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Programme Paper

Resource Depletion, Dependence and Development: Can Theory Help?

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EXECUTIVE SUMMARY

What factors do economists expect governments to take into account when deciding how rapidly to deplete the petroleum resources that are part of their national wealth? The key idea of this paper is that governments are expected to seek to preserve and increase income and the wealth on which it is based, so that depletion policy is linked to the conditions for development of the non-petroleum economy at home and the opportunities for investment in acquiring assets abroad.

The paper begins with a brief statement of the purpose of the project. An analysis of the theory of depletion policy follows in Section 1. This concerns how rapidly or slowly to develop and produce reserves on the basis of the objectives of government in the context of its responsibility to optimize the country's social welfare. It then examines why depletion policies are needed rather than leaving it all to the market. The explanation is that property rights over national resources outside the US are vested in the state, so governments have to play a role. Next, the instruments of depletion policy available to governments are considered, notably their power to license exploration acreage and approve development plans. The choices available in the context of fiscal, forward and backward linkages within the economy that will determine the impact of development are then outlined, together with depletion preferences. Finally, Section 1 considers whether the value of the oil in the ground will increase more rapidly than the return from investing the revenues. How these might be measured is outlined in Section 2, together with a discussion on the uncertainties relating to the size of reserves, future prices and costs, future government fiscal take, society's time preferences and the risks of real and financial investment over time. Sections 3 and 4 consider the issues of the 'resource curse' and the potential role of oil funds.

Based upon all this analysis, Section 5 considers the connection between these uncertainties and the development linkages. This results in a policy checklist (Section 6) looking at what economic theory advises, what the optimal spending patterns might be, and what is needed for capital renewal, diversification and reducing dependence.

The paper focuses on the connections between

- depletion policy, including the willingness of some key petroleum-exporting countries to expand production in the medium to long term;

- development policies linked to depletion, especially the difficulties of diversifying sources of income to replace revenue from petroleum as production ceases to grow, or declines, as a result of natural resource depletion or lack of markets;
- the creation, use and management of sovereign 'heritage' or 'stabilization' funds by many petroleum-exporting countries which are earning more petroleum revenue than they consider it prudent or possible to spend or invest in development of the non-petroleum sectors of their economies.

While the paper is based upon a digest of economic theory and the existing economic literature, it attempts to make this accessible to non-economists. It argues that in petroleum-dependent countries there is a strong relationship between depletion policy, the degree of dependence on petroleum, and the development potential of the non-petroleum sector. It is limitations on development potential outside the petroleum sector which prompts a third choice: whether to leave oil in the ground for its value to appreciate with any future increases in price or produce it to realize cash to invest, through instruments like heritage funds, in global financial assets that will produce income independent of petroleum.

Sections 6 and 7 set the context for the Chatham House 17-18 April 2008 workshop on this topic by considering how this analysis affects individual countries and presenting a series of specific questions to direct the various country case studies that formed the basis of workshop discussions and feed into 'Ending Dependence: Hard choices for oil-exporting states', Chatham House Report, forthcoming July 2008.

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1. INTRODUCTION

This paper is part of a project that examines the interaction between depletion, dependence and development in key petroleum-exporting countries. What factors do economists expect governments to take into account when deciding how rapidly to deplete the petroleum resources which are part of their national wealth? The key idea of this paper is that governments are expected to seek to preserve and increase income and the wealth on which it is based, so that depletion policy is linked to the conditions for development of the non-petroleum economy at home and the opportunities for investment in acquiring assets abroad. If petroleum resources are left in the ground to be produced later, their value will increase if the price of petroleum increases. If produced, the resulting profit can be employed to increase national wealth in other ways: profit invested in the domestic economy – through projects, education and health – will increase the rate of growth of the non-petroleum economy and its ability to pay for future government expenditure and imports of foreign goods and services. Profit invested earns income and foreign exchange in the future.

A clear perception of the nature of these choices, and their interconnection, sheds light on how to solve practical problems. The future growth of oil prices is uncertain (and some countries may influence it by their depletion decisions) but a view has to be taken for a decision to be made. The rate of return on investment funds is determined by the world economy (with a margin of error for good or bad management). The potential for development of the non-petroleum economy is complex, but it can be influenced by the government itself – and petroleum revenues may be necessary, but not sufficient, to unlock this potential. Governments of petroleum-rich countries are bound to consider all their development and investment options, and the growth of their non-petroleum economies is an interest which producers and consumers should share.

This working paper is intended to introduce a discussion about economic sustainability in countries whose government expenditure and imports are dependent on revenues earned from petroleum exports. It begins with an analysis of the theory of depletion policy (Section 1), which concerns how rapidly or slowly to develop and exploit reserves. It considers the objectives of government, why depletion policies are needed rather than leaving it all to the market, and finally the instruments of depletion policy available to governments. It then outlines the choices available in the context of fiscal, forward and backward linkages within the economy that will drive the development impact.

The latter part of this section looks at depletion preferences. The starting point is to consider if the value of the oil in the ground will increase more rapidly than the return from investing the revenues. How these might be measured is outlined in Section 2, together with a discussion of the uncertainties relating to the size of reserves, future prices and costs, future government fiscal take, society's time preferences and the risks of real and financial investment over time.

The latter section considers the issues of resource curse and the role of oil funds. Based upon all this analysis, the paper then considers the connection between these uncertainties and the development linkages. This produces a policy checklist looking at what economic theory advises, what the optimal spending patterns might be, what is needed for capital renewal, diversification and reducing dependence. The final section sets the context for the workshop by considering the analysis for the countries together with questions to direct the various country case studies which will form the basis of the workshop.

The paper focuses on the connections between

- depletion policy including the willingness of some key petroleum-exporting countries to expand production in the medium to long term;
- development policies linked to depletion, especially the difficulties of diversifying sources of income to replace revenue from petroleum as production ceases to grow, or declines, as a result of natural resource depletion or lack of markets;
- the creation, use and management of sovereign 'heritage' or 'stabilization' funds by many petroleum-exporting countries which are earning more petroleum revenue than they consider it prudent or possible to spend or invest in development of the non-petroleum sectors of their economies.

Future working papers will show that, for some countries, technical factors will constrain, and may even reverse, the expansion of petroleum export revenues within 10-20 years, depending on how rapidly reserves are depleted and domestic consumption grows. As part of this, country experts provided commentaries on the policies and capacity of the countries concerned to reconcile their development objectives – generating government expenditure and imports – with their capacity to replace petroleum revenues by development of the non-petroleum sectors of their economies. All these papers and commentaries were discussed in a Chatham House

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workshop (17-18 April 2008) which engaged participants from governments, national oil companies and research institutes from a cross-section of countries, including those with diverse governance structures and different levels of petroleum dependence, diversification potential and capacity for expanding petroleum production.

2. DEPLETION POLICY

This Section is intended to provide the theoretical context for discussion of how slowly or rapidly the government should allow petroleum reserves to be developed and produced.¹ It considers why a government should have a depletion policy at all rather than simply leave it all to 'the market'. It considers the context in which depletion policy is formulated, and what some observers suggest the choices might be, based upon economic theory.²

Government objectives

In economics, the function of government is usually thought to be to maximize the social welfare function of the nation.³ In the context of the paper this will be roughly translated as the promotion of economic development. This does not necessarily imply heavy and intrusive government intervention in the economy. Many economists would argue that such a 'command economy' is inefficient and that the less the government intervenes and the more it leaves it to the market the better. However, as will be explained below, when it comes to depletion policy, government intervention in the rate at which oil and gas reserves are developed and produced (effectively depleted) is inevitable in petroleum-dependent economies.

The context: why depletion policies exist

The context of any depletion policy is dominated by three simple facts: one from geology, one from property rights, and one from financial theory.

The fact from geology is that oil and gas reserves are an exhaustible or non-renewable resource.⁴ Once the barrel of oil or cubic metre of gas has been produced today, it cannot be

1 A crucially important dimension to the answer is the government's ability to deploy the revenues from oil and gas production in a sensible way. This is the subject of Section 2.

2 Although the intention is to keep the economic analysis comprehensible for non-economists, some concepts and jargon are unavoidable. However, to avoid cluttering the main text, these concepts and jargon when they first appear are explained in footnotes.

3 A social welfare function is simply an economist's way of expressing the wellbeing of the society. Its determinants express what society wants. The social welfare function can conceptually be measured in terms of 'utility' which is economist's jargon for satisfaction. It is important to note that utility means more than just consuming goods and services. As the Bible states 'Man does not live by bread alone' or as Ayatollah Khomeini famously once remarked, 'we did not make revolution for cheaper water melons'.

4 There is something called the 'Gold Hypothesis' which argues that oil is still being created underground and as such is not a depletable resource (Gold, 1992). This is very much a minority view.

produced tomorrow.⁵ However, if production is postponed today, then it can take place tomorrow. This is the key trade-off of depletion policy. Of course, production today can be replaced by exploring for, discovering and developing new reserves that previously were not known or were thought uneconomic. However, eventually, at least in theory, the reserves in a country at a particular time are a finite number with a range of uncertainty (the effect of uncertainty is discussed below).

The fact from property rights is that in almost every legal jurisdiction outside the United States,⁶ subsoil minerals are the property of the state, or else the state is trustee for the nation.⁷ Even in the US and Canada, the federal or state government also owns rights to offshore resources, as well as onshore resources alongside private property owners. Therefore the government of the country, as owner, must make decisions over access to these resources and investment in their development and production – over depletion policy in some shape or form.⁸ Since the resulting revenue in the first place accrues to government ‘on behalf of the nation’, clearly government also has the responsibility for how it is spent. The government’s accountability to ‘the nation’ takes very different forms in different countries, depending on their form of government and traditions of transparency and democracy. However, a clear distinction between the state as sovereign owner versus a private owner whereby the government of the day must apply the concept of intergenerational transfer of costs and benefits associated with resource development. On the revenue side, some economists have suggested that the government should simply share the revenue among its citizens and allow them to choose how to spend it. In Alaska, citizens receive an ‘oil dividend’. This is generated from the Alaska Permanent Fund, established under the constitution to receive the greater part of the oil revenues and to whose capital neither the citizens nor the government have access. Other countries have somewhat similar funds (discussed below) but none pay a direct dividend to their citizens. In any case, the government cannot escape responsibility for legislation regarding access to petroleum reserves, taxation, and the problem of managing the macroeconomic consequences – for example, the risk of ‘Dutch disease’.⁹

⁵ Economists refer to this opportunity cost as the ‘user cost’.

⁶ In Canada, there are some freehold rights but they are a small percentage of the whole.

⁷ In Islamic jurisdictions, the deep subsoil minerals belong to God. The rulers have obligations towards the people about their use. See El-Malik (1993).

⁸ In the US and Canada the government is also involved in two ways – as the regulator of private sector extraction of resources (for example to reconcile conflicting property rights) and to control competition.

⁹ See below under the risks of ‘resource curse’.

The fact from financial theory is that oil and gas resources are an element of wealth in the country's portfolio of assets. Thus their production does not generate income as such. Rather, it simply swaps one asset under the ground – petroleum resources – for another asset – cash revenue – above the ground. The cash revenue can be invested in productive assets, either at home or abroad, to generate future income.¹⁰ In that way, when the petroleum resources are depleted (or no longer of any value), something has been created to replace the resources in the nation's asset portfolio. Thus, in the context of an exhaustible resource, the creation of alternative wealth to resources constitutes sustainable development.¹¹ Alternatively, the cash revenue may be consumed, reducing the national wealth.

Instruments of depletion policy

Depletion policy is about the rate at which oil-in-place is discovered, and reserves are developed and produced.¹² This involves a number of interventions. The first is the decision of the state owner of the prospective exploration (outside the US, the government) as to how much acreage should be made available, under what terms and to whom. For governments allowing private sector investments in the form of international oil companies (IOCs),¹³ some form of legislative process normally determines this and can either involve bidding rounds in some shape or form or bilateral allocation (Cranton, 2007; Radon, 2007).¹⁴ The bids may be either sealed bids based on specific criteria or discretionary. For national oil companies (NOCs), this is directly determined by the NOCs' policy and the funds allocated by the government.¹⁵ Clearly, governments acting on behalf of current and future citizens, who are the owners, have complete control (subject to

¹⁰ This gives rise to significant confusion because in conventional national income accounting methods, producing oil and gas is regarded as a net addition of value added to national output/income. This grossly overstates national income because it ignores the depletion of the stock of wealth embodied in the reserves (Heal, 2007; World Bank, 1997). Some have suggested alternative ways to measure the production of non-renewable resources. For example, the IMF has recently been promoting the 'balance sheet approach' which attempts to consider a country's net worth (Traa and Carare, 2007). See also Neumayer (2004) for a discussion of 'genuine income'. This whole issue is discussed further in Section 7.2.

¹¹ Otherwise, 'sustainable development' of an exhaustible resource becomes an oxymoron. For a detailed discussion of such a concept see Hamilton (2002).

¹² The outcome of exploration is the discovery of oil-in-place. This outcome is unknown in advance although probabilities can be assigned. Development, which is an investment decision, develops reserves in the form of producing capacity. This capacity can then be produced. This three-stage process can be described as depletion. A key point is that while the amount of reserves and production are determined geologically to an extent, they also depend upon the role of government in decisions on resources available to NOCs, the level of IOC involvement and the investment climate for the IOCs.

¹³ Obviously private sector involvement could also apply to purely domestic companies.

¹⁴ An important distinction is that while the owner of the resource is the state, the manager of the resource is the government. The distinction does matter. The fact is that while the state remains intact (assuming it is not destroyed by another state) governments can and do change, as can their policies.

¹⁵ Some NOCs have private shareholders and balance sheets, and direct access to capital markets. Depletion policy may apply to them in similar ways to the private sector, but the government as majority or controlling shareholder may also have a direct say in the exploration, investment and production decisions. The government also has to make the strategic decision on the relative role of the IOCs versus the NOC.

political legitimacy) over this stage although not the outcome of the exploration since this (discovering oil-in-place) cannot accurately be predicted in advance.¹⁶

The second 'intervention' relates to the level of investment in exploration, development and production. Again government plays a key role. If an NOC is involved, then the government determines the availability of funds and the incentive structures for the NOC to utilize the funds.¹⁷ If IOCs are involved then investment levels will be determined by economics, including costs, taxation and market prospects (Dam, 1976; Johnston, 2007), political stability in the country and the degree of confidence on the part of the investor that the government will not start to squeeze on terms once investment has been sunk.

Finally, once a field has been developed and is capable of producing, governments can directly set production levels by virtue of their control over the producer, i.e. the NOC, or by regulation of the private sector. This may be part either of a specific depletion policy or of a commitment to the Organization of Petroleum Exporting Countries (OPEC) in its role as manager of the international oil markets.¹⁸ In most jurisdictions where IOCs are subject to resource conservation legislation, the extraction is subject to best engineering and reservoir depletion practices such that the amount of oil extracted is the maximum economically and commercially feasible. Thus the rate of production of any particular field is not simply a function of how much rent a government might need for its programmes; it depends fundamentally on the geology and accordingly on the hydraulics, physics and other characteristics of the reservoir.

Thus preference for a depletion profile will be about managing the speed of exploration and the sequence and pace of investment in developing capacity as well as the rate of production from that capacity.¹⁹ Different risks and costs apply at each stage. How these may be incorporated into depletion is discussed below. Here we consider the general question of what overall profile of production government should prefer and why.

¹⁶ Using various probabilistic methods such as Monte Carlo Simulations it is possible to take views on the outcome of exploration.

¹⁷ The way in which the oil sector is structured is crucial in determining investment levels (ESMAP, 2007).

¹⁸ There can be indirect means to control production. For example, the Russian government has strong control over production levels by virtue of its control of the transport infrastructure.

¹⁹ Some 'depletion' policies appear mainly technical: for example, normally exploration and production licences require the company to pursue 'good oilfield practice', which is taken to mean producing at a level which will not reduce the ultimate recovery factor from the field. The assumption is that the lost volume of oil (or gas) will always have a value.

The choices and linkages

Government preferences should take into account wider factors than those considered by private investors. This is because governments are concerned with the linkages between petroleum production and the rest of the economy. Also, governments are or should be responsible for the interests of future generations.

