOUR

In the early decades of the twentieth century, a battle developed among economists, especially in the United States, that shaped the future of economic knowledge and its relation to nature and the material world. The battle was to have important consequences for the way questions of natural resources entered democratic debate. One side wanted economics to start from natural resources and flows of energy, the other to organise the discipline around the study of prices and flows of money. The battle was won by the second group, who created out of the measurement of money and prices a new object: the economy.

42 G. R. Searle, *A New England? Peace and War 1886–1918*, Oxford: Clarendon Press, 2004: 375–6.

43 Theodore M. Porter, *The Rise of Statistical Thinking, 1820–1900*, Princeton: Princeton University Press, 1986: 130.

44 Donald Mackenzie, *Statistics in Britain, 1865–1930: The Social Construction of Scientific Knowledge*, Edinburgh: Edinburgh University Press, 1981; Porter, *The Rise of Statistical Thinking*: 129–46, 270–314; Alain Desrosières, 'Managing the Economy: The State, the Market, and Statistics', in Theodore Porter and Dorothy Ross, eds, *The Cambridge History of Science*, vol. 7: *Modern Social Sciences*, Cambridge, UK: CUP, 2003.

45 Porter, *Rise of Statistical Thinking*: 314.

46 Jacob Viner, 'The Present Status and Future Prospects of Quantitative Economics', *American Economic Review*, March 1928 (supplement), reprinted in J. Viner, *The Long View and the Short*, Glencoe: Free Press, 1958: 451, cited in Thomas M. Humphrey 'Empirical Tests of the Quantity Theory of Money in the United States, 1900–1930', *History of Political Economy* 5: 2, 1973: 307.

In the emergent profession of academic economics, many economists were concerned to measure the exhaustion of the earth. In the United States, leading economists like Richard T. Ely, a founder of the American Economics Association, and his student Thorstein Veblen, whose theory of capitalism as a system of 'sabotage' we encountered in Chapter 1, became preoccupied with questions of natural resources and their depletion, with excess or 'conspicuous' consumption, and with the dissipation and conservation of 'energy'. Economics, in their view, was to be a study not of the laws of markets but of material flows and resources.[47] These men lost the battle to shape the discipline they helped found to the rival forces of the price theorists, led by men like Irving Fisher. Economics became instead a science of money; its object was not the material forces and resources of nature and human labour, but a new space that was opened up between nature on one side and human society and culture on the other – the not-quite-natural, not-quite-social space that came to be called 'the economy'.

Many new devices and arrangements made it possible, during the first half of the twentieth century, to develop the forms of calculation and practices of representation that enabled people to talk about and manage the circulations of money that represented the 'national economy'. Rather than describe all the work that went into building it, we can illustrate some of the mundane and interconnected ways in which it came into being with the example of Irving Fisher – the man whom the *New Palgrave Dictionary of Economics* in 1987 called 'the greatest economist America has produced'.[48]

A disciple of the work of William Jevons, Fisher is remembered as the man who built the first working model of the economy. The model consisted of a tank of water fitted with cisterns, pipes, valves, levers and stoppers. He used this hydraulic-mechanical apparatus in his lectures at Yale as an experimental device to investigate how a shock to demand or supply in one of ten different commodities affected the overall level of water, or prices, in a general equilibrium system. A more practical example of the work of making the economy was Fisher's invention of the 'Index Visible', a device for managing information on small cards that is known today as the Rolodex, which he patented in 1913. He set up a company in his house in New Haven, the Index Number Institute,

47 Veblen argued that business should be run by engineers rather than businessmen, for engineers understood material processes and were orientated towards the more efficient use of resources, whereas businessmen were concerned only with profits. In response to the great anthracite coal strike of 1902, a movement among engineers in the US wanted to take control of the 'economic', not just of the 'technical', efficiency of business, and called for an alliance between engineers and organised labour. Donald R. Stabile, 'Veblen and the Political Economy of the Engineer: The Radical Thinker and Engineering Leaders Came to Technocratic Ideas at the Same Time', *American Journal of Economics and Sociology* 45: 1, 1986: 41–52.