The key depletion choice is usually considered to be whether to produce now or to leave the oil and gas in the ground until later. However, the government is not simply a resource manager. It has to consider linkages between the petroleum sector and the rest of the economy.²⁰ **Fiscal linkages** are the revenue which can be captured by government from production and sale of oil or gas. There is a parallel set of linkages to the balance of payments from export revenues. The strength of the link will be a function of the net value of the output and the fiscal terms which govern the sector. The link arises through revenue available to the government for expenditure on consumption or investment outside the petroleum sector and the foreign exchange earned from exports to pay for imports to the non-petroleum sector of the economy

Forward linkages refer to the provision of oil products or gas to the rest of the economy either as energy or as feedstock.²¹ **Backward linkages** cover the factor inputs in the supply chain from the domestic economy into the oil and gas sector in the form of labour or local content which would not otherwise be employed or would be employed at lower productivity.

Taken together, these linkages provide a 'multiplier effect' from the petroleum sector to the rest of the economy.

The multiplier effect depends partly on the how the government allocates its revenues between consumption and investment, and partly on the capacity of the economy to benefit from the output and input linkages. These may be large in a well-functioning economy with underemployed inputs, small in a badly functioning economy where underemployed potential is not brought into action, and small in a large diversified economy with few underemployed

²⁰ The concept of linkages from producing minerals was developed by Hirschman (1981).

²¹ It can also refer to the phenomenon of the petroleum sector supplying trained manpower and managerial competencies to the rest of the economy.

resources. Culture may also be a factor.²² Government policy itself affects the strength of these linkages by creating an environment for economic development under the rule of law, property rights, competition and the operation of markets for investment, goods and services, and by investing in infrastructure, health and education.²³

Within these country- and time-specific constraints, the government has three possible, but not mutually exclusive, choices. It may also be constrained by constitutional provisions (as in Alaska) or by an overriding law or policy which diverts revenue to development funds and heritage funds and constrains the share which the political executive controls through the budget process.²⁴

The first option is to spend on consumption. This provides the population with utility (and may also have some multiplier effects as local inputs are used to supply the population's spending). The second is to put the money into real domestic investments. This can mean physical capital such as infrastructure, factories and farms but also human capital such as education and health. These investments create a return of future income which can then be consumed, saved or invested in building the wealth of the economy.²⁵ The third option is financial: paying off public debt and investing, through special funds, in financial assets. Often these are foreign assets, to avoid the Dutch disease effects on inflation and the exchange rate of high levels of local expenditure.

As will be developed in Section 6, there are many different views on the optimal deployment of resources. In theory at least, 'the portfolio composition problem (to produce or not) can be separated from the expenditure (deployment) decision' (Stiglitz, 2007: 40). Also, in the meantime, the government (or its NOC) has the option to go and borrow (at a cost) using its potential reserves as the basis to secure the loan.²⁶ But in practice the two are linked, because part of the indigenous population of many petroleum-dependent economies suffer high unemployment

22 There are variations. For example, Hirschman (1958) introduced the idea of 'technological strangeness'. Thus a simple subsistence agrarian economy (even if well functioning in its own terms) would be much less able to develop backward linkages than a modern industrial economy. But development could change its capacity.

23 There is an extensive literature on what conditions are favourable to productivity in the economy.

24 Many petroleum-exporting countries restrict budgetary spending to revenue arising at the budget oil price, with surplus revenue sequestered into various funds. However, domestic investment by these funds may or may not replace central government expenditure, and may or may not be controlled, in effect, by the executive without parliamentary scrutiny.

25 As will be developed below, the basis of this 'return' and how it is measured is a key part of the story.

26 But without a commitment to a depletion profile, and a mechanism to secure future revenues to the creditors, the cost of borrowing could be very high.

and low per capita incomes, creating popular pressure for local spending and investment. In many oil-exporting countries this linkage is in fact extremely large and highly politicized. The question is therefore how to align depletion policy with development policy, including the institutional framework and the realities of local development potential outside the petroleum sector.

Depletion preferences

A key reason for delaying production is the possibility that the value of the oil in the ground, net of costs, will increase more rapidly than the return that can be derived from converting the oil into above-ground non-petroleum assets. However, the value of production to be taken into account in deciding a country's preferred depletion profile from any point in time forward will be different for unproved reserves, for proved reserves awaiting investment, and for production from invested facilities in which capital costs have already been incurred. This is because 'unitization' of per barrel costs over total reserves does not give good guidance to the value of production forward from any particular point in time. For undiscovered reserves, the existence, cost and timing of production are all uncertain. For known reserves, these uncertainties are less, but the development costs are partly a function of the depletion decision itself. The discounted capital cost of facilities for an early peak in production (for example, using two offshore platforms) will be higher than those for a lower, longer plateau (for example, using one platform). For existing production, requiring little capital investment, future costs will be lower still, and net values higher. Net values are not the same as prices. If the costs do not change, doubling the price will more than double the net value. The higher the cost-price ratio (and the lower the net value), the lower the increase in price necessary to justify leaving the oil in the ground: If costs are 90% of today's price, any increase of over 10% in future prices would justify leaving oil in the ground. This accords with the intuitive logic that cheap oil should be developed first and expensive oil last, and that NOC projects should come before foreign investor projects, where the government income is less.²⁷

If the choice is not to explore, or not to produce or to slow development and production, this leaves the option to do this in the future, and the option value will be different according to the stage in the process already reached. Strictly, the option values should enter into the choice of

²⁷ The fiscal system or production sharing terms introduces a complication for the government, since the sharing of value may be affected by the allowances made for the private sector investor to recover past costs.

the preferred depletion profile: in practice, preferences will change (because option values change) through the process of exploration, development and production. The choice of depletion policy is thus more complex than is usually represented in the economic literature.²⁸

The basis for preferring any production profile (say 'early' production) to another (say 'later' production) should be to compare their impacts now and in the future and choose the profile which optimizes the social welfare function. Leaving aside for the moment uncertainty (discussed below), these 'comparisons' involve a number of issues. There are two key problems: what to include in the calculation and how to compare present and future values.

What to count

While private sector project analysis (PPA) is relatively clear and rigorous in terms of the commercial elements to be included in the cash flows and how they are measured, social cost-benefit analysis (CBA)²⁹ is painfully woolly and subjective.³⁰ This is because it often involves trying to value something that has no obvious market price but nonetheless is a cost or a benefit to the society. The government should take account of the reduction of the oil reserve wealth (which is not counted in a private project appraisal), including the forgoing of the option to produce later when the oil price might be higher, and externalities such as environmental costs, and benefits which occur through direct linkages with the petroleum operation (inputs and outputs), the multiplier effect of these and of the government expenditure and the balance of payments effects of the revenues. In countries with limited non-petroleum development capacity (for whatever reasons) the multiplier effects of 'early' production might be lower than for 'later' production, or even negative (the Dutch disease and resource curse cases). This is not a trivial calculation. The government needs to attempt it for the different depletion profile possibilities.

²⁸ A further complication is if the producer is large and therefore has the potential to be a price maker, then decisions on production today will influence the price in the future.

²⁹ PPA is when the investor considers the private cash flows associated with the project. CBA by contrast also measures the cash flows of the project but measures different things in different ways. Thus a CBA should internalize all externalities associated with the project in the cash flows whether negative or positive. It should also exclude transfer payments such as sales taxes. A CBA should also value all inputs and outputs based upon shadow prices. Shadow prices are simply prices that are expected to reflect the real opportunity cost of using the good or service. Where there are no prices (for example, the destruction of a beautiful view) CBA should impute values. There is also a lively debate over whether CBA should use a lower discount rate than PPA (Pearce, 1983).

³⁰ It is largely for this reason that CBA became rather discredited after the 1960s. However, this should not disguise the fact that CBA raises very serious issues, especially when public interest issues arise, as is the case with a depletion policy. Arguably, the rise of concern over environmental issues has resurrected interest in CBA since environmental damage represents a classic negative externality which all public projects should account for. Also CBA links to the NOC concept of 'national mission' (Marcel, 2006).

Rates of discount and internal return³¹

The key to comparing costs and revenue today with costs and revenue tomorrow is the rate at which future costs and revenues are discounted,³² so that projects (or programmes) whose time-profiles differ can be compared on a common basis – the ‘net present value’ of each stream of costs and revenues today. There are two main ways in which discount rates are used. One is to choose a standard or ‘test’ discount rate and use it for all projects: this will produce different net present values, which can be compared. The other is to find the rate of discount that would produce a zero net present value. This is the internal rate of return (IRR) that will be different for different projects, and the rates of return can be compared. Test discount rates are most commonly used: they can be compared with a ‘cost of capital’ and justified in terms of social time preferences and risk. The net present values resulting from using a standard test rate also give an idea of the total economic value of the project – the ‘size of the prize’. Both standard discount rates and rates of return reflect time preference – and may include risk factors – but they have different uses. Standard discount rates are used to calculate net present value (NPV) of future cash flows – the result is the profit which would remain today after all costs and revenues have been discounted. This shows the economic size of the project: NPVs can be added together. However, the NPV does not show the profitability of the project.³³ The IRR of a project (or programme) is the rate which exactly equates all its positive and negative cash flows: discounted at that rate, the project has no present value. It is a measure of the profitability of the project, though it gives no idea of the absolute size of the profit.³⁴ IRRs can be compared with each other or with some standard discount rate, but they cannot be added or averaged.

31 The discount rate is the rate used to convert a future value into a present value: in other words, what the present value could earn in the future if invested. The rate of return is the ratio of money earned on an investment relative to the amount invested.

32 Obviously inflation is an important risk since revenue in the future will be worth less than today because inflation means future revenue will buy less. However, to avoid further complications, inflation is assumed to be zero and therefore this theoretical analysis is in real terms. Given oil is also priced in dollars, the value of the dollar vis-a-vis other currencies is also important but, again, this complexity will be ignored in the following theoretical analysis.

33 Some analysts use the ratio of the discounted benefits to the discounted costs as a measure of profitability. This approach can be (but is seldom) applied to calculate per barrel costs of oil (or per barrel tax revenue) by dividing discounted costs (or taxes) by discounted barrels.

34 There is also a technical difference: it is difficult to calculate a single rate of return for projects in programmes in which future cash flows switch between positive and negative more than once.

The standard or 'test' discount rate has two components – time preferences³⁵ and risk.³⁶ Time preference in western economics is assumed to be positive. Thus consumption today is considered more desirable than consumption tomorrow.³⁷ How much more desirable is a function largely of poverty levels. The poor have much greater need of more consumption now and therefore will have a much higher discount rate than the rich. At any given price, ownership of a barrel sold today is worth more than ownership of a barrel which will be sold tomorrow at the same price (adjusted for inflation). Uncertainty about tomorrow's sale will also increase the discount rate.³⁸ The risks associated with future cash flows will be discussed in greater detail below. The key point is that, whatever the discount rate, at constant prices early depletion will be preferred to later depletion.

In private project appraisal the investor usually takes a 'test', 'target' or 'hurdle rate', discount rate or estimated 'cost of capital', as a basis for comparing projects with different costs and benefits and estimating the value of assets for purchase or sale. Risk premiums may be added to different elements of the project's cash flow. Public project or programme evaluation can also use discount rates, but the appropriate rate of discount is debatable: should it reflect the citizen's time preference? What risks should be taken into account? Do high rates – which might reflect living citizens' preference – unfairly diminish the costs or benefits which will be incurred by future generations? Public authorities often specify a 'test rate of discount', comparing individual projects and prioritizing them. The same method could be used for different depletion profiles, by evaluating the present value of different profiles of the welfare function (some variant of GDP) at an arguable test rate of discount.

³⁵ Economists place great store on the time value of money. Money expected in the future has a lower value today simply because the money could be invested today and earn interest, producing a high sum in the future. Thus the present value of £110 expected in one year if the interest rate is 10% would have a present value of £100. This of course assumes zero inflation.

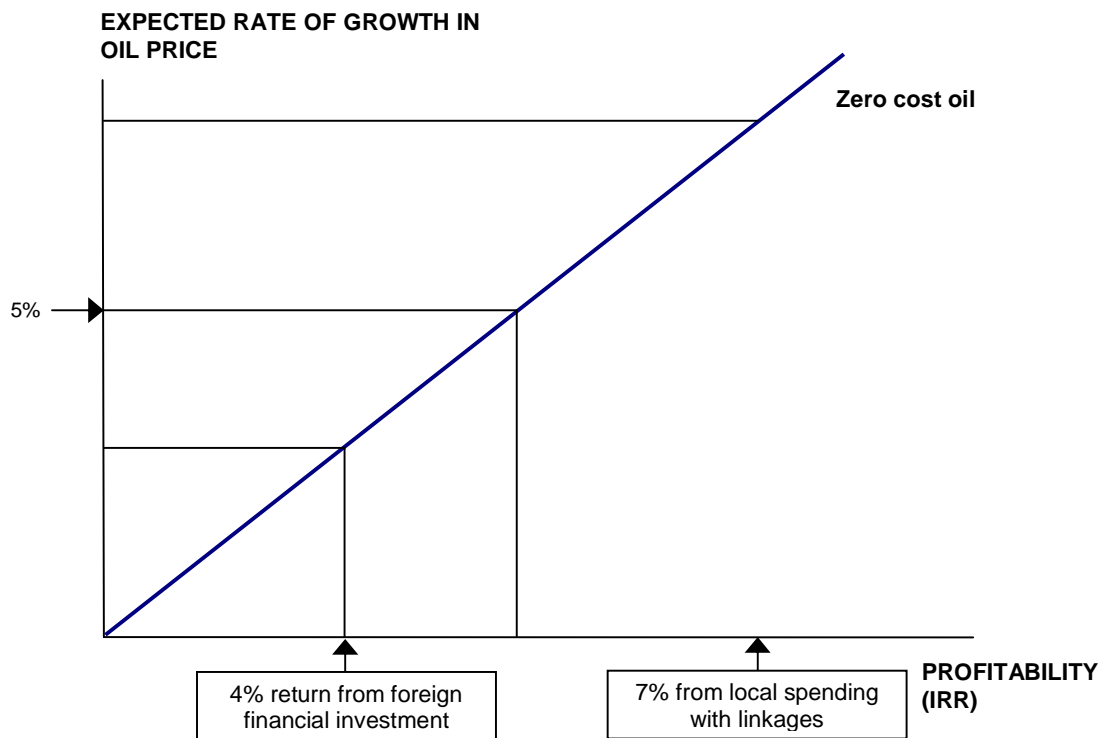
³⁶ This can be very complicated. Many analysts would argue that undiscounted values subject to risk should be converted to certainty equivalents and then be discounted at a rate that is either determined by the opportunity cost of capital or by Ramsey's rule (Ramsey, 1928).

³⁷ Thus a consumer who lends and sacrifices current consumption requires compensation for postponing the utility gained from consuming today. Assuming certainty on repayment, this determines the riskless rate of interest.

³⁸ Discount rates and risk are a nightmare in theoretical economics. For example, the 'capital asset pricing model' (CAPM) that has been the basis for much of the discussion over discount rates in recent years distinguishes between diversifiable risk which should not increase the discount rate and non-diversifiable risk which should increase the discount rate (Brealey and Myers, 1988). However, it can produce odd results. This author heard a leading proponent of CAPM, as an expert witness in a legal case, being forced to admit that based on CAPM, buying a US treasury bond carried the same financial risk as wildcatting on the dark side of the moon because exploration risk was diversifiable.

However, comparison between depletion profiles can be treated in a simpler way. The starting point (the 'cost') is the same – the surplus over operating costs of a barrel of oil produced today. The IRRs of a production profile can be calculated. In both methods the key components are rates of growth: future increases in petroleum prices, the growth of the non-petroleum economy due to linkages and multiplier effects, and the rate of return on external financial investments. The IRR comparison, however, side-steps the choice of a standard discount rate. The question is simply which of the alternatives offers the highest IRR: depletion, with consequent conversion of income into domestic investment or foreign assets, or keeping the oil in the ground where its value may appreciate. This comparison can be represented graphically. Figure 1 shows the simple case where the rate of return on oil in the ground is compared with other two alternatives: for simplicity, costs are ignored at this stage.

Figure 1 The Economic Trade-off



To use illustrative numbers, if the oil price is expected to grow at 5%, and foreign financial investment is expected to yield 4%, the best alternative is to leave the oil in the ground. This might be the result of an analysis that simply looked at those two alternatives. If, however, investment in the local economy will yield 7%, then it makes sense to produce the oil and invest the proceeds locally. The rate of return on domestic investment could fall to 5% before it broke even with leaving oil in the ground, and the oil price expectation would have to fall below 4% to justify producing in order to acquire foreign assets.

Windfall surges in oil prices and revenues may generate income that for the time being cannot be spent locally at rates above those expected from investment abroad. They are also likely to

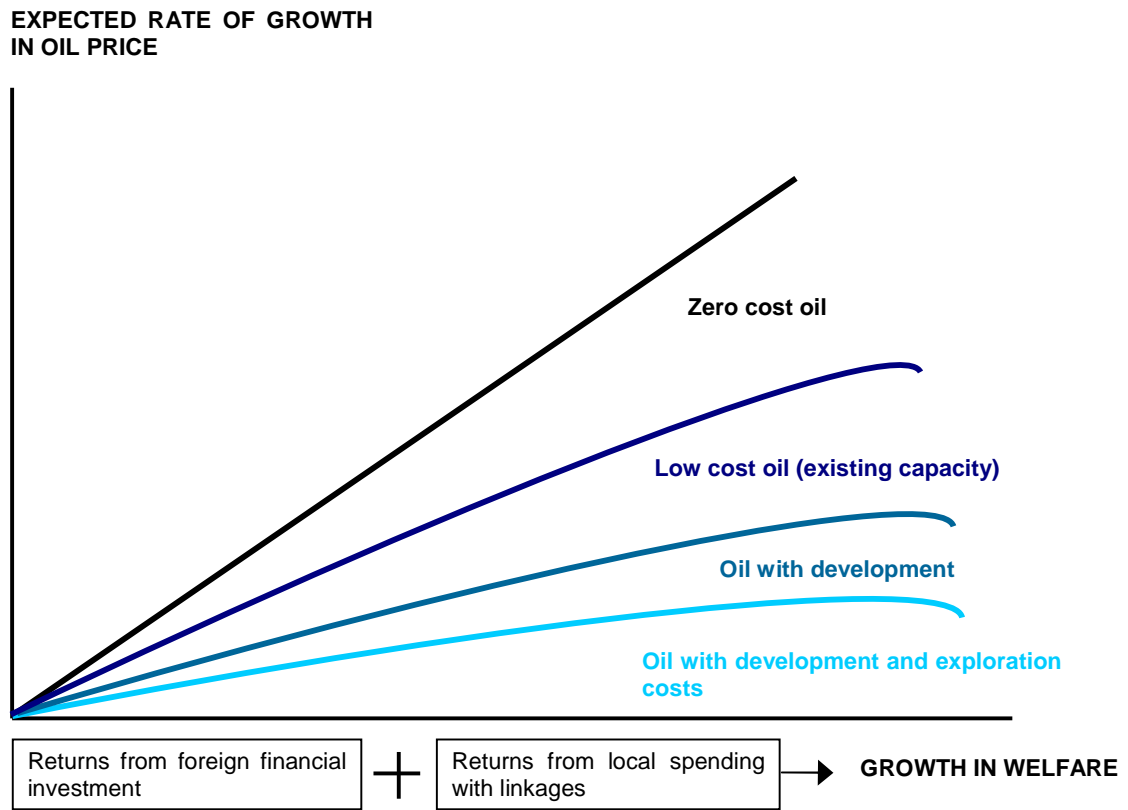
reduce expectations for further price rises, reducing the attractiveness of keeping oil in the ground, but we are seeing that they may also lead to assumptions that prices will not fall and therefore cause governments to seek greater shares of the rent, which, together with rising costs, may lead to oil being left in the ground as industry cuts back on investments.

Of course costs matter: it is only the profit element of oil in the ground that has future value. It is the rate of growth in that profit which should be compared with alternative investments. The smaller the starting profit, the less growth in the oil price that is required to match the rate of return on the alternatives, so long as costs are constant. A 10% increase in the oil price will double the profit if it begins at 10% of the price. However, the starting point also matters. A country which has invested in a large production capacity (for example, during a high-demand, low-price oil regime, or in the pre-1973 private sector management of depletion) will need a high expectation of future oil price increases to justify leaving oil in the ground because its future costs are low.³⁹ Continuing production may be the best policy, even if revenues cannot be spent productively locally and the result is to exchange oil in the ground for foreign financial assets.

Figure 2 shows the effect of incorporating costs into the analysis. At any given moment, the highest future costs are likely to be those of undiscovered or undeveloped reservoirs: relatively low expectations of future oil price increases will still offer a good return in leaving oil profits in the ground, even though the same expectations would justify continuing production of a field in which future costs are low because the exploration and development costs have already been incurred. This provides the intuitive result that shifts in depletion profiles are likely to take place through shifts in exploration and development rather than in production changes from developed fields (production cuts may, of course, take place in response to short-term market conditions, as for example when OPEC countries try to defend the price through production quotas). The paradox is that a surge in prices which lowers expectations of further price increases in the future will make it less attractive to keep low-cost oil in the ground but more attractive to delay the development of high-cost oil. When (as in recent years) there is limited spare capacity to produce 'low-cost' oil the delaying effect may prevail.

³⁹ In this kind of cash flow analysis, the 'unitization' or 'levelization' of costs on a per barrel basis over the life of the reserves are not appropriate: sunk costs are sunk.

Figure 2 Breakevens (Depletion should be delayed if price is above breakeven line)



3. UNCERTAINTIES

The preferred depletion profile will produce impacts as described in Section 6. However, there are considerable uncertainties associated with the precise impacts arising from the choices and these require further analysis. They can be divided into uncertainties over numbers and uncertainties over transmission mechanisms.

The levels of recoverable oil and gas reserves

The depletion path is going to be influenced by perceptions regarding the level of reserves. Figures for reserves are uncertain and liable to change. The level of 'proven' reserves⁴⁰ is a function of knowledge of the geology, the technology to develop and produce the oil which determines the costs of production, investment in the sector and the price of the oil and gas. All of these determining factors will change over time. Thus a depletion policy based upon one set of views of the level of reserves is likely to change as those views change since changing views will change the scarcity premium associated with the oil (Griffen and Teece, 1982).

Future prospects for oil and gas prices and costs of production

In very simple terms, key determinants of depletion preferences will be price expectations and expectations about the cost of production. Both will determine the rent or 'profit' which contributes to the social welfare function.⁴¹ As explained above, other things being equal, if the future rent is expected to rise at a rate above the rate of return available from the investment of the realized rent of oil, produced today, then it makes sense to delay production. If everyone has the same price expectations, to some extent this creates a self-fulfilling prophecy. If everyone expects rent to rise then they reduce production which will push up prices, thereby increasing today's rent. Eventually, the higher price produces a market response, reducing demand and

⁴⁰ The traditional view is that proven reserves are reserves that are capable of being produced with the current state of technology and prices. Probable reserves have a 50% chance of being produced with the current state of technology and prices. Possible reserves have a less than 50% chance of being produced with the current state of technology and prices. The Society of Petroleum Engineers and the UN are working to develop a more discriminating set of definitions which will distinguish between uncertainties about physical data, technology, and economics] and can be connected to the more restrictive definitions of the New York Securities and Exchange Commission. See the UN Economic and Social Council's Annotated Agenda for the Fourth Session of the European Commission's Committee on Sustainable Energy, ECE/ENERGY/GE.3/2007/1 of 7 August 2007 for background and current agenda.

⁴¹ In this context, rent refers to the difference between the full costs of production, including an acceptable rate of return and the price realized by selling the oil and gas. For oil, this arises from two sources. One is the producers' surplus which occurs because producers have differing costs of production as a result of geology and efficiency. Thus they are low costs relative to the market price. The other source of rent is what economists call 'super-normal profit' which occurs because OPEC restricts supply and pushes the market price above its competitive equilibrium. Currently, the rent associated with oil prices is extremely high.

increasing supply, thus leading to lower prices and lower price expectations,⁴² until at some point 'oil in the ground' no longer seems the best investment available. In the past, because the oil industry has always been one of strong consensus, this has been an important factor in the cyclical nature of oil markets. Producers can respond to this cyclicity in three ways: by attempting to coordinate production (as in OPEC quotas), by holding 'stabilization funds' to smooth out fluctuations in revenue, and by adjusting spending cautiously when prices fluctuate.

Uncertainty about the volume and potential rent value of oil and gas reserves is a key for the formation of any depletion and related spending policy based on the expected value of the oil wealth. However, such valuation is difficult and controversial (Adelman and Watkins, 1995; Hamilton, 2002). If there were an efficient private market for subsoil minerals, then it would be feasible to observe market values for assets and depletion. However, such a market for petroleum in the ground only exists in the US and Canada – and prices are obviously influenced by global prospects in which the depletion policies of governments play an important part. These governments have to come up with a view of future oil prices. Forecasting oil prices is notoriously difficult (Huntington, 1994), which implies that getting the depletion policy right for governments and therefore for the private sector where it exists will be an extremely hit or miss process. Currently uncertainty over future prospects for oil prices is compounded by the potential for technological developments which might replace oil and by energy policies driven by growing environmental concerns, not least in the context of climate change which could also reduce the demand for oil.⁴³

The government's future share of rent or profit

In countries where the private sector shares the rent through revenue-less-cost-based royalties, production sharing or service contracts, or through licences for development,⁴⁴ the government takes its revenue through some combination of sale or leasing of acreage (or signature bonuses), royalty and tax, and direct shares of production tax. Any belief that government take might increase in the future would, other things being equal, encourage a preference by the private sector for earlier depletion but a preference by government to delay development. In recent

⁴² Arguably, gas differs. Gas prices tend to track oil prices partly because of competition but also because in many gas sales contracts the gas price is directly linked to oil prices. However, there is much less rent in gas simply because of its relatively low energy density per cost of production and, as yet at least, there is no Organization of Gas Exporting Countries to restrict supply and increase price above a competitive equilibrium.

⁴³ This is clearly a huge topic for discussion but somewhat outside the remit of this paper.

years, the trend for fiscal systems has been to become more progressive in favour of the government's take. However, the 'obsolescing bargain' does create a cyclical dimension to the process. In Ray Vernon's 'obsolescing bargain' (Vernon, 1971) once oil has been discovered and the investment sunk in development, relative bargaining power which had been at one level at the time of the original contract negotiations switches in favour of the host government which then tries to increase its fiscal take by changing the terms of the original contract. The cycle tends to be driven by the level of oil prices at the time the agreements were signed, the degree of competition for acreage when the agreements were signed, the sophistication of the negotiators and the current level of oil prices. Thus a period of low prices, easy terms and weak negotiators inevitably sow the seeds for the next round of conflict to unilaterally renegotiate terms. A poor deal today means a renegotiation or unilateral change tomorrow. Expectations of instability lead private sector investors to add a risk premium to the rate of return they require, thus reinforcing the potential for future change. Such risk can be reduced by the design of contracts or tax systems which automatically adjust: for example, by progressively increasing the government share when prices are high.⁴⁵ Thus a redistribution of the benefits does not require a renegotiation of contract terms by the government.

Time preferences of the society for consuming today versus tomorrow

The discount rate, or required rate of return, affects depletion preferences by virtue of its impact on the present value of revenue expected in the future. A high discount rate reduces the present value of future revenue, thereby encouraging faster rates of depletion and vice versa. As already outlined, the discount rate consists of two elements – time preference and risk. Both can change over time. For example, less poverty tends to reduce the time preference element – if you are rich, jam today seems slightly less urgent than jam tomorrow.

An issue of some importance in the depletion debate literature is whose discount rate should be considered (Robinson and Morgan, 1978). Discount rates are sensitive to the time horizons chosen. It is often assumed in traditional economic analysis that a private oil company would have a fairly short time horizon – hence a high discount rate – therefore, if left to decide, would

⁴⁴ Outside the US and Canada, about 10-15%, depending on definition, of current world production of oil is produced by private sector companies.

⁴⁵ This is a complex subject. Where government take is regulated by contract, the contract has many contingencies. Where the contract is implicit in the tax system – as in the UK, Norway, and Russia – it is usually based on a difference between the rates of return required by the government and the private sector: the latter, with high discount rates, values future oil less than do governments.

produce the reserves quickly. A government by contrast is expected to take a longer view, have a lower discount rate and therefore produce more slowly. However, in practice this may be far from the reality. A government in a five-year electoral cycle will find its discount rate rising rapidly as the elections loom and the need to increase revenues to 'buy' electoral support becomes crucial.⁴⁶ A variation on this theme is if the government concerned is seen as corrupt and inefficient. In such a world, citizens may well prefer a much slower rate of depletion until governance improves.⁴⁷ These problems are side-stepped if depletions profiles are chosen on the basis of the rate of profitability (IRR).

How might the risks of investments, real and financial, change over time?

A number of factors could change the attractiveness of investments,⁴⁸ encouraging governments to convert their below-ground assets into above-ground assets. Currently, for example, the IMF takes the view with respect to the Middle East and Central Asian producers that they 'should seize the opportunity to invest in infrastructure and human capital' (IMF, 2006: 3). The implication is that linkages and productivity growth will yield a better rate of return than the appreciation of value of rent on oil in the ground. Such views lead to a discussion of uncertainties over transmission mechanisms, in particular the role of the resource curse, the role of oil funds and how backward linkages might develop.⁴⁹ The oil producer's attitude to international capital markets (and vice versa) may also change over time. Heal (2007: 157) indeed argues that assuming good access, it makes sense to produce and invest because it 'pays to turn oil in the ground to money in a bank account'. This is subject, however, to the breakeven analysis described above.⁵⁰ Dependence on international capital markets for investment is complicated by a number of factors, not least geo-politics.⁵¹ Also, there is the obvious point that the state of the international capital markets is subject to risks exogenous to the country investing. Perceptions of these risks, as well the uncertainties of the results of investment, may also change.

46 It is certainly feasible to argue that this is precisely what drove the UK's depletion policy in the 1980s.

47 In a number of producing countries, the author has had many conversations with citizens along these lines.

48 Defined as both the return and the relative risks.

49 It is important to remember that while the paper is about optimal depletion policies, these are determined by the government's ability to pursue an optimal deployment of revenues.

50 It also ignores the prospects for dollar devaluation.

51 For example, following the first oil shock of 1973-4, both Libya and Iraq reduced their production for fear that any financial surpluses invested abroad could be vulnerable to sequestration by hostile governments.

4. THE RESOURCE CURSE OR BLESSING?

In theory, large oil and gas revenues should promote economic development in at least two ways.⁵² First, large revenue inflows should provide opportunities to invest in projects and programmes that promote development. Second, inflows of foreign exchange can overcome the problems associated with 'dual gap analysis' (when improving saving rates to offset insufficient investment does not promote development because the saving is in local currency while development may require access to imports of capital goods for which foreign exchange is essential).

Unfortunately, these theoretical benefits have not materialized in reality in many cases. Observers have widely recognized and discussed the fact that most natural resource-abundant countries, particularly oil exporters, have not been able to utilize revenue from natural resource extraction for the general benefit of their societies. This has been dubbed the 'resource curse'. For example, Auty (2001) found that between 1970 and 1993 resource-rich countries grew some three times slower than resource-poor countries and that fuel- and mineral-rich countries performed even less well than the rest of the resource-rich group. There is a large literature which appears to support this view (Gylfason et al., 1999; Neumayer, 2004; Mehlum et al., 2006; Sachs and Warner, 1995).⁵³

This poor outcome has motivated a vast body of literature to explore the reasons for these apparent negative effects. This body of literature has already been well summarized (Ross, 1999; Stevens, 2003; ODI, 2006; Rosser, 2006; Humphreys et al., 2007). There are various groups of explanations of why oil exporters and exporters of other natural resources have suffered resource curse attacks. Declining terms of trade between primary products and manufactured goods were blamed (Prebisch, 1962), together with short-term price volatility (Auty, 1998; Mikesell, 1997; Sala-i-Martin and Subramanian, 2003). Researchers then concentrated on

⁵² This discussion of the resource curse is taken largely from Stevens and Dietsche (2007). See also Collier (2007); Davis et al. (2003); Dietz et al. (2007); Humphreys et al. (2007); Lederman and Maloney (2007).