48 James Tobin, 'Irving Fisher (1867–1947)', in J. Eatwell, M. Milgate and P. Newman, eds, *The New Palgrave: A Dictionary of Economics*, vol. 2, London: Macmillan, 1987: 369–76.

where assistants working in the basement used the new equipment, along with the index formulas Fisher had devised, to calculate the first indices of commodity prices and the purchasing power of the dollar. The *New York Times* and other newspapers published his price indexes every week, together with a commentary by Fisher, enabling 7 million readers to follow and participate in the price movements that would come to be called the economy.

There were many other mechanisms for removing nature and material resources from economics and turning it into a science of prices – not as simple as the Rolodex, or as uncontroversial. For example, Fisher became a champion of eugenics. His mentor at Yale was William Graham Sumner, America's leading social Darwinist. In 1906, Fisher helped establish the Race Betterment Society, and in 1922 founded and became the first president of the American Eugenics Society. Racial improvement formed a logical part of his economic theory. Human labour was a form of wealth or capital stock. Like non-human capital, it was a resource that could be improved or left to degenerate. The progress of society depended on the decisions individuals took about whether to consume in the present or invest for the future. These decisions were affected by an individual's self-control, life expectancy, thrift and degree of foresight – something that inferior races, and degenerate members of a superior race, lacked.[49]

Appointed to President Theodore Roosevelt's National Conservation Committee, set up in 1908 to address growing concerns over the exhaustion of natural resources, Fisher produced a report arguing that the most important means of conserving nature was not for the government to regulate its exploitation, but to take measures to prevent 'racial degeneracy', since 'one of the first symptoms of racial degeneracy is decay of foresight', while 'the more vigorous and long-lived the race, the better utilization can it make of its natural resources'. Economics would withdraw from studying the capacities and resources of nature and attend instead to the capacities and resources of the human. Fisher advocated establishing a federal Department of Health as the main instrument of racial improvement, but economics too could work on the enhancement of human capabilities. It could extend individual powers of foresight by developing prosthetic devices like the Rolodex and the newspaper commodity price index, and subsequently by elaborating the entire machinery of calculation called the economy.[50]

49 Mark Aldrich, 'Capital Theory and Racism: From Laissez-Faire to the Eugenics Movement in the Career of Irving Fisher', *Review of Radical Political Economics* 7: 3, 1975: 33–42.

50 After his stint on the National Conservation Committee, Fisher taught a new course at Yale on 'National Efficiency', which was described as a 'study of natural resources, racial vigor, and social institutions'. William J Barber, 'Irving Fisher of Yale', *American Journal of Economics and Sociology* 64: 1, 2005: 49.

MONEY ECONOMY

In the discipline of economics, the easiest place to trace the appearance of the idea that the economy exists as a general structure of economic relations would be in the publication of John Maynard Keynes's *General Theory of Employment, Interest and Money*, in 1936. Although tending to employ phrases like 'economic society' or 'the economic system as a whole', where today one would simply say 'the economy', the *General Theory* conventionally marks the origin of what would come to be called macro-economics.[51]

The economy was formed as a new object in the context of broader developments. Jan Tinbergen, a pioneer of the mathematical measurement of 'the economy', developed his first econometric model in response to a Dutch government request for policies to combat the depression.[52] Keynesian theory was also a response to the experience of mass unemployment and depression, and to the emergence of fascist, Soviet, New Deal and other general economic programmes that addressed not just individual human behaviour but the interaction of aggregate and structural factors such as employment, investment and money supply. Also important was the emergence after the First World War of the welfare and development programmes for European colonies (Keynes's first job was in the Revenue, Statistics and Commerce Department of the India Office), in response to the growing threats to colonial rule.

These broader events were not just the context for the emergence of a new conception of the economy. While the possibility of making the economy in the mid-twentieth century arose out of these events, economics was itself involved in the reconfiguring of social and technical worlds that gave rise to the economy, as we have seen with the work of Fisher. We can mention two larger aspects of this reconfiguration: new forms of circulation of money; and the weakening of European empires and other forms of imperial control, accompanied by the creation of 'national economies'.

The interwar period saw a significant alteration in the forms of circulation of money in countries such as Britain and the United States. The most dramatic change was the increase in the use of money – in particular paper money – for everyday transactions. Before the First World War, Keynes had remarked on how seldom people in Britain used token or paper money for financial transactions. He could think of only two purposes for which he himself regularly used money – to purchase railway tickets and pay his domestic servants.[53] Most everyday transactions were settled by running an account or writing a cheque. In the United

51 Michael Bernstein, *A Perilous Progress: Economics and Public Purpose in Twentieth-Century America*, Princeton: Princeton University Press, 2001; Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science*, Cambridge, UK: CUP, 2002.

52 Mary S. Morgan, *The History of Econometric Ideas*, Cambridge, UK: CUP, 1990: 102.

53 John Maynard Keynes, *Indian Currency and Finance*, London: Macmillan, 1913.

States, federal bank notes had been introduced by the National Currency Act of 1863, but their supply was limited. Their use remained unpopular, and they competed with a range of other regional bank notes and local scrips.[54] Again, local accounts and personal cheques were by far the most common ways to settle transactions. During the war the situation began to change, with the rapid increase in the printing of money, and the relaxation and later abandonment of the gold standard in most countries. The creation of the US Federal Reserve in 1913, and similar reforms in other countries, led to a standardisation of bank notes and the widespread and rapid acceptance of the use of paper money.

This transformation in the use and circulation of money illustrates how economic knowledge helped to form its new object. In the first place, economists developed new theories of money, entering into the political battles over questions of currency reform, the gold standard, and government control of exchange rates and money supply. Keynes's first published work, *Indian Currency and Finance* (1913), was a practical contribution to this politics, and was followed by the publication of *A Treatise on Money* (1930). In the United States, the conflict between Irving Fisher's quantity theory of money and the 'real bills' doctrine of J. Laurence Laughlin and his students shaped the creation of the Federal Reserve system.[55] The conceptions and calculative technologies provided by economists were built into the new financial institutions. In other words, economists developed practical tools for measuring and managing the value of money that became part of the novel day-to-day machinery of monetary circulation that was soon to be recognised as 'the economy'.

The next step was to begin to see this new mechanism of money circulation as a system in its own right, rather than just another 'market'. Following the publication of *A Treatise on Money* (1930), Keynes made a decisive break with the ideas of his predecessors at Cambridge, Marshall and Pigou, as well as with the work of Fisher and Frisch. Earlier theorists, he argued, had treated money as simply a neutral signifier of value, and thus saw no essential difference between a system of exchange using money and a barter system. In the earliest surviving drafts of *The General Theory*, which date from 1932–33, and in fragments of his Cambridge lecture notes from the same period, he discusses the differences between the 'real-exchange economy' or 'neutral' economy of classical economic theory, and the 'money economy' of the real world of the present.[56] These notes represent his first use of the concept of 'the economy' in its contemporary sense.

54 Viviana A. Zelizer, *The Social Meaning of Money: Pin Money, Paychecks, Poor Relief and Other Currencies*, Princeton: Princeton University Press, 1997.

55 Perry Mehrling, 'Retrospectives: Economists and the Fed: Beginnings', *Journal of Economic Perspectives* 16: 4, Autumn 2002: 207–18.

56 John Maynard Keynes, *The Collected Writings of John Maynard Keynes*, ed. Donald Moggridge, London: Macmillan, 1971–89, vol. 13: 396–412, 420–1; vol. 29: 54–5; Robert Skidelsky, *John Maynard Keynes*, vol. 2: *The Economist as Saviour, 1920–1937*, London: Macmillan, 1992.

Keynes's breakthrough was to conceive of the new totality not as an aggregation of markets in different commodities, but as the circulation of money: the economy was the sum of all the moments at which money changed hands.

THE NATIONAL ECONOMY

A further step in the making of this economy was to construct mechanisms for measuring all the instances of spending and receiving money within a geographical space – the new national income accounts. Before the interwar period, attempts to calculate national wealth or 'national dividend' had come up against a series of insuperable obstacles. There was the problem of counting the 'same' goods or money twice. For example, commodities sold at wholesale could not be counted again, it was thought, when sold at retail. Income earned as a professional salary should not be included in national wealth a second time when paid as wages to the servants. And, as Alfred Marshall pointed out, there was the problem of accounting for all the waste that was incurred in the production of wealth – not only the depreciation of tools and machinery, but also the exhaustion of the country's natural resources.[57]

After the First World War, the Dawes Committee, set up to estimate Germany's 'capacity to pay' economic reparations, discovered the lack of not just reliable data concerning national income but of a manageable conception of what one was trying to count. In both Germany and the US there were extensive interwar efforts to remedy this problem.[58] It took two decades to solve it. The solution was not to count things more accurately, but to re-conceive the object being counted. No longer was the goal to count the nation's wealth or dividend, but rather its aggregate 'national income' – the sum of every instance of money changing hands. Each such instance represented income to the recipient, however productive or unproductive the activity and regardless of the waste incurred. The work of Keynes again played a critical role, and he and his students worked closely with the Treasury in London to design the methods of estimating national income.