⁵³ However, such views are increasingly being challenged. For example, Lederman and Maloney (2007: 3) argue that there is empirical evidence to show 'that natural resources do spur economic development when combined with the accumulation of knowledge for economic innovation'. Indeed they argue that from the empirical work, 'The central finding is that ... several plausible indicators of the incidence of natural resource exports seem to have a positive rather than a negative effect on subsequent economic growth. Put bluntly, there is no resource curse' (ibid.). In similar vein, see also De Ferranti et al. (2002); Maloney (2002); Stijns (2001); and Wright and Czelusta (2003) for further work which questions the existence of the resource curse.

possible macroeconomic transmission mechanisms, for example Dutch disease, where overvalued real exchange rates undermine international competitiveness⁵⁴ and reduce the size of the non-oil traded sector.⁵⁵ Specifically, they argue that the manufacturing and service sectors create more positive externalities than natural resources. Thus a relative decline in manufacturing and services could depress economic growth (Hirschman, 1958; Matsuyama, 1992). Researchers have also identified microeconomic transmission mechanisms, including the argument that a dominant primary sector based on the extraction of natural resources crowds out investment in other economic sectors, and that high wages paid in the capital-intensive resource sector are transmitted to other sectors, undermining their competitiveness. It has also been suggested that resource-rich countries lack the incentive to invest in human capital (Birdsall et al., 1997, 2001). Further economic explanations have included the impact of oil and mineral exports on the exchange rate and finding the right mix between investment and consumption spending and on industrial and trade policies.

More recently, explanations have placed greater emphasis on the political economy of oil and other natural resource exporters. This change of focus has come about because many countries continuously failed to pursue the policy actions that economists had identified for countering the various macroeconomic and microeconomic transmission mechanisms. For example, Neumayer (2004: 34) argues that 'Ultimately, it is difficult to resist the conclusion that it is political-economic failures that have been the root cause of slow growth'. Thus applying standard economic assumptions to politics, economists have next sought to identify the reasons why countries would deliberately pursue poor policies.

A political-economic explanation that has attracted much attention has taken a rational agency perspective. It has been argued that those holding power in resource-abundant countries – typically politicians or bureaucrats – take personal advantage of their national resource wealth, engaging in rent seeking and corrupt political and business practices which rob their countries of the opportunities that the resource wealth could provide. For many, this is in fact the central issue in resource curse analysis. Thus, 'Our most important result is that resource-rich countries suffer

⁵⁴ The transmission mechanism for the Dutch disease is more complex than just the exchange rate effect but further discussion here is not appropriate, given the focus of the paper.

⁵⁵ Arguably, today there is no longer any excuse for a country to suffer an attack of Dutch disease (Sachs, 2007) since it and its cures are now well understood. However, some still do.

from low GS (genuine savings) but that they can improve their performance by fighting corruption, difficult as this may be' (Neumayer, 2004: 35)

Formal models constructed to explain the poor outcomes have employed basic economic arguments to political behaviour, starting out from the assumption that political and administrative power holders are rational self-maximizing individuals with a narrow interest in exploiting their countries' natural resource wealth for personal gain. Aggregating this rational individual behaviour results in collectively negative outcomes. This result should not come as a surprise nor should it be viewed as down to 'policy failures'.

At first sight the policy conclusions of this line of argument would appear bleak. Domestic solutions are difficult to propose because normative appeals to politicians and bureaucrats to change their behaviour would be inconsistent with the basic assumptions of the argument. This dilemma points to external solutions. Not surprisingly, there have been many calls for international regimes to impose restraints upon countries to exploit their natural resource wealth or for internationally devised mechanisms to manage these countries' resource revenue. At second sight, institutions have more recently been proposed as a possible solution to circumvent predatory state behaviour.

A popular political-economic explanation suggested by some has been based on the notion of rentier states or rentier societies (Isham et al., 2002). The basic conjecture has been that the presence of oil and other mainly non-renewable natural resources provides structural incentives that impede the governments of such countries from building more democratic regimes. In rentier states the revenue generated by natural resource exploitation allows incumbent governments to diffuse pressure to democratize. Natural resource rents allow governments to keep domestic taxes low, which undermines political representation (Moore, 2004; Ross, 2001). Governments can also undertake unproductive redistributive spending to satisfy political constituencies, and they can employ internal security to control domestic opponents. Thus, natural resource wealth tends to consolidate and conserve 'bad' political regimes and undermine the social and cultural changes that have facilitated democratic transitions and consolidations elsewhere. Furthermore, the domination of the state means there is less incentive to 'form a healthy civil society, an independent middle class fails to develop, and technocratic and entrepreneurial talent remains captive of state largesse in terms of employment and advancement opportunities' (Neumayer, 2004: 38 citing Chaudry, 1997). A variation on this theme is that political elites fear

industrialization and urbanization because they would weaken their grip on control of the resources (Acemoglu et al., 2001).

Of course, this explanation of the lack of democracy has implied that democratic regimes would respond better to general public interests and redistribute more broadly the benefits of investments in the natural resource sector. Various quantitative studies have therefore sought to draw a statistical link between the level of natural resource wealth and political regime type (Rosser, 2006; Ross, 2001; Jensen and Wantchekon, 2004; Collier and Hoeffler, 2005). The policy implications of this line of argument are equally bleak. If natural resource wealth has a structurally deterministic impact on the incentives and the interests of domestic political regimes then there is little scope for change. The conclusion comes close to proposing that well-endowed countries leave their natural resources in the ground to prevent rent-seeking from taking place.

A major challenge for both types of political-economic explanations has been that they have not been able to explain variance in outcomes across natural resource-abundant countries. While most natural resource-abundant countries, and in particular oil-rich countries, appear to have suffered from this type of resource curse, there are a few frequently cited examples of countries that seem to have avoided this outcome. These countries have typically included Chile and Botswana, which are of course mining countries (Sarraf and Jiwaji, 2001; Acemoglu et al., 2003; Iimi, 2006). Arguably, the positive examples also include Malaysia and Indonesia (Stevens, 2005) and among industrialized countries Norway, the US, Australia and Canada (Wright and Czelusta, 2003). It has been tempting to look upon these countries to identify particular institutional features that distinguish them from the many others.

If the existence and causes of the resource curse are controversial, it is hardly surprising that cures or means of avoiding it are equally problematic. However, in terms of this paper, if there is a strong probability of an attack of resource curse, or if the institutions for the development of positive linkages to the non-hydrocarbon sector are weak, this suggests that depletion should be slowed in order to allow time for the necessary institutions to develop (see below) although, as the previous analysis suggests, it is by no means obvious that such institutional development will simply occur spontaneously. Clearly, fears of an attack of the resource curse will play an important role in the decision of governments on whether or not to convert their below-ground assets of petroleum resources into above-ground assets of cash. However, also important is the issue of whether the above-ground assets of cash might be managed in reserve funds.

5. RESERVE FUNDS FOR FUTURE GENERATIONS AND STABILIZATION OF DEVELOPMENT⁵⁶

For a private company, the world's capital markets constitute a stabilization mechanism and a reserve fund: profit can be returned to shareholders and bondholders and investment can be drawn from them. For governments of petroleum-dependent countries, reserve funds provide a link to the global capital markets: value can be stored and withdrawn either to mitigate short-term fluctuations in income or as part of the inevitable long-term replacement of oil in the ground by other assets. The existence and functioning of reserve funds is an essential part of the alignment between depletion policy, with all its uncertainties, and development policy, with its long-term, slow-changing aspirations and constraints. The rates of return earned in funds provide an 'opportunity cost' against which to compare the expected returns of leaving oil in the ground or of investing the proceeds of production in the local economy.

Many resource-rich countries have established special funds for depositing the revenues accrued from natural resources extraction.⁵⁷ The motivations for such funds differ but often include: stabilizing revenue streams by countering commodity price volatility; providing an inter-generational saving mechanism; avoiding Dutch disease effects by sterilizing the impact of foreign exchange inflows; and finally, ensuring transparent arm's-length management of revenues insulated from day-to-day politics. A further motivation for a fund is that in many cases the comparative advantage of the oil producer means that while in principle domestic spending to diversify the economy is sound, in practice it will take a long time for any serious development of the non-oil sector to occur, implying a very low rate of return on domestic investment. In such circumstances, transforming the oil revenues into financial or real foreign assets via a special fund may well be the most relevant option. These differing motives affect the structure and rules for contribution to the funds and use of their revenues.

⁵⁶ The following section is taken from an as yet unpublished report on 'The policy challenges in managing windfall gains in Mongolia', prepared by Paul Stevens, which benefited a great deal from comments by Vera Songwe of the World Bank and Peter Frosley Christensen of Development Associates Denmark.

⁵⁷ There is a large literature on such funds. Among some of the more recent contributions are Bell and Faria (2007); Davis et al. (2001); Davis et al. (2003); Lewin and Devlin (2002); Fasano (2000); Heilbrunn (undated); Humphreys and Sandbu (2007); Shabsigh and Ilahi (2007).

How funds work

Some funds are managed directly by the existing fiscal authorities and operate inside the budget framework without any earmarking of revenues. They are often termed virtual funds or informal funds. Formal funds are often managed by special appointed boards and operate (at least in theory) partly or wholly outside the government's budget. In addition, the revenues derived from formal funds are often earmarked for special purposes. In some cases, they have contributed to enhancing the effectiveness of fiscal policy by de-linking budget expenditures from revenue availability, thus avoiding irresponsible levels of government spending during boom years. In general, the working of any fund is very much a function of the institutional capacity of the country to manage it effectively.⁵⁸ Many also argue that oil funds cannot work without liquidity constraints since governments can borrow money or withdraw accumulated assets to increase public spending while a part of the oil revenue is accumulated in an oil fund. This view argues it is critical to integrate the oil fund with the overall fiscal framework as represented by the budget. Equally it can be argued – as developed in Appendix 1 – that oil exporters with strong fiscal discipline can manage oil revenues without an oil fund, as Indonesia did in the 1970s (Usui, 1997).

Funds as a defence against politics

Many developing countries have adopted funds (both formal and informal) with the specific object of mitigating the rent seeking and corruption characteristic of resource-rich (but wealth-poor) countries, hoping that the creation of a visible focal point for revenue management will create a constituency for improved resource management. Consequently, many funds also have clear delineations of responsibility for revenues and prescribed mechanisms for channelling them. Separate funds also allow for recruitment of professional fund management not associated with the existing (and perhaps tainted) civil service. Examples of successful natural resource funds include Norway's State Petroleum Fund, Chile's Copper Stabilization Fund, Botswana's Revenue Stabilization Fund and (to some extent) Kuwait's Oil Funds.⁵⁹ In these countries the funds have assisted in accumulating assets to meet future needs when natural resources become depleted. In addition, they have contributed to enhancing the effectiveness of fiscal policy by de-linking budget expenditures from revenue availability, thus avoiding irresponsible levels of government

⁵⁸ The system of asset management in oil funds is of enormous importance but is outside the remit of this paper. However, in situations where the institutional capacity of the government is weak, there is a strong case for relying on external fund managers to manage oil revenues.

⁵⁹ The reservation is because there have been allegations of impropriety with respect to some of the Kuwaiti funds.

spending during boom years. Finally, the funds (especially in Norway and Chile) have moderated real exchange rate appreciation and thus also weakened Dutch disease symptoms.

Fiscal behaviour or funds?

A variation on this theme is the development of a rule-based fiscal system and fiscal responsibility legislation. Experience so far with such systems in oil exporters is 'relatively limited' (Da Costa and Juan-Ramon, 2006: 3) and 'has proved very challenging' (ibid.). IMF (2007[a11]) found that based upon empirical work, there was no evidence that introducing such approaches 'has impacted fiscal outcomes'.

Funds as part of the social (development) contract

However, all successful stabilization funds we know of are in democratic or partly democratic countries with well-functioning, transparent institutions, with predictable and stable legal frameworks.⁶⁰ These successful examples share some key characteristics: the rules for the funds are generally simple and transparent, and their results are published, so that the managers are accountable to the public, as well as to the government and parliament, thus generating citizen interest in fund management.⁶¹ In this way the funds are seen as a manifestation of a compact between a government and its citizenry, giving the latter a sense of ownership of the natural resource rents, thus enhancing public demand for accountability. In addition, the funds operate in a mainly benign fiscal context in which fund managers can resist political pressure for over-spending. This constrains governments from either misappropriating or misallocating natural resource revenues although, as described below in the context of Alaska, if citizens then will not agree to taxation needed to balance budgets this can create its own problems. Finally, IMF (2007a) argued that the key to success for such funds was the quality of public financial management systems.

⁶⁰ Paul Collier at a Club de Madrid meeting in 2006 expressed this beautifully in the context of Norway. He describes managing oil revenues as like jumping a hurdle. Norway chose to do this wearing a hat, i.e. its oil fund. Other countries, seeing Norway's success, rushed to get a 'hat' of their own, not realizing that Norway was an athlete before it began the run up to the hurdle. Thus it was a functioning, accountable democracy, relatively rich, with a highly educated population and a significant capacity in ship building and other activities associated with oil development.

⁶¹ Funds in other countries may be successful. Without public information it is impossible to judge. In Kuwait it is a criminal offence to divulge how much is in the funds although the figure of \$213bn was officially published in Spring 2007. There are estimates of the size of the funds (see 'The world's most expensive club', *The Economist*, 24 May 2007), and there is some information about income from them in government budgets and IMF country reports.

Limitations of funds

However, the establishment of natural resource funds is not in itself sufficient to reap positive development outcomes from natural resource extraction. Countries such as Venezuela, Oman, Kazakhstan, Papua New Guinea and Angola have all set up natural resource funds, but with generally disappointing development outcomes.

A reserve fund does not necessarily restrain governments from pursuing unsustainable fiscal policies and some governments have used a fund's resources as collateral for reckless borrowing. The problems are exacerbated where the executive branch of government faces few restraints, and checks and balances are weak. In such circumstances the rules and regulations governing the funds are often changed or not adhered to, with few effective sanctions available to restrain the executive. This has been the case in Venezuela where power has been successively concentrated in the office of the president, which in turn has used these powers to distribute patronage. In Angola lack of transparency and lack of integration into the budget, combined with independent spending authority, effectively turned the oil funds into vehicles for personal enrichment of the elite. While Angola may represent the extreme case of natural resource fund mismanagement, it nevertheless highlights a key danger of fragmenting fiscal responsibility into several spending authorities, tending to limit transparency and defeating the purpose of the budget process. As will be described below, even in a democratic context such as Alberta, elected governments can change the rules governing the funds to allow them to raid the proceeds, albeit on the grounds of public interest.

In recent years, precisely because of these problems, the role of such funds has become controversial, not least within and between the World Bank and the IMF. The case for and against them is summarized in Appendix 1.

6. LINKAGES: UNCERTAINTIES AND POLICIES

It was argued above that linkages critically affected depletion preferences because they affect the 'profitability' – or contribution to the welfare function – of investing revenues from depletion into national economic development.

When Hirschman developed his ideas of forward and backward linkages he did so in the context of something called 'technological strangeness'. Thus, for example, in the most extreme case, the development and production of oil on tribal lands in (say) the depths of the Amazon jungle are unlikely to lead in the near term to the tribe building drilling rigs from scratch. A less extreme example is Azerbaijan where the local economy around Baku had many construction yards used to build offshore rigs and platforms in Soviet times. The problem was that their technology was at least 15 years out of date and therefore they were largely unusable when the Azeri-Chirag-Gunashli (ACG) offshore oil fields were under development. Thus the extent to which the depletion of oil might encourage the development of the local supply chain and local content depends upon the existing nature of the local economy. This will change over time. The slower the depletion rate, the more opportunity there is likely to be to develop local capacity. This is crucially important in the context of sustainable development since strong backward linkages will promote the non-oil economy for when the oil runs out or is no longer wanted.⁶² A good practical example was the relative experience of the UK and Norway (Hallwood, 1990). The UK government decided it wanted to produce the oil quickly while the Norwegians chose a much slower rate of depletion. The result was that the UK simply brought in American technology and it took a very long time to develop local capabilities. By contrast, the Norwegians took a conscious decision to develop a solid base to provide local content and Norwegian service companies have a significant share of the global market.

⁶² Even if there is less oil production domestically, the developed local capacity still has the option to use its skills abroad.

7. THE POLICY CHECKLIST

What has been developed in the previous sections has been an outline of the choices facing any depletion policy and the consequences. However, so far this has been outlined on a 'positive' or objective basis with no recommendations as to which choices will produce the optimum results for the country. This section moves to a more 'normative' or subjective approach and examines some opinions as to which option might be best.