In the United States, Simon Kuznets of the National Bureau of Economic Research systematised the new methods. In 1942 the US Department of Commerce began publishing national economic data, and in his 1944 budget speech President Roosevelt introduced the idea of 'gross national product'.[59]

57 Alfred Marshall, *Principles of Economics*, 8th edn, London: Macmillan, 1920: 523.

58 J. Adam Tooze, 'Imagining National Economies: National and International Economic Statistics, 1900–1950', in Geoffrey Cubitt, ed., *Imagining Nations*, Manchester: Manchester University Press, 1998: 212–28. See also J. Adam Tooze, *Statistics and the German State, 1900–1945: The Making of Modern Economic Knowledge*, Cambridge, UK: CUP, 2001.

59 Daniel Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting*, New York: Basic Books, 1976: 331–2.

Kuznets warned that 'a national total facilitates the ascription of independent significance to that vague entity called the national economy'.[60] The warning was of no use. The subsequent elaboration of the GNP of each economy made it possible to represent the size, structure and growth of this new totality. The making of the economy provided a new, everyday political language in which the nation-state could speak of itself and imagine its existence as something natural, spatially bounded and subject to political management.

The emergent national economy was dependent upon a 'nationalisation' of political and administrative power – the emergence of large-scale, techno-scientific governmental practices based upon the vastly expanded administrative machinery of post-1930s national governments. It also contributed to the making of these nationalised machineries of government, in which economics superseded law as the technical language of administrative power.[61]

For orthodox, pre-Keynesian economics, the sphere of economic behaviour was the individual market. This was the abstraction in terms of which the relations between costs, utilities and prices were to be analysed. When Keynes's *General Theory* replaced this abstraction, which had no geographical or political definition, with the 'economic system as a whole', it was a system defined by a set of geopolitical boundaries. The system was represented in terms of a series of aggregates (production, employment, investment and consumption) and synthetic averages (interest rate, price level, real wage, and so on), whose referent was the geographic space of the nation-state. This 'national' framing of the economy was not theorised, but introduced as a commonsense construct providing the boundaries within which the new averages and aggregates could be measured.[62] Subsequently, the division of economics into the separate fields of macro- and micro-economics inscribed this commonsensical reference to the nation-state in the structure of the discipline, where it remained unnoticed. Thinking of the national economy as simply 'the macro level' provided a substitute for a theoretical analysis of its geopolitical construction. In place of a study of the institutional forms of the state, economics reproduced this institutional structure within the structure of the discipline.

The forming of the economy in terms of the nation-state was related to the re-casting of the international order. The dissolution of the European and Japanese empires before and after the Second World War destroyed an older framing of political power in terms of position in an imperial order. Here too the economy provided a new way of organising geopolitical space. Previously

60 Simon Kuznets, *National Income and Its Composition, 1919–1939*, Vol. 1, New York: National Bureau of Economic Research, 1941: xxvi.

61 Theodore J. Lowi, 'The State in Political Science: How We Become What We Study', *American Political Science Review* 86: 1, 1992: 1–7.

62 Hugo Radice, 'The National Economy: A Keynesian Myth?' *Capital and Class* 8: 1, 1984: 121.

it had made little sense to talk of, say, the British economy, so long as Britain's economic realm was thought to include India and its other colonies. More generally, a world that was pictured as consisting outside Europe of a series of extensive but discontinuous European and other empires could not easily be imagined to contain a large number of separate economies, each coinciding with a self-contained geographical space and consisting of the totality of economic relations within that space.

The collapse of empire and the growing hegemony of the United States created a new order, consolidated first by the League of Nations and then by the UN, the World Bank and the International Monetary Fund, in which the world was rendered in the form of separate nation-states, with each state marking the boundary of a distinct economy. Again, the new macro-economics took these imagined objects as its untheorised referents: international trade was measured in terms of aggregates (imports and exports of goods and capital) and averages (terms of trade, exchange rates) that were defined in terms of the transactions between national economies.[63] Economic expertise, institutionalised in the World Bank, the IMF and other new agencies, helped construct the new global political order through the publication of statistics and the proliferation of political programmes defining as their object these separate economies.

The framing of the Keynesian national economy was part of a programme to limit and reduce the operation of market competition, through increased management of finance, trade and migration, and above all through the prevention of a global market in labour. It can thus be seen as a successor to the colonial order – an earlier and much older system of limiting market forces by means of monopoly, managed trade, the control of labour, and political repression, which began to collapse in the interwar period. Seen in this light, the making of 'the economy' should be connected with a parallel development that also sought to frame politico-economic relations to exclude the operation of market competition: the development of the large corporation, including its largest and most powerful variant, the multinational oil corporation.

Joseph Schumpeter argued that economists had more justification than natural scientists for using mathematical models to describe the world they studied.[64] This was because the economic world, unlike the natural world, was actually constructed out of numerical phenomena – prices, measures of quantity, interest rates, and so on. He saw this as an argument for the further development of quantitative and formal methods of economic analysis. This affinity between the methods of economics and the make-up of the world it studied was certainly a strength, but it was a strength that had further consequences.

63 Ibid.

64 Joseph Schumpeter, 'The Common Sense of Econometrics', *Econometrica* 1: 1, January 1933: 5.

It made it relatively easy for economic knowledge to become involved in the everyday making of the objects of economic analysis.[65] As a result, there could never be any simple divide between the models and representations developed by academic economics and the world it claimed to represent.

These transformations created in the twentieth century a political and material world densely imbued with the expertise, calculative techniques and conceptual machinery of modern economics. The so-called material world of governments, corporations, consumers and objects of consumption was arranged, managed, formatted and run with the help of economic expertise. The readiness with which it seemed that this world could be manipulated and modelled by economics reflected not simply that it was a naturally 'quantitative' world, as Schumpeter suggested. It reflected this imbrication of the concepts and calculations of economic science in the world it was studying.

FUEL MONEY

We can now connect the assembling of 'the economy' with the transition from a coal-based energy system to a predominantly oil-based one. The conception of the economy depended upon abundant and low-cost energy supplies, making postwar Keynesian economics a form of 'petroknowledge'.

The conceptualisation of the economy as a process of monetary circulation defined the main feature of the new object: it could expand without getting physically bigger. Older ways of thinking about wealth were based upon physical processes that suggested limits to growth: the expansion of cities and factories, the colonial enlargement of territory, the accumulation of gold reserves, the growth of population and absorption of migrants, the exploitation of new mineral reserves, the increase in the volume of trade in commodities. All these were spatial and material processes that had physical limits. By the 1930s, many of those limits seemed to be approaching: population growth in the West was levelling off, the colonial expansion of the United States and the European imperial powers had ended and was threatened with reversal, coal mines were being exhausted, and agriculture and industry faced gluts of overproduction. The economy, however, measured by the new calculative device of national income accounting, had no obvious limit. National income, later renamed the gross national product, was a measure not of the accumulation of wealth but of the speed and frequency with which paper money changed hands. It could grow without any problem of physical or territorial limits.

Oil contributed to the new conception of the economy as an object that could grow without limit in several ways. First, oil declined continuously in price. Adjusting for inflation, the price of a barrel of oil in 1970 was one-third of

65 Michel Callon, *The Laws of the Markets*, Oxford: Blackwell, 1998.

what it had sold for in 1920.[66] So although increasing quantities of energy were consumed, the cost of energy did not appear to represent a limit to economic growth. (In fact, economists explained the growth of their new object without reference to the consumption of ever-increasing quantities of physical energy, measuring only the input of capital and labour. This left an unexplained 'residual' growth, which for a long time they tried to attribute to factors outside their economic models that they called 'technology'.[67])

Second, thanks to its relative abundance and the ease of shipping it across oceans, oil could be treated as something inexhaustible. Its cost included no calculation for the exhaustion of reserves. The growth of the economy, measured in terms of GNP, had no need to account for the depletion of energy resources. The leading contributions to the academic formulation of the economy – Keynes's *General Theory*, Hicks's *Value and Capital*, Samuelson's *Foundations*, and the Arrow-Debreu model – paid no attention to the depletion of energy.[68] The economics of growth of the 1950s and 1960s could conceive of long-run growth as something unrestrained by the availability of energy.[69] Moreover, the costs of air pollution, environmental disaster, climate change and the other negative consequences of using fossil fuels were not deducted from the measurement of GNP. Since the measurement of the economy made no distinction between beneficial and harmful costs, the increased expenditure required to deal with the damage caused by fossil fuels appeared as an addition rather than an impediment to growth.[70] In all these ways, the availability and supply of oil contributed to the shaping of the economy and its growth as the new primary object of mid-twentieth-century politics.