What economic theory advises

What the discount rate tells

Economic theory conventionally answers the question of what the depletion rate should be at a simple level by considering expectations regarding the growth in rent (r) compared to the country's discount rate or rate of interest (i).⁶³ If r exceeds i , then it pays to slow down production, saving it for the future. In effect it means that the present value of future production exceeds the current value. Or, put another way, the gain in price more than offsets the loss of interest if the oil was produced and the revenue invested. If on the other hand i exceeds r then it pays to speed up production because future production is worth less than current production. The optimal production level is therefore where r equals i . Clearly such a prescription is highly dependent upon price expectations which in turn will be influenced by such issues as the expected size of oil reserves and the presence of any sort of 'back-stop' fuel technology. The analysis in section 2 suggests a nuanced variation: the optimal 'breakeven' between production now and production later depends on ranking the expected return on the oil assets remaining in the ground with the alternatives of investing in the local economy (with estimates and supporting policies of multiplier effects and linkages) and investment in assets outside the country. Changes in expectations can explain changes in depletion policy. The government, through its ability to influence the return on investing in the non-oil economy, should consider depletion and development policies together.

⁶³ At a more complex level the analysis can get positively eye-watering and is most certainly not for non-economists. For example, a variety of criteria can be used – utilitarian; maxi-min criteria; and conservation criteria considering in turn preservation of the resource base, maximum sustainable yield, and permanent liveability (Webb and Ricketts, 1980). See also Dasgupta and Heal (1979). For more accessible versions see Robinson and Morgan (1978); Griffen and Teece (1982).

Such analysis has been used to explain the first oil shock (Robinson and Morgan, 1978). Thus after the price increases of 1973-4 expectations were for prices to go on rising, thereby significantly increasing r . At the same time, the nationalizations by government (it was argued) had significantly reduced their discount rate i compared to the IOCs which had previously controlled the depletion rates. Thus r greatly exceeded i , leading to slower production.

The problem with this approach is that it is based upon very restrictive simplifying assumptions, not least the assumption of perfect knowledge. It also ignores the effect on demand: did OPEC policy-makers in 1973-6 correctly anticipate the effect of their price increases on demand, which in turn constrained their production possibilities? Invariably the 'optimal' depletion level is impossible to achieve if only because the future is unknowable. It also assumes that the stock of oil reserves is a fixed quantity, ignoring the fact that reserves are actually a function of investment and only in a very limited geological sense are the global resources finite (Adelman, 1990). While much of the analysis in the literature tries to accommodate this, at the end of the process, it fails to provide serious practical guidance to policy-makers.⁶⁴

Thus 'there is most unlikely to be agreement about how fast resources ought to be depleted. Ideas on this issue will vary with value judgments concerning the weight to be given to future generations and with views about the nature of the economic system itself – whether substitution possibilities are extensive and growing or whether choices are becoming increasingly limited and technical progress less likely' (Webb and Ricketts, 1980: 73). This then leads us into more practical prescriptions for depletion policy and how revenues should be deployed.

Focus on optimal spending, rather than depletion⁶⁵

The key idea is that reserves in the ground constitute an item of wealth and countries should not spend annually more than that wealth could earn as income after the (discounted) value of the resource has been replaced by other income-generating assets. An early version of this was Hartwick's Rule (Hartwick, 1977). This argued that all the revenues net of production costs should be invested. This is often referred to in the literature as 'invest resource rents'. This, at

⁶⁴ Depletion policy is not independent of the state of governance within a country. If governance is poor then depletion policy may simply be aimed at getting the revenues as swiftly as possible and stashing them away in overseas bank accounts for the benefit of the ruling elite.

least in theory, maintains the stock of wealth of the country which then provides a permanent income which can be spent.⁶⁶ Put another way, 'consumption in each period should be limited to permanent income or, in this case, the implicit return on government wealth' (Barnett and Ossowski, 2003: 47). The best measure of the direction and sustainability of the fiscal system is the primary non-oil balance.⁶⁷ If it is balanced, then the fiscal position is sustainable. If it is in deficit, being funded by the oil revenues, then clearly it is not sustainable assuming at some point oil revenues dry up as a result of depletion or being no longer required. In reality, as Heal (2007: 158) points out, 'all resource exporters appear to be depleting natural capital faster than they are building up other forms of capital, and so are becoming poorer, whatever their income levels.'⁶⁸

This approach has attracted quite a lot of attention in recent publications, notably those issued by the IMF.⁶⁹ Olters (2007) points out that among the sub-Saharan African oil producers, the non-oil primary deficit averaged 27% during 2004-6, which, it is argued, is simply unsustainable.⁷⁰ Public spending cannot for ever exceed permanent income, which is defined as the expected annuity value of oil wealth and non-oil revenue. Neumayer (2004) also provides additional evidence to support the view that the resource curse is a function of unsustainable over-consumption and discusses the concept of 'genuine income' which should determine consumption levels rather than income derived from depleting natural resources. In similar vein, Da Costa and Juan-Ramon (2006) argue that using the 'net worth approach' of Norway's experience, only the return from the Oil Fund can be used to finance the structural non-oil operating deficit and that up to a predetermined cap any excess must be funded with public debt.

How this idea should translate into the measurement of permanent income and an actual fiscal stance with respect to the non-oil deficit is complicated (Barnett and Ossowski, 2003). The presence of sovereign premiums for oil-producers means the government faces two interest rates – a relatively high one for borrowing and a lower one for its gross saving. Thus the

65 Again, at the risk of repetition, it is worth remembering that while the key question of this paper is what constitutes an optimal depletion policy, the answer is conditional upon how the revenues can be deployed.

66 However, this would need to be adjusted for population growth, which is an important factor in many developing countries (Hamilton, 2003).

67 For further discussion see Section 6.2 on dependence.

68 Arguably to claim this is so for 'all' resource exporters is an overstatement.

69 An excellent survey is provided by Barnett and Ossowski (2003). Interestingly, much of this literature actually relates to how aid donations should be managed (Adam et al., 2007; Heller et al., 2006).

70 It might be helpful to distinguish between two types of unsustainability (Neumayer, 2003). Weak sustainability is where total investment (private and public) in all forms of capital exceeds total depreciation of all forms of capital. Another (un)sustainability relates to public expenditure where the size of the non-oil primary deficit can be high or low independently of whether the country is weakly sustainable or not.

government should seek to pay off its (relatively) high cost debt and until this has happened it should spend less than the return on its wealth.⁷¹ This appears to have been the strategy of many countries since the oil price began to rise in 2002. Governments face uncertainty over future oil wealth not least because of price volatility.⁷² This will clearly influence the optimal size of the non-oil deficit, an issue described in the literature as 'the precautionary motive'. Its main impact is to encourage governments to run a smaller primary non-oil deficit.

There is also the issue of distinguishing between capital and current expenditure. Capital spending should in theory have a positive impact on growth in the non-oil economy.⁷³ This faces the government with a portfolio choice over the composition of financial versus physical assets already alluded to. However, because the government depends for its 'income' on taxation, this implies that the return on public investments has to be very high to allow the government to recoup its outlays.⁷⁴ However, an alternative view is that capital spending by government may yield a flow of social benefits which effectively defines government investment as a form of durable consumption. This would argue for higher non-oil deficits as the government perceives itself to be wealthier as a result of oil. Given the poverty levels in many oil producers, this provides a potent argument which many governments have been persuaded by. Sachs (2007) places great emphasis on the need for government investment to focus on public goods and merit goods.⁷⁵ This translates into investment in infrastructure, health, education, social security and knowledge creation. Such investment attracts increasing returns to scale which implies the private sector is less likely to invest. However, he stresses the need to make the investment plans 'according to the absorptive capacity of the economy' (Sachs, 2007: 186).

71 See also Collier and Gunning (2005).

72 Uncertainty over recoverable reserves adds to this problem although Barnett and Ossowski (2003) argue that price volatility, as opposed to a structural change in pricing, should not significantly change long-term expectations of oil wealth because such volatility has a high transitory component.

73 Of course this depends upon the productivity of investment which is to a degree a function of the presence of the 'resource curse', as already discussed. Research suggests that returns on public infrastructure projects vary hugely (Gramlich, 1994).

74 For example, Barnett and Ossowski (2003) argue that with a tax rate of 20%, the marginal product of capital would have to be five times the rate of interest.

75 A public good is defined as one whose consumption is non-rival (i.e. one consumer's use cannot diminish another's use) and exclusion from consumption infeasible. The former condition means there is no supply curve and the latter no demand curve. Without these there is no mechanism to determine price which is key for the allocation of the goods. A merit good is one that the government deems should be consumed whether individuals wish to or not. Examples would include health care and education. Thus the government's decision overrides the preference of the individual consumer.

Focus on capital renewal

This is a variant of the preceding idea and revolves around the idea of 'genuine savings'. This is the difference between total investment in some kinds of capital and total disinvestment in other types of capital. More precisely, Hamilton (2002: 3) defines genuine savings as 'the net change in wealth over an accounting period as new assets are invested, old assets depreciate, and human and natural resources are augmented or depleted'. Heal, in similar vein, defines it as 'the value in shadow prices of changes in all capital stocks including changes in natural resource stocks' (2007:158). The significance is that if an economy's genuine savings are negative, this is unsustainable since it implies the total capital stock or wealth of the economy is depleting. Thus Hamilton (2002) computes the negative genuine savings for energy producers in 1997 as -4.6% of GDP. However, this disguises some extremes such as Azerbaijan -31.4, Kuwait -23.6, Saudi Arabia -14.2 and Yemen -25.7.⁷⁶ This compares with the countries traditionally thought of as 'success' stories (Stevens, 2005) such as Botswana +37.2, Chile, +14.1, Malaysia +32.9 and Indonesia +20.5.

The economic theory basis of measuring the asset value of oil, gas and minerals is clear. Asset values are the present value of economic profit over the life of the resource. Asset depreciation should be measured at user cost which is the change in the value of the reserves as a result of the depletion of those reserves. However, there are a number of practical problems with measuring genuine savings (Hamilton, 2002). Educational expenditure involves both consumption and investment. Investment in human capital needs to be measured on the basis of marginal rather than an average cost, which means that using the current level of spending on education can undervalue the level of investment in human capital. There is also the issue of how to measure human capital depreciation.⁷⁷ When measuring pollution it is important to avoid double counting by including damages already reflected in GDP as a result of lost output owing to pollution. Finally, there is the problem already alluded to throughout this paper of how to estimate the value of oil, gas and mineral reserves and their depletion to reflect market values in the absence of a market.⁷⁸ Neumayer (2000: 258) actually argues that the World Bank study on genuine savings (World Bank, 1997) uses a method to compute genuine savings which is 'inferior to one of its rivals. Using the so-called "El Serafy" method to compute resource rents leads to opposite conclusions for both regions and indeed most countries'.

⁷⁶ It should be pointed out that the validity and reliability of these numbers has been challenged (Neumayer, 2000, 2003).

⁷⁷ To use the technical term, this is known as 'getting old'.

⁷⁸ There are two conventional methods. The simple present value approach (El Serafy, 1989) and the total rent approach (Repetto et al., 1989).

Economic diversification

For many years, the major oil producers have been espousing the virtues of diversifying their economies away from dependence upon crude oil exports (Auty, 1990; Dar and Presley, 2001; Eden, 1979; Fasano and Iqbal, 2003; Jazayeri, 1988; Karshenas, 1990; Kubursi, 1984; Looney, 1990; Mayer et al., 1999; Rumaihi, 1986). Reducing dependence on hydrocarbon earnings is desirable for two reasons. First, it implies the growth of the non-hydrocarbon sector in the economy which develops an alternative for when oil revenues decline through either depletion or lack of a market. Second, it protects the economy from its macroeconomic vulnerability to volatility in oil receipts.⁷⁹

While diversification may be desirable, it has proved to be extremely elusive. Since the early 1970s, oil-exporting countries have paid lip service to the diversification of their economies away from dependence on crude oil exports. Despite this, the record in general has been very poor, with huge amounts of public money being lavished on inefficient and uncompetitive industries.⁸⁰

Several factors explain this failure. The consequence of Dutch disease and crowding out is the contraction of an existing non-oil, non-gas or non-mineral tradable sector. Therefore the hydrocarbon sector potentially creates a self-feeding inability to diversify. Another explanation which is favoured in many of the countries themselves is that trade restrictions imposed by the OECD countries exclude the outputs from the non-hydrocarbon sector. While both arguments may have validity there is a third explanation that is equally powerful. In most cases, the diversification policy has consisted of governments trying to create new industries. Thus, much of the new economic activity has comprised government-owned enterprises. One does not have to be a rabid supporter of a 'market forces philosophy' to see that governments are generally very bad at picking winners.⁸¹ If the public enterprise is a monopoly, it is likely to be high-cost and inefficient, not simply because it is in the public sector but because it does not face the pressure of competition. Also, because it is a government initiative, it is more likely to attract subsidies and protection that will eventually inhibit its development. It was quite noticeable that those countries which avoided the curse – Botswana, Chile, Indonesia and Malaysia – all pursued a policy of trade openness with the rest of the world coupled with a deliberate policy of

⁷⁹ There exists a large literature on the problems and possible cures for the volatility of commodity markets (Greenaway and Morgan, 1999).

⁸⁰ One of the few examples cited in the literature of an economy that has significantly decreased dependence on oil and minerals is Tunisia (Davis, 1995).

exchange rate depreciation to ensure the competitiveness of non-oil, non-gas and non-mineral exports (Stevens, 2005).

The only really effective diversification has come from private sector investment, although governments can play a very important role in this process, as can be seen from the experience of the Asian tigers (World Bank, 1993). More recently, Marcel (2006) has suggested that attempts at diversification have been distorted by the imperative to generate more employment for nationals.

Dependence

The concept of dependence in the context of oil and gas can be rather woolly. In the past it has been considered in the context of the dependence of the economy on oil or gas revenues in terms of their contribution to GDP, to government revenue and to export earnings. However, using such an approach means comparison is vague and subjective and gives no hint as to what might be regarded as a 'healthy' or 'unhealthy' level of dependence. More recently, attempts have been made, notably by the IMF, to come up with a more operationally useful definition (Barnett and Ossowski, 2003; Davis et al. 2003; IMF, 2007a, 2007b; Leigh and Olters, 2006; Marcel, 2006; Olters 2007). Resource rent dependence is defined by the IMF as the degree to which petroleum revenues allow the non-petroleum economy to receive more government expenditure than it pays in taxation and to import more goods than it exports.

Two concepts are key:

- (1) the non-hydrocarbon fiscal deficit (NHFD), the primary non-oil balance already discussed, which measures the internal dependency of the economy;
- (2) the non-hydrocarbon current account deficit (NHCD), which acts as a measure of external dependency.

Both deficits depend upon oil to cover them: the NHFD on oil revenues and the NHCD on oil exports. Both are also easily measurable from existing data. Clearly as hydrocarbon revenues and exports decline, then the two deficits become increasingly unsustainable. Thus it is possible

81 Someone once remarked that governments were bad at picking winners but losers were good at picking governments.

by making assumptions about future production, future export levels and future prices and costs to identify the 'crunch point' after which neither deficit can grow further without borrowing. Indeed, assuming a natural decline in production for either geological or market reasons, the deficits cannot be sustained at the current level.

It is legitimate to question what this issue of dependence has to do with depletion policy since at first sight it appears to be relevant to how the revenues are deployed rather than the rate at which they are earned. Apart from the point continuously reiterated in the paper about the role of optimal deployment of revenue in determining depletion policy, depletion policy will affect the 'crunch point' at which the two deficits become unsustainable. What this does most usefully is to *identify the time frame* within which the country must do something in terms of policy initiatives to diversify and reduce dependence.

Depletion should be geared to diversification⁸²

For governments, slower or staged project development for oil and gas production, i.e. relatively slow depletion, can help to stagger the revenue inflow. This brings a number of benefits. It helps prevent the economy from overheating, causing inflation, and a possible exchange rate appreciation, leading to an attack of Dutch disease. It may constrain the project from crowding out other sectors of the economy from access to factor inputs.⁸³ By constraining popular expectations, slower revenue inflows can also help mute pressures on government to spend on projects which may be unnecessary, unwise or simply too large for the economy to digest. Smaller revenue inflows spread over a longer time can also make the 'pot' seem less worth fighting for; this can help reduce the domestic conflict often exacerbated by such projects (Collier and Hoeffler, 2004). Slowing the revenue inflow also gives more time for the government to develop the policy-making capacity which is a necessary condition for creating a 'developmental state'. This is a key element in reducing the potential for an attack of the resource curse (Mkandawire, 2001; Stevens, 2005). Finally, from the government's perspective, slowing development gives local service industry capability a chance to emerge. This would help to maximize the backward linkages from the project to the local economy, thereby assisting the process of diversification.

⁸² The extreme version of this argument which is put forward by some is to leave the oil and gas in the ground and not produce it at all.

⁸³ This can be a crucial issue in transition economies which are trying to rebuild their non-hydrocarbon sectors after the damage done to them by the process of transition (BTC, 2003).

If an IOC is involved, from the company perspective there are also advantages to developing the project in stages, thereby slowing development. It is likely that if a host country suffers a resource curse, the operating company will attract criticism from NGOs and ethical investors, which will damage corporate reputation. Anything that reduces the risk of the country suffering resource curse is therefore to be welcomed. Furthermore, if an attack of resource curse encourages internal conflict, it risks the viability of the project, and that in turn could increase the cost of capital. Staging the project could also reduce the risk of the company's vulnerability to the 'obsolescing bargain' by allowing the company to retain leverage over government behaviour with respect to oil revenue management. Before the project operates, the World Bank and the IMF often have significant leverage over governments. They go to great efforts to put in place policy instruments to assist sound revenue management. However, once the revenue begins to flow, that leverage diminishes accordingly.⁸⁴ The only alternative source of pressure to ensure good governance lies in the companies' ability to threaten no further investment, although the implication of interference in sovereign behaviour is clearly controversial.⁸⁵ It also raises issues as to the contractual nature of the project, i.e. whether a refusal to move to the next stage of the project would threaten the contractual relations between government and company. Finally, if a slower approach does encourage the development of a local service industry, this could reduce the cost of the project's factor inputs, which would clearly benefit the IOC.

However, despite these arguments, in terms of conventional commercial analysis common in most large corporations, slowing the development of a petroleum or mineral project is serious heresy. This is for two reasons. Often the project requires associated investment in infrastructure – for example, an oilfield will require an export pipeline. This must be built at a minimum size which, given economies of scale, is often quite large. The very high fixed costs involved require maximum capacity utilization. Otherwise, average fixed costs rise exponentially. Thus while the infrastructure operates below capacity as it is slowly filled up, this causes damage to the project's profitability. Second, and probably more significantly, any delay in production appears to reduce the net present value of the project as the discount rate bites into the value of revenues expected even further into the future. For these reasons, if companies are even to consider the option of staged development, thereby slowing the project, a business case for doing so must be

⁸⁴ A recent classic example of this is what is happening with the Chad-Cameroon oil project.

⁸⁵ It also raises the question as to whether other companies, less concerned about host government behaviour, might not step in to fill the gap.

developed to supplement the arguments already outlined. This can be done, however, by the use of 'option theory' which argues that staged development actually can create value for the project.

Implications for countries

This paper argues that in petroleum-dependent countries there is a strong relationship between depletion policy, the degree of dependence on petroleum, and the development potential of the non-petroleum sector. It is limitations on development potential outside the petroleum sector which prompts a third choice between leaving oil in the ground for its value to appreciate with any future increases in price, and producing it to realize cash to invest, through instruments like heritage funds, in global financial assets to produce income independent of petroleum.

There is an immense literature, and much economic and political experience, on the problems of understanding a country's development potential and realizing it in practice. A common view is that successful development requires a combination of:

- orthodox economic policies ('Washington Consensus Plus'), featuring a budget balanced except for financing development expenditure, competitive markets, control of inflation at a low level, an openness to international trade and investment, and a limited role for government in the micro decisions of the economic agents;
- 'good governance', including private property rights, enforcement of contracts, clear and transparent regulation, independent courts of justice and lack of corruption, reinforced by transparency and accountability on the operations of the state;
- a culture responsive to these conditions, including high levels of education and proficiency, good health, open debate and a free press and personal security.

Every element in these concepts is open to some debate and qualification. In particular, it is argued that at certain stages in a country's development, government needs to create and protect 'national champions' in order fully to develop the national potential in the face of international competition; and that movements in capital and people need to be controlled to prevent permanent damage from short-term destabilizing events and trends. For resource-rich countries there is an additional set of challenges from the threat of the resource curse which has already been discussed in some detail. Finally, the potential of every country is shaped by the endowment its history gives it in terms of economic and political institutions, policies and culture. Empirical studies therefore show a variety of factors being arranged with different degrees of

success, in countries where similar resource endowments are combined with different national circumstances.

In this project the 'simulation studies' sketch and extrapolate how far, or for how long, the petroleum resource endowments of certain countries under study can support the present degree of dependence (measured by the non-petroleum fiscal balance and current account balances) of their economies on the petroleum resource.

8. QUESTIONS FOR COUNTRY STUDIES

The following are questions to inform and direct the individual country studies. Commentators were asked to discuss the present status, trends and policy intentions under each heading and to give an appraisal of the strengths and weaknesses of the country's position on each point. The questions are also highly relevant to other hydrocarbon producers beyond those covered in this project.

Links with the hydrocarbon sector (other than support for fiscal and current account deficits)

- What is the current commitment of hydrocarbon sector resources for exploration and development to sustain and enlarge the hydrocarbon reserves and production capacity?
- What is the level of development of supply and service industries for the hydrocarbon sector?
 - a. Domestic?
 - b. Foreign?
- To what extent does the hydrocarbon sector support the domestic market in terms of:
 - a. Pricing and subsidies?
 - b. Energy policy and fuel mix?
 - c. Competition or monopolies?
 - d. Private sector?
 - e. Energy efficiency and replacement to reduce the growth in domestic energy consumption?

The non-hydrocarbon sector

1. Are structural changes in the economy likely to reduce the propensity to generate fiscal and current account deficit?

2. Is domestic energy pricing distorting economic development to a path that will be unsustainable when oil revenues fall?

3. What are the country's competitive advantages/disadvantages in the non-hydrocarbon sector? Will these change as a result of economic reform? Please comment with reference to the following:
 - a. Business regulation
 - b. Access to foreign capital and technology
 - c. Local capital markets and entrepreneurial capacity
 - d. "Resource curse" issues: exchange rate, wage rates, demand for imported goods
 - e. Other factors e.g. labour, governance, etc.

4. Are government policies, including international commitments like WTO membership, improving the conditions for sustainability in the non-hydrocarbon sector?

The overall economy

5. On present evidence, what is the "rate of return" – the development multiplier – for investment of hydrocarbon revenues in the non-hydrocarbon sector (including investment in education, infrastructure and health)? Are economic reforms and structural trends likely to improve this "rate of return"?

6. What is the role of the sovereign wealth funds and how do they contribute to improving the performance of the non-hydrocarbon sectors?

7. What is the ability of the government to implement the policies proposed in a consistent and continuous way, given the time frame set by the quantitative country simulations in the project (up to 30 years)?

APPENDIX 1: THE CASE FOR AND AGAINST OIL FUNDS

There are essentially two schools of thought. One school argues that the conditions for such funds to work are such that if they are present, the revenue windfall can be managed within the normal budgetary process. Hence the funds are not needed. Thus Davis et al. (2001: 2) concluded, 'countries with more prudent expenditure policies tended to establish an NRF [natural resource fund], rather than the NRF itself leading to increased expenditure restraint.' They also established that in many cases integrating the fund into the overall fiscal policy 'has proven problematical, and despite the operation of a fund, the stabilization of expenditure has remained elusive' (ibid.) The other school argues that even if conditions are not ideal, the creation of such funds can make some contribution to avoiding the worst excesses of resource curse if only because of the role of the fund in dampening spending expectations.

The empirical evidence is inconclusive. Devlin and Lewin (2002) report on preliminary empirical evidence (panel data for 71 countries 1970-2000) which shows resource funds are correlated with reduced government spending as a percentage of GDP and higher investment shares. However, the results also suggest that as the size of the fund increases, the impact on budget surpluses may be negative. Davis et al. report that their econometric evidence suggests that in some countries with such funds, expenditure has tended to be less correlated with changes in non-resource export earnings than in those without funds 'although this experience is not uniform' (2001: 2). They also discovered that the creation of a fund had no identifiable impact on government spending. In similar vein, Humphreys and Sandbu also report that such funds do not 'on average contribute to better fiscal policy in countries heavily dependent on natural resource exports' (2007: 225-6). However, by contrast Shabsigh and Ilahi found that 'oil funds are associated with reduced volatility of broad money and prices and lower inflation' (2007: abstract).

The following summarizes some of the qualitative arguments for and against such funds from the literature and how they should operate.

On the positive side

Such funds can help avoid rent seeking and corruption and create a focal point/constituency for proper management of the revenue.

They can allow the significant accumulation of assets for future use. Accumulation of reserves is a generally accepted mechanism for managing windfall gains from natural resource booms. One

of the main purposes of building foreign reserves is to help smooth out the impact of external shocks. Temporary shocks to the balance of payments can either be financed or managed through domestic adjustment which could induce large output swings. While reserves allow countries to smooth out the path of adjustment, it is difficult to assess their appropriate level. In countries where the financial sector is developed and the institutions advanced, the government can decide to postpone present consumption and hold financial assets to finance future expenditures. Alternatively the government could include in its consumption basket only interest on financial holdings, thereby smoothing out the fiscal consumption trajectory.

Norway is an example of a country where macroeconomic policy is aimed at ensuring that the structural, non-oil deficit should correspond to the expected real return on the Government Petroleum Fund, estimated at 4%. In the event of extraordinarily large changes in the Petroleum Fund's capital or in factors influencing the structural deficit from one year to the next, the change in oil revenue spending should be smoothed over several years with a basis in the assessed return on the Petroleum Fund some years ahead. However, even a relatively well-governed country such as Norway has problems in ensuring adherence to these fiscal policies, as evidenced by non-oil deficits of more than 100% of the returns on the Petroleum Fund in both 2003 and 2004.

Funds can help avoid revenue volatility by absorbing fluctuations in prices. From a macroeconomic perspective volatility is linked to concerns about shocks to the balance of payments and policy choices have focused on smoothing the external current account balance. This emphasis led to the practice of tracking trade deficits as the predominant source of vulnerability, and closely monitoring the reserves-to-imports ratio. Chile, with its substantial copper exports, is an example of a country that tracks and manages volatility of commodity price shocks by accumulating high levels of reserves. At the equivalent of about nine months of imports, Chile's reserves-to-imports ratio is well above the frequently used guideline of a reserve cover of three-four months of imports. It is at about the same level as in emerging market Asian countries and more than twice as high as in Australia and New Zealand.

Funds can improve fiscal policy impact by defusing spending pressures by sterilizing revenue inflows when prices are high. In addition, investing abroad may help reduce any tendency to exchange rate appreciation. Finally, if sufficiently insulated, funds may keep revenues out of the hands of kleptocracies until accountable democracies emerge although the ability to insulate in such a context is clearly problematical.

On the negative side

Funds are no guarantee of an appropriate fiscal stance and indeed are no substitute for sound fiscal and macroeconomic management. Often public knowledge of how much is in the fund creates serious pressures for more to be spent.

In many cases, the rules governing the operation of the funds are constantly changed to suit political circumstances. They also present a temptation to corruption and fraud. Control of the fund endows considerable patronage that may lead to the entrenchment of a regime. The creation of a fund gives a false sense of security which may undermine the basic need for real fiscal discipline.

It is perhaps unsurprising that relatively well-developed countries with good institutions and a tradition of sound fiscal and macroeconomic management performed better at fund management than did countries with limited institutional capacity and a mixed fiscal and macroeconomic track record. It is thus unlikely that a natural resource fund will be well managed if the overall state apparatus is badly run. This has led several authors to dismiss the concept of natural resource funds as unsuitable for developing countries (Gary & Karl, 2003). While natural resource funds are thus no panacea for revenue management, they do have the potential to enhance transparency and improve fiscal management and governance. Indeed some form of fund, whether virtual or formal, may be needed in countries where the domestic economic absorptive capacity is not sufficient compared to the revenues accrued from natural resource extraction.

Observations

As for operating rules, the following points are seen as key.

Professional management of the fund is essential, as is reporting to an independent board of control. Income for expenditure or to finance non-oil deficits should be transferred to fiscal authorities with oversight by the independent monetary authority.

The fund should not have independent spending authority, otherwise it undermines the budgetary process. There need to be simple general rules for accumulation and withdrawal and the government needs to define clear goals for the fund to fulfil.

Another defining characteristic of the successful funds was that public ownership benefited from the presence of well-functioning democracies and legislatures (Alaska and Norway) that kept a check on the executive branch of government. The sense of public ownership was in certain cases enhanced by the fact that the funds paid dividends to the citizens either directly or indirectly (e.g. through pension supplements or community development projects). Some funds have non-government representatives on the funds' oversight boards (e.g. Alaska and also Chad), with the aim of stimulating public ownership and increasing transparency.

Finally, international experience also suggests that concentration of powers in one arm of government and a single line of accountability (e.g. between the fund and the executive) tend to discourage fiscal responsibility. Many authoritarian countries with 'super-presidencies' (e.g. many countries of the former Soviet Union and Venezuela) or ruled by monarchies (e.g. in the Middle East) tend to display such features and those countries have had limited success in restraining abuses of their funds. An obvious mechanism by which the potential for such abuses can be reduced is to build several layers of accountability into the management of the natural resource fund. Candidates for institutions involved in such accountability structures include the parliament, the president, the treasury, the central bank and the auditor general. A key precondition for such multiple layers of accountability to be effective is that the separation of powers must be real. In several countries where there is no effective opposition or governments are dominated by super-presidencies the separation of powers is often more notional than real. Nevertheless, several countries have attempted to overcome such constraints by making it cumbersome and difficult to change the rules of the funds, e.g. by requiring a supermajority in parliament.

There is a need for transparency and accountability via regular reporting, audits, press releases, etc. This can be done best by accountability through 'appropriate representative bodies and other state agencies that interweave lines of supervision' (Heilbrunn, undated: 2). Transparency

is thus a key issue in the design and implementation of a natural resource fund. When there is limited public scrutiny of the funds, there are fewer barriers preventing politicians and bureaucrats from the executive branch of government from making expenditures outside the funds' guidelines and rules.

Unfortunately, management of natural resource funds has often been surrounded by secrecy, allowing them to be used as 'backdoor' budgets at best and as personal bank accounts at worst. Successful funds have generally avoided this by being transparent and free from political interference in day-to-day management. Transparency can be further enhanced by regular publication of audited financial reports of all transfers in and out of the fund, as is the case in Norway, Alaska and other well-managed funds. However, it is important that transparency requirements are not solely aimed at the funds, as considerable misappropriation can occur prior to natural resource revenues reaching the fund (e.g. in connection with exploration fees, signature bonuses, tax payments, etc.). The Extractive Industries Transparency Initiative (EITI) and the 'Publish What You Pay' campaign both provide governments and companies with guidelines on how to enhance transparency in the complete revenue chain.

There is a need to enhance citizens' interest in prudent use of the resources. However, who decides this can be problematical. An excellent example is the contrast between the Alaskan and the Albertan experiences, which illustrate the extremes of the spectrum (Smith, 1991; Warrack and Keddie, 2002). In the case of Alaska it was deemed that the resources 'belonged' to the people. Therefore creation and control of the fund were vested in them and the rules could only be changed by referendum. Furthermore, the income was distributed directly to the people by means of an annual dividend. In the case of Alberta the fund was created and controlled by the government which decided how and when the revenues should be spent although in theory the government in turn was accountable to the electorate. There were three objectives for the Albertan Heritage Fund – to save for the future; to strengthen or diversify the economy; and to improve the quality of life of Albertans. Both systems suffered problems. In Alberta, the provincial government frequently changed the rules governing the behaviour of the fund to allow it to raid the fund and use the money to 'promote local industry'. For the most part the outcome was less than desirable. In 1997, the government changed the rules so the fund could no longer be used for industrial development. In the 1990s the government stopped paying revenues into the fund. However, contributions have since resumed. Alaska, by contrast, saw no such dissipation of the revenue. It faced a different problem. The fund effectively turned Alaska into a rentier society. The population came to expect the dividend and, more importantly, pay no local

taxes. The result was that the state government could not raise revenue and runs successive budget deficits. When in 1999 the government asked the people to change the rules to allow some of the fund income to offset these deficits, 70% of a 95% turnout rejected the proposal. Thus future generations of Alaskans will simply inherit very large debts that are being accumulated by the current generation to meet state public spending.⁸⁶

⁸⁶ A reviewer of an earlier draft of the paper made the following comments on the Alaskan-Albertan experience. 'If anything these two examples go to the heart of the problem of finding an optimal set-aside fund and that is "culture" or mentality. Alaskans comprise a frontier, "get-rich-quick" culture, with everyone looking for his Eldorado. Alberta went through this phase more than a century ago, with a few recurrences now and then and now ... but the Alberta "culture", and especially those who elect Alberta's politicians, is best described as fiscally prudent, economically and politically conservative, generous, charitable and good neighbourly. When asked in 1997 what to do with the Fund, they said keep it for future generations. In another survey on fiscal matters in 1998, Albertans gave saving in the Heritage Fund a lower rating than paying down debt. But when asked in 2002 what to do with windfalls, a one-time tax rebate barely outweighed saving for the future. One-time spending rated low.'

APPENDIX 2: DETAILS OF SELECTED FUNDS

Prepared by Robert Foulkes, Glada Lahn and Khatira Shikhiyeva

Algeria

Revenue Regulation Fund (Fonds de régulation des recettes) – established June 2000 – estimated assets: \$45.6 billion (end June 2007)

Laws and regulation	Other information	Sources
<p>The Revenue Regulation Fund (FRR) is a government sub-account at the Bank of Algeria. It is held in Algerian dinars with a low interest rate. The Algerian government receives revenue from hydrocarbons via taxation.</p> <p>Inflows to the FRR are everything above the equivalent of the budgeted oil price (\$19 per barrel in 2007); outflows are used for debt amortization and the financing of the remaining non-hydrocarbon deficit provided the FRR remains above US\$10 billion and the world price for Algerian crude is more than US\$49 per barrel.</p> <p>The FRR is currently used only for medium-term stabilization, not as a long-term vehicle for savings and investment.</p> <p>For a basic organizational chart showing receipt flows, please see the presentation by Dr Chakib Khelil, Minister of Energy and Mining, 'Good governance', Chatham House, London, July 2006. Available at: www.chathamhouse.org.uk/publications/papers/view/-/id/489/</p>	<p>In its reports, the IMF highlighted the need for a long-term approach whereby the proportion of oil revenues that the government needs to save each year to maintain the population's per capita wealth could be calculated. Under proposed reforms, the fund's assets would comprise 'the sum of oil receipts plus the income earned on its investment. The outflow of the fund would cover the long-term viable non-hydrocarbon budget deficit. The fund would also be integrated into the government's broader credit-liability management plan.' The report recommends further measures to increase transparency.</p>	<p>African Development Bank and OECD, 'African Economic Outlook: Algeria', 2007/8 www.oecd.org/dataoecd/14/40/40573850.pdf</p> <p>IMF, 'Algeria: 2006 Article IV consultation – staff report; public information notice on the Executive Board discussion; and statement by the executive director for Algeria', February 2007 www.imf.org/external/pubs/ft/scr/2007/cr0772.pdf</p> <p>Rabhi, M., 'Corruption: Le FMI épingle l'Algérie', Liberté, 21 February 2005</p> <p>www.algeria-</p>

		<p>watch.org/fr/article/eco/fmi_corruption.htm</p> <p>Benyahia, A. 'Gestion des revenus pétroliers: La BM demande des changements à l'Algérie', 21 November 2007 www.elwatan.com/spip.php?page=article&id_article=81116</p>
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Angola

Reserve Fund for Oil – established September 2007 (The relevant measure was approved by the Council of Ministers in September 2004 (EITI), but Deutsche Bank gives 2007 as its year of inception) – estimated assets: \$0.2 billion (2007)

Laws and regulation	Other information	Sources
<p>The Reserve Fund for Oil (RFO) was established by the Council of Ministers to balance Angola's future fiscal deficits. It is managed by the National Bank of Angola and the use of funds depends on approval by the Council of Ministers. An estimated price for oil is factored into the annual budget (US\$45 per barrel in 2007) and any surplus is automatically channelled into the fund.</p> <p>The deputy prime minister announced in April 2008 that Angola's National Assembly will pass new laws by the end of 2008 on how the RFO is to be structured and monitored. The government has taken advice from a number of existing sovereign wealth funds and the World Bank and IMF, and the new laws are thought to reflect the Norwegian model.</p>	<p>The RFO appears to have been established in response to several controversies over lack of transparency in oil revenue management and a reliance on expensive short-term loans to fund the budget deficit in the early 2000s. In 2003, the government decided to publish oil revenue for the first time in the annual budget.</p>	<p>IMF, 'Angola – 2007 Article IV consultation: preliminary conclusions of the mission, Luanda, June 6, 2007', www.imf.org/external/np/ms/2007/060607.htm</p> <p>Extractive Industries Transparency Initiative, 'Angola EITI implementation update', http://eitransparency.myaiweb15.com/countryupdates/angolacountryupdate.htm</p> <p>Deutsche Bank Research, 'Sovereign wealth funds – state investment on the rise', www.dbresearch.com/PROD/DBR_I</p>

		<p>INTERNET_EN- PROD/PROD000000000215270.pdf</p> <p>Angolan embassy in the UK, 'Government refutes Human Rights Watch accusations', 21 January 2006, www.angola.org.uk/press_release_human_rights2006.htm</p> <p>Dow Jones, 'Angola plans oil fund laws by end of '08 – Deputy PM', 15 April 2008</p>
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Azerbaijan

State Oil Fund of the Republic of Azerbaijan (SOFAZ) – established December 1999 – estimated assets: US\$3.34 billion (April 2008)

Laws and regulation	Other information	Sources
<p>The State Oil Fund of Azerbaijan (SOFAZ) is a savings fund for future generations, which aims to diversify the country's portfolio assets and manage the effects of Dutch disease. SOFAZ receives income from hydrocarbons exploration, development and production sharing contracts, the sale of hydrocarbons, bonuses and acreage payments.</p> <p>SOFAZ is led by the executive director, who is appointed and dismissed by the president of the Republic of Azerbaijan. SOFAZ's activities are overseen by a supervisory board, which includes government ministers and members of the parliament. The board reviews the fund's draft annual budget, report and financial statements, prepared by the executive director, along with the auditor's opinion and provides its comments.</p> <p>SOFAZ assets are managed in accordance with asset</p>	<p>Azerbaijan joined the Extractive Industries Transparency Initiative (EITI) in June 2003 and SOFAZ is closely involved with this initiative.</p> <p>Ernst &Young is the appointed auditor for SOFAZ's financial statements. At the same time, the fund's activity may be examined by the Chamber of Accounts, established by the Milli Majlis (the Azerbaijan parliament).</p> <p>SOFAZ's revenues and</p>	<p>The State Oil Fund of Azerbaijan: www.oilfund.az/</p> <p>Coalition to Improve Transparency in Extractive Industries: www.eiti-az.org/ts_gen/eng/index.php</p> <p>EITI Azerbaijan: http://eitransparency.org/Azerbaijan</p> <p>Azerbaijan's EITI Memorandum of Understanding: http://eitransparency.org/files/implementing_country/azerbaijanmou.pdf</p> <p>Republic of Azerbaijan: 2007 Article</p>

<p>management guidelines approved by the presidential decree, Asset Management Rules (Guidelines) for the State Oil Fund of the Republic of Azerbaijan, # 511 dated 19 June 2001. The SOFAZ budget is prepared and executed in accordance with the Rules on Preparation and Execution of the Annual Budget for the State Oil Fund of the Republic of Azerbaijan, as approved by Decree no. 579 of the president of the Republic of Azerbaijan, dated 12 September 2001.</p> <p>In accordance with the regulations of SOFAZ, the fund's assets may be used to alleviate priority nation-wide problems, and for construction and reconstruction of strategically and socially significant infrastructure facilities, for the purpose of the country's socio-economic progress. A budgetary law requires that all SOFAZ expenditures, except for operating expenditures, are incorporated as part of an annual consolidated government budget presented to the parliament for approval. SOFAZ can only execute the expenditures envisaged by its budget. Execution of expenditures is through the state treasury.</p>	<p>expenditures, both quarterly and annual statements, in Azerbaijani and English, are regularly published in the local press and posted on the fund's website.</p> <p>The fund is one of the central elements of 'The long-term strategy of oil and gas revenue management of Azerbaijan', signed by President Ilham Aliyev, in September 2004. This covers the strategy for the period up to 2025 and sets key principles for efficient management of national wealth.</p>	<p>IV Consultation – Staff Report; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for the Republic of Azerbaijan, Country Report No. 07/191, 5 June 2007: www.imf.org/external/pubs/ft/scr/2007/cr07191.pdf</p>
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Indonesia

Indonesia does not appear to have an SWF yet. Reuters reported in November 2007 that 'Indonesia is keen to set up a sovereign investment agency modelled on Singapore's Temasek Holdings or Malaysia's Khazanah Nasional, to improve the performance of state firms.'

Iran

Oil Stabilization Fund (also known as the Foreign Exchange Reserve Account) – established in 2000 – estimated assets: \$12.9 billion (2008)

Laws and regulation	Other information	Sources
Iran's Oil Stabilization Fund (OSF) is a crude oil foreign exchange reserve fund held in an account at the central bank. The rules	The replacement of the OSF Board of Trustees with the	Central Bank of the Islamic Republic of Iran:

<p>governing the fund are set in each five-year development plan. According to the main provision of Article 60 of the Third Five-Year Development Plan (2000-5) which set the initial terms for the fund, all foreign exchange incomes received from crude oil exports above the figure specifically projected in the plan for each year are to be deposited in the account. As of the beginning of the plan's third year, the Treasury could draw from the OSF account if the government's oil export receipts fell below the budgeted amount for that year and there was no possibility of financing the budget deficit through taxes or other means. The OSF is currently provided for in Article 1 of the Fourth Five-Year Development Plan (2005-10). In November 2000, an amendment to the plan stipulated that 50% of the fund reserves should be set aside for lending to domestic private entrepreneurs in foreign exchange, with priority sectors granted loans at lower interest rates. The rial proceeds of OSF operations were to be placed in a Rial Reserve Fund for eventual budget deficit financing (see the Central Bank of Iran Annual Report for details of withdrawals).</p> <p>Iran's OSF has, since its inception, theoretically been run by a seven-member board of trustees composed of senior government officials from various ministries under the chairmanship of the head of the Management and Plan Organization who are required to submit financial balance to the Majlis (Iranian parliament). However, in May 2008, the government amended Article One of the Fourth Five-Year Development Plan, and transferred the board's powers to the government's Economic Committee.</p> <p>There are no safeguards on the way its assets are invested. Officially, the fund itself cannot be used to finance a general budget deficit, but is specifically earmarked to fill the gap in foreign exchange shortfalls. The use of the OSF resources for making up the Treasury's inability to collect rials from tax and non-tax sources is strictly prohibited.</p>	<p>government's Economic Council has been met with concern from parliamentarians who fear that an important check on spending foreign currency has been removed.</p> <p>The Iranian government also has a foreign investment arm which invests foreign exchange although the relationship between this and the OSF is not clear. The Iran Foreign Investment Company (IFIC) was incorporated in March 1998 as a private joint stock company with a mission to manage and expand Iranian holdings abroad.</p> <p>IFIC established its first investment house in Bahrain in 2003 and it has interests in energy, telecom and IT, banking, insurance, stock markets, industry, mining, oil, gas and petrochemicals, as well as new and future technologies.</p>	<p>www.cbi.ir/default_en.aspx See Annual Review 1385 (2006-7)</p> <p>IMF Executive Board concludes 2005 Article IV Consultation with the Islamic Republic of Iran, Public Information Notice (PIN) No. 06/34, 27 March 2006, www.imf.org/external/np/sec/pn/2006/pn0634.htm</p> <p>Amuzegar, J., 'Iran's Oil Stabilization Fund: a misnomer', Middle East Economic Survey XLVIII (47), 21 – November –2005, www.mees.com/postedarticles/oped/v48n47-5OD01.htm</p> <p>'Iran foreign currency account practically dissolved by government move', Tehran-e-Emrooz, 12 May 2008, accessed through BBC Monitoring</p> <p>Iran Foreign Investment Company website: www.ifi-co.com</p> <p>Oil Stabilization Fund – Iran, Sovereign Wealth Fund Institute: www.swfinstitute.org/fund/iran.php, accessed 12 May 2008.</p>
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Kazakhstan

National Oil Fund – established in 2000 – estimated assets: \$21.556 billion (January 2008)

Laws and regulation	Other information	Sources
<p>The National Oil Fund of Kazakhstan (NOF) is funded by proceeds from oil royalties, the sale of mineral assets and privatization. It is a stabilization fund whose assets are monitored by the National Bank of the Republic of Kazakhstan (NBK).</p> <p>In accordance with Decree No. 1641 issued on 1 September 2005 by the president of Kazakhstan, revenues from the raw material sector will be entirely channelled into the fund. The resulting deficit between overall budget expenditures and revenues to the budget from the non-oil part of the economy will be balanced out by a transfer from the NOF. These changes took effect in 2007. The fund was explicitly modelled on Norway's Government Petroleum Fund – Global.</p> <p>Its assets are held at the NBK which serves as a trustee of the fund, in accordance with Ministry of Finance guidelines. The fund has its own Management Council, consisting of the president of Kazakhstan, the prime minister, the chairman of the senate of the parliament, the chairman of the majlis of the parliament, the chairman of the National Bank, the head of the Administration of the President, the governor of the National Bank, the deputy prime minister, the minister of finance, and the chairman of the Accounting Committee on Control over the Execution of the National Budget. This council manages the fund and operations also require annual approval by parliament.</p> <p>In June 2001, the government approved NBK's investment strategy for the fund, which established rules for investments. These include</p>	<p>The fund is externally audited on an annual basis. As a result of a competitive selection process held by the Ministry of Finance, Ernst & Young Kazakhstan Ltd was selected as the independent auditor.</p> <p>Kazakhstan joined EITI in October 2005.</p> <p>Monthly reports on revenue and usage of the fund are published on the Ministry of Finance's website.</p>	<p>Embassy of the Republic of Kazakhstan in the UK, 'Kazakhstan – economic overview', www.abdulin.com/embassy/Country%20Profile%202007_1.pdf</p> <p>Ministry of Finance: www.nationalfund.kz/index.php?lang=eng</p> <p>Embassy of the Republic of Kazakhstan in the UK, 'NATIONAL BANK OF KAZAKHSTAN: KEEPING INFLATION IN CHECK: interview with the head of the National Bank of Kazakstan Mr Anvar Saidonov', www.kazakhstanembassy.org.uk/cgi-bin/index/270</p> <p>National Oil Fund of Kazakhstan: www.nationalfund.kz/index.php?lang=eng</p> <p>Embassy of the Republic of Kazakhstan in the US, 'National Fund of the Republic of Kazakhstan', www.homestead.com/prosites-kazakhembus/National_Fund.html</p>

<p>specifications on the types and proportions of investments in various currencies (48.5% is kept in dollars, 27.9% in euros, 10.1% in pounds sterling and 8.8% in yen), on classes of financial instruments, on levels of risk and on a benchmark portfolio. The fund's assets can only be invested abroad. The strategy also established rules for the regularity and content of the bank's reports on its trust management of the fund to the government. Of the total fund, 54% is managed by the NBK while the rest is under external management; external managers are selected by competitive bidding.</p> <p>The fund has two portfolios: the Stabilization Portfolio (minimum 20% of the fund), which aims to ensure lower volatility of returns, and the Savings Portfolio, which aims to ensure higher long-term returns.</p>		<p>National Bank of Kazakhstan, 'The functioning of the National Fund of the Republic of Kazakhstan', 2003, www.osi-az.org/cow_docs/MarchenkoKazakhstan.pdf</p> <p>EITI Kazakhstan: http://eitransparency.org/Kazakhstan</p>
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Kuwait

A fund was first established through the Kuwait Investment Board in 1953. It is now divided into the General Reserve Fund (GRF)(1960) and the Fund for Future Generations (FFG) (1976) – assets announced to parliament: \$264.4 billion (June 2008)

Laws and regulation	Other information	Sources
<p>Kuwait was the first country to establish a Sovereign Wealth Fund and its experience is reflected in its sophisticated international investment strategy.</p> <p>The GRF is the main treasurer for the government and receives all revenues (including all oil revenues) from which all state budgetary expenditures are paid. All revenues above the budgeted oil price (which is usually conservative – e.g. \$36/barrel for 2007) remain in this fund and are invested in Kuwait and abroad.</p> <p>In addition, 10% of oil revenues each year – regardless of price or</p>	<p>The GRF and FFG are audited internally and by the State Audit Bureau, and disclose details of all funds to the Council of Ministers and the National Assembly (parliament). Under Law 47/1982, information on the KIA's work may not be disclosed to the public but asset</p>	<p>Kuwait Investment Authority website: www.kia.gov.kw/kia</p> <p>Energy Information Administration, 'Country analysis briefs: Kuwait', www.eia.doe.gov/emeu/cabs/Kuwait/Background.html</p> <p>Sovereign Wealth Fund Institute Fund List, 'Kuwait Investment Authority', http://swfinstitute.org/fund/kuwait.php</p>

<p>production – goes into the FFG. The FFG also collects the profit on its assets, all of which are reinvested. FFG assets are invested exclusively outside Kuwait in various specified asset classes based on an approved Strategic Asset Allocation. The FFG cannot be used for government spending purposes unless sanctioned by law (this happened following the 1990-1 Gulf war when money was needed for reconstruction and the government took a 'loan' from the FFG). Interest accumulated on GRF investments feeds into the government's annual income.</p> <p>In 1953, the emir of Kuwait established the Kuwait Investment Board to manage excess oil revenues and help address oil price volatility. In 1963, the Kuwait Investment Office (KIO) replaced the Kuwait Investment Board in London. In response to the oil boom in the early 1970s, KIO started to diversify its assets, and set up major portfolios. The FFG was established with 50% of the General Reserve at that time in 1976. The KIO is responsible for managing this fund and any other funds entrusted to it by the Ministry of Finance.</p> <p>The Kuwait Investment Authority (KIA) was established by Law 47/1982 as an independent legal entity to develop and oversee the management of the GRF and FFG under the auspices of the Ministry of Finance. The minister for finance heads the KIA's board of directors, which also includes the minister for oil, the governor of the Central Bank of Kuwait, the under secretary of the Ministry of Finance in an ex-officio capacity, and five other Kuwaitis who are experienced in the field of finance and investment. KIA's main office is in Kuwait City. The KIO in London functions as its subsidiary.</p>	<p>figures have been leaked to the press for the last two years.</p> <p>Both the KIA and KIO divide their investment strategy internationally into several areas: Equities (Europe), Equities (America), Equities (Asia Pacific); Fixed Income; Private Equity & Property; Treasury and Alternative Investment. The KIA uses external managers to manage their portion of the funds whereas the KIO relies solely on in-house managers.</p> <p>The investment on the GRF created by previous surpluses of petroleum revenue has given the government a significant stable source of revenue, equivalent to around one-third of the non-hydrocarbon GDP.</p>	<p>Economist Intelligence Unit (EIU), 'Sovereign wealth funds: friend or foe?: Kuwait: the whiff of old money and conservative ideas', 1 24 September 2007</p> <p>List of KIA's investments on Zawya.com: www.zawya.com/cm/profile.cfm/cid1000019</p>
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Malaysia

Khazanah Nasional Berhad (BHD) – established 1993 – estimated assets: \$25-26 billion (2008)

Laws and regulation	Other information	Sources
<p>Khazanah Nasional Berhad is not an oil fund but rather the investment arm of the Malaysian government whose revenues come from fiscal surpluses, not just natural resources. Unlike an SWF, Khazanah was incorporated under the Companies Act 1965 on 3 September 1993 as a public limited company and began operations a year later. It has a mandate from government to promote economic growth and make strategic investments on behalf of the government which would contribute towards long-term 'nation building'. Its key role so far has been to manage the state's shares in Malaysian 'government-linked companies' (GLCs).</p> <p>Khazanah manages a diverse portfolio of Malaysian company assets. In the last couple of years, it has successfully drawn foreign investment through the sale of Islamic debt bonds. This is said to be in –line with a strategy of trimming state control over the companies and increasing market liquidity. Formerly considered a national investor, Khazanah is now branching out internationally though it does this through the companies in which it holds a share.</p> <p>The share capital of Khazanah is owned by the minister of finance, except for one share owned by Pesuruhjaya Tanah Persekutuan (the federal land commissioner). It has an eight-member board comprising representatives from the public and private sectors. The prime minister of Malaysia is the chairman of the board. The board of directors is assisted by an executive committee and an audit committee established by the board. The management team is headed by the managing director. See: www.khazanah.com.my/leadership.htm</p>	<p>Khazanah has stakes in more than 50 companies in various sectors, mainly based in Malaysia. For a list of the portfolio companies, see www.khazanah.com.my/portfolio.htm</p> <p>It is considered a commercial entity in most respects and has a high level of transparency compared to most SWFs. Since 2004, Khazanah has taken a very active role in reforming the management and structure of GLCs to make them more globally competitive and return value for Malaysia in terms of long-term development and inter-sectoral linkage building.</p>	<p>Khazanah website: www.khazanah.com.my/</p> <p>Sovereign Wealth Fund Acquisitions and Other Foreign Government Investments in the United States: Assessing the Economic and National Security Implications, Edwin M. Truman, Peterson Institute for International Economics, Testimony before the Committee on Banking, Housing, and Urban Affairs, United States Senate, 14 November 2007, www.iie.com/publications/papers/paper.cfm?ResearchID=842 and, www.iie.com/publications/papers/truman1107tables.pdf</p> <p>'Successes and failures', The Edge, Malaysia, 27 March 2006</p> <p>'The Malay way of business change', The Economist, 18 August 2005</p> <p>'Khazanah's quiet revolution', AsiaFinance, November 2004</p>

Nigeria

Excess Crude Account – established 2004 – estimated assets: \$17.3 billion (2007)

Laws and regulation	Other information	Sources
<p>The Excess Crude Account (ECA) was established as a stabilization fund to meet budget deficits that result from oil price volatility, and potentially to fund domestic infrastructure.</p> <p>All oil revenue inflows (as well as certain taxes) are received into the Federation Account, from which any oil income above the budgeted average international price for oil (US\$40 per barrel in 2007, US\$53.83/b for 2008) goes directly into the ECA. The ECA is held in the Central Bank in the Federal Account. In an attempt to reduce state governments' ability to pressurize the federal government into releasing funds from the Account, the federal government passed a Fiscal Responsibility Act and said it will not release funds from the Excess Crude Account to any state that has not passed its own version of the act by the end of 2007. Nonetheless, the National Economic Council (NEC), which advises the president on economic policy, recently recommended sharing out all of the Account's current assets for unspecified spending and debt repayments, and saving just 20% of future excess crude.</p>	<p>The constitution provides that all tiers of government – federal, state and local – share in oil revenues. The revenue-sharing formulas are set by an act of the National Assembly, based on a recommendation from the Revenue Mobilization, Allocation and Fiscal Commission. However, there is an ongoing legal battle over how the funds from the ECA should be distributed to the states and local governments, if at all.</p> <p>In addition to compensating for revenue shortfall in the budget, in 2007 these funds have also been allocated to a number of Nigerian federal states to compensate them for their financing of the Paris Club debt settlement in excess of their own state debt obligations. The compensation amounted to US\$1.8 billion or 0.9 percent of GDP.</p> <p>Under former President Olusegun Obasanjo, Nigeria committed to EITI in 2003. Nigeria EITI (NEITI) was launched in February 2004; the NEITI Act, which was incorporated into Nigerian law in early 2007, effectively gives statutory backing for the country's implementation of EITI. Annual audits of the hydrocarbons sector are now mandatory under the NEITI Act. NEITI engaged the Hart Group, through an international competitive tender, to conduct independent financial, physical and process audits of the Nigerian extractive industries.</p>	<p>International Monetary Fund, IMF Executive Board Concludes 2007 Article IV Consultation with Nigeria, Public Information Notice (PIN) No. 08/16 15 February 2008, www.internationalmonetaryfund.org/external/np/sec/pn/2008/pn0816.htm</p> <p>2008 Budget Speech By His Excellency, President Umaru Musa Yar'Adua, GCFR at the Joint Session of the National Assembly, Abuja, Thursday, 8 November 2007.</p> <p>Deutsche Bank Research, 'Sovereign Wealth Funds – state investment on the rise', www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000215270.pdf</p> <p>Truman, Edwin, 'Meeting the challenge of Sovereign Wealth Funds', September 2007 www.iie.com/publications/opeds/oped.cfm?ResearchID=805</p>

		<p>Nwanma, Vincent, '2008 budget promises more efficient government spending', Nigerian budget monitoring programme' www.budgetmonitoringng.org/Spotlights/2007/10/31/News12225/</p> <p>EITI Nigeria website: http://eitransparency.org/Nigeria</p> <p>NEITI website: www.neiti.org/index.html</p> <p>Nigeria: FG, States to Settle Excess Crude Dispute Out of Court, Leadership (Abuja), 6 May 2008.</p>
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Norway

Government Pension Fund – Global (formerly the Norwegian Government Petroleum Fund) – established 1990 – estimated assets \$371 billion (end 2007)

Laws and regulation	Other information	Sources
<p>The Government Pension Fund (GPF) – Global was established as the Norwegian Government Petroleum Fund under the Storting (the Norwegian parliament) Act on the Government Petroleum Fund (Act of 22 June 1990, No. 36). The fund received its first revenues in 1996 and was transformed into the Government Pension Fund in 2005 to emphasize its purpose in financing future pensions. The GPF – Global is one of the world's biggest SWFs and owns roughly 0.65% of Europe's equity market capitalization, and nearly 0.4% of Asia's and 0.3% of the Americas'.</p>	<p>Norway has been a financial and political supporter of EITI since 2003, and now plans to fully implement the initiative's transparency principles. An international EITI secretariat was officially opened in</p>	<p>'On the Management of the Government Pension Fund in 2007', Report No. 16 to the Storting (2007-2008), –Recommendation of 4 April 2008 from the Ministry of Finance, approved by the Council of State on the same</p>

<p>The central government's net cash flow from petroleum operations is transferred in its entirety to the GPF – Global via the state budget. Unlike many states which have only vague definitions of which revenues should go to the fund, Norway is explicit, precise and transparent.</p> <p>Norges Bank, the Norwegian central bank, manages the fund and the Ministry of Finance oversees it. The return on fund investments also adds to the fund. The fund invests exclusively abroad to promote exchange rate stability. Its investments are determined by two considerations: to maximize its international purchasing power subject to an acceptable level of risk; and to meet ethical guidelines introduced in 2004 with the Finance Ministry identifying businesses in which the fund cannot invest. These guidelines aim to respect the rights of those affected by the companies in which the fund invests through the use of two types of instrument: exercising ownership rights, i.e. attempting to influence a company's corporate governance to reduce ethical infringements; and excluding companies from the fund when there are grossly unethical practices and little hope of effecting change.</p> <p>According to the White Paper the minister of finance plans: (1) to include real estate as a separate asset class in the GPF, envisaging that up to 5% of the fund's capital may be invested in real estate which would be offset by a reduced allocation to fixed income investments; (2) to expand the benchmark portfolio to include more emerging markets; and (3) to increase the permissible ownership stake that the fund can take in foreign assets from 5% to 10%.</p> <p>The fund's expenditure consists of an annual transfer to the Treasury corresponding to the amount of petroleum revenues used in the fiscal budget. The transfer from the fund finances the non-oil budget deficit. According to the fiscal guidelines, this should equal 4% of the fund's capital annually, i.e. the expected real return on the fund. In this way, money is accumulated in the fund if there is a government budget surplus including oil revenues; the accumulation of assets in the fund will reflect actual savings.</p>	<p>September 2007 in Oslo with the support of the Norwegian authorities. In practice, Norway's membership of EITI will not result in much change to its use of oil revenues since its regulations are already strong and transparent.</p> <p>The GPF - Global is not used strategically, unlike funds in other countries, in that its investments are spread across roughly 3,500 companies, in few of which the fund holds more than a 1% stake.</p> <p>The Ministry of Finance has excluded 17 companies from the fund's portfolio, mainly for their involvement in the production of 'inhumane' weapons. The exercise of ownership rights and recommendations for exclusion are reported by Norges Bank and made public after disinvestment.</p> <p>The only government bonds the fund is specifically prohibited from buying are those of Burma.</p>	<p>date,www.regjeringen.no/nb/dep/fin/dok/regpubl/stmeld/2007-2008/report-no-16-2007-2008-to-the-starting.html?id=506664</p> <p>Norges Bank, 'Norges Bank Investment Management Annual Report 2006', www.norges-bank.no/Pages/Report____65332.aspx</p> <p>Norges Bank: www.norges-bank.no</p> <p>The Norwegian Petroleum Sector and the Government Pension Fund – Global, Ministry of Finance: www.regjeringen.no/upload/FIN/Statens%20pensjonsfond/The_Norwegian_Petroleum_Sector_te.pdf</p> <p>Loong Tse Min, 'Growing concerns over sovereign wealth funds', http://biz.thestar.com.my/news/story.asp?file=/2007/10/17/business/19186149&sec=business</p> <p>Ministry of Foreign Affairs, 'Norway at the forefront of extractive industries transparency efforts', Press Release, 27 September 2007, www.regjeringen.no/en/dep/ud/P</p>
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<p>The fund also serves as a stabilization fund by decoupling government spending from oil revenue flow, and promotes exchange rate stability by investing a substantial portion of petroleum revenues abroad.</p>		<p>ress-Contacts/News/2007/Norway-at-the-forefront-of-extractive-in.html?id=481866</p>
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Saudi Arabia

Various funds – a new Sovereign Wealth Fund to be established in 2008. Estimated government foreign assets: \$319billion (end 2007)

Laws and regulation	Other information	Sources
<p>Saudi Arabia has small official reserves and does not have a dedicated oil investment fund at the time of writing. The Kingdom's foreign assets are managed by the central bank, the Saudi Arabian Monetary Agency (SAMA), whose non-reserve foreign holdings were estimated at over \$300 billion in February 2008. SAMA's reserves accounted for another \$30 billion. SAMA also manages almost \$60 billion on behalf of other government agencies including Saudi pension funds.</p> <p>Saudi Arabia is close to approving a new SWF. The fund will start small, with capital of under \$5.3 billion, and will be managed by The Saudi General Investment Fund. While details are limited, the fund will be a portfolio investor, yet as being an example of the trend in GCC countries it will create new investment vehicles to optimize wealth management, diversify revenue streams and promote economic development.</p>	<p>The majority of non-reserve foreign holdings are believed to be invested in US dollar-denominated fixed-income securities.</p>	<p>Sovereign Wealth Fund Acquisitions and Other Foreign Government Investments in the United States: Assessing the Economic and National Security Implications, Edwin M. Truman, Peterson Institute for International Economics, Testimony before the Committee on Banking, Housing, and Urban Affairs, United States Senate, 14 November 2007, www.iie.com/publications/papers/paper.cfm?ResearchID=842 and www.iie.com/publications/papers/truman1107tables.pdf</p> <p>Ziemba, R., 'The new Saudi investment vehicle', 28 April 2008, www.rgemonitor.com/blog/economonitor/252536/</p> <p>' Saudi foreign reserves to reach \$595b by 2011', Bloomberg, 2 July 2008.</p>

		'Understanding the new financial superpower – the management of GCC official foreign assets', Council on Foreign Relations, and Rachel Ziemba, RGE Monitor, December 2007
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Timor-Leste

The Petroleum Fund – established 2005 – estimated assets: \$2 billion (end 2007)

Laws and regulation	Other information	Sources
<p>The Petroleum Fund was established by the 2005 Petroleum Fund Law. Parliament can amend the Petroleum Fund Law at any time.</p> <p>The fund's income consists of all revenues from development, exploration, transportation and sale or export of petroleum defined by the Petroleum Fund Law Article 6.</p> <p>The central bank holds the fund in an earmarked receipts account. The fund must invest its revenue exclusively abroad. Of the revenue, 90% must be invested in relatively low-risk, low-yield 'qualifying instruments', defined in Article 15; the remaining 10% can be invested in riskier instruments provided they are 'issued abroad, liquid and transparent, and traded in a financial market of the highest regulatory standard' (Article 14).</p> <p>An Investment Advisory Board or IAB (Article 16) advises the minister of planning and finance with respect