The abundance of hydrocarbon energy contributed to the new forms of calculation in further ways, two of which were of particular significance. One was the industrialisation of agriculture. To earlier economic thought, land appeared as a primary source of wealth and as a limited resource, unable to

66 The price of oil fell from $31 a barrel in 1920 to $9 in 1970 (in 2006 prices). The average price per decade also declined, from $18 per barrel in the 1920s, to $15 per barrel in the 1930s and 1940s, $14 per barrel in the 1950s and $12 per barrel in the 1960s. *BP Statistical Review of World Energy 2007*, available at www.bp.com.

67 Dale W. Jorgenson, ed., *The Economics of Productivity*, Cheltenham: Edward Elgar, 2009. Robert U. Ayres and Benjamin Warr show that including a measure for energy, or rather exergy – energy when converted into useful work – provides a better accounting for all US growth since 1900. Ayres and Warr, 'Accounting for Growth: The Role Of Physical Work', *Structural Change and Economic Dynamics* 16: 2, 2005: 181–209.

68 Keynes, *General Theory*; John Hicks, *Value and Capital*, Oxford: OUP, 1939; Paul A. Samuelson, *Foundations of Economic Analysis*, Cambridge, MA: Harvard University Press, 1947; Kenneth J. Arrow and Gerard Debreu, 'Existence of an Equilibrium for a Competitive Economy', *Econometrica* 22: 3, 1954: 265–90.

69 Geoffrey M. Heal and Partha S. Dasgupta, *Economic Theory and Exhaustible Resources*, Cambridge, UK: CUP, 1979: 1.

70 Herman E. Daly, *Steady-State Economics: The Economics of Biophysical Equilibrium and Moral Growth*, San Francisco: W. H. Freeman, 1977.

increase at the rate of population growth and liable to degeneration and exhaustion. The introduction of synthetic fertilisers after the First World War, manufactured from natural gas, and of chemical herbicides and insecticides after the Second World War, appeared to remove these natural limits to growth. The other contribution was the rise of synthetic materials, manufactured with hydrocarbons, which appeared as a direct answer to resource depletion. In 1926, a meeting of the Institute of Politics in Williamstown, Massachusetts, brought together mining engineers, geologists and chemists to talk with political scientists about the threat of resource depletion. The mining engineers warned about the threat of exhaustion of key minerals; but the chemists disagreed, arguing that the new synthetic materials developed during the First World War would make it possible to create any resources that ran short by artificial means. 'The mining engineers argued that when present stocks of important materials are exhausted, our civilization will be profoundly dislocated', according to a report on the meeting. 'The experts in chemistry, on the other hand, were pervaded with a striking optimism.' Acknowledging the possibility of temporary shortages, 'they looked forward with assurance to replacing exhausted materials with others equally suited to human needs.' The difference of view extended to political issues. The mining engineers warned that 'the natural distribution of resources is distinctly unequal, so that a condition approaching monopoly exists in many essential resources', oil being the most obvious example. The chemists, on the other hand, 'felt that synthetic products would, in many cases, break up national monopolies, and restore a really competitive situation'.[71]

If oil played a key role in the making of 'the economy', it also shaped the project that would challenge it, and later provide a rival method of governing democratic politics: the 'market' of neoliberalism. A group of European intellectuals under the leadership of Friedrich Hayek launched the neoliberal movement at a colloquium in Paris, organised in August 1938, to discuss the work of Walter Lippmann criticising the New Deal, as a movement against this new object of planning, the economy, and against planning itself as a method of concentrating and deploying expert knowledge. Neoliberalism proposed an alternative ordering of knowledge, expertise and political technology – the political apparatus that it named 'the market'. This was not the market of David Ricardo or William Jevons, but a term that began to take on new meanings in the hands of the nascent neoliberal movement. Drawing on Lippmann's warnings in *The Phantom Public* and *The Good Society* about the dangers of public opinion and the need to expand the areas of concern that are reserved to the decisions of experts, neoliberalism was envisioned by

71 Henry M. Wriston, 'Institute of Politics', *American Political Science Review* 20: 4, 1926: 853–4.

Hayek and his collaborators as an alternative project to defeat the threat of the left and of populist democracy.

The development of neoliberalism was delayed by the war and the programmes of postwar reconstruction. Its political challenge to the Keynesian apparatus got gradually underway a decade later, in modest form, with the founding of a think tank in London in 1955 called the Institute of Economic Affairs. The launch was triggered by the first postwar crisis in the oil-currency system: Britain's attempt to preserve the sterling area as a mechanism of currency regulation, despite the loss of its control of the hub of that mechanism, the Anglo-Iranian Company's oilfields in Iran. The desperate measures with which London tried to retain the pound's value despite the loss of the oil wells through which its value had been manufactured provided the point of vulnerability where the neoliberal movement first began to construct an alternative to the economy.

Likewise in the US, the origins of the neoliberal movement were tied to the struggles over the postwar issues of oil and the regulation of international financial speculation. The State Department's plans for American oil policy in 1945 were blocked by the Petroleum Industry War Council, whose foreign policy committee was chaired by Albert Mattei, president of the Honolulu Oil Corporation. Mattei warned the officials attempting to create an international body to regulate postwar oil development, 'we are going to come in with constructive suggestions, and if you don't accept our suggestions we are going to tear your playhouse down'.[72] He went on to help kill the Anglo-US Petroleum Agreement. A powerful northern California Republican, Mattei was a founding board member in 1946 of the Foundation for Economic Education – the original inspiration for Hayek's Institute of Economic Affairs in London. One of its first publications was Henry Hazlitt's *Will Dollars Save the World?*, an attack on the Marshall Plan and the forms of state planning in Europe on which it was based, as well as the ideas about the dollar and other currencies that it reinforced. Hazlitt called for the US to go on the real, not just the formal gold standard, and for others to follow.[73]

The oil wells and pipelines of the Middle East, and the political arrangements that were built with them, helped make possible the assembling of the Keynesian economy and the forms of democracy in which it played a central part. Democratic politics developed, thanks to oil, with a peculiar orientation towards the future: the future was a limitless horizon of growth. This horizon was not some natural reflection of a time of plenty; it was the result of a particular way of organising expert knowledge and its objects, in terms of a novel world

72 Stephen J. Randall, *United States Foreign Oil Policy 1914–1948*, 2nd edn, Montreal and Kingston: McGill-Queen's University Press, 2005: 199–200.

73 Henry Hazlitt, *Will Dollars Save the World?* New York: Appleton-Century, 1947. His analysis of Europe began with an attack on allied control of the German economy, based on the arguments of the ordoliberal Wilhelm Röpke.

called 'the economy'. Innovations in methods of calculation, the use of money, the measurement of transactions and the compiling of national statistics made it possible to imagine the central object of politics as an object that could increase in size without any form of ultimate material constraint.

We have now expanded the meaning of the term 'carbon democracy'. At first it referred to the central place of coal in the rise of mass democracy, and then to the role of oil, with its different locations, properties and modes of control, in weakening the forms of democratic agency that a dependence on coal had enabled. Oil has now taken on a larger significance in our understanding of democracy. In the postwar period, democratic politics was transformed not only by the switch to oil, but by the development of two new methods of governing democracies, both made possible by the growing use of energy from oil. One of these was an arrangement for managing the value of money and limiting the power of financial speculation, which was said to have destroyed interwar democracy – a system built with the pipelines, oil agreements and oligarchies that organised the supply and pricing of oil. It was accompanied by the construction of the Cold War, which provided a framework for the policing of the postwar Middle East that replaced the need for mandates, trusteeships, development programmes and other scaffoldings for imperial power. The other new mode of governing democracies was the manufacture of 'the economy' – an object whose experts began to displace democratic debate and whose mechanisms set limits to egalitarian demands. In the years 1967–74, as we will see in Chapter 7, the relations among these disparate elements were all transformed, just as they are being transformed again today. To understand the so-called 'oil crisis' of that period, we must first understand how political forces in the Middle East brought the postwar petroleum order to an end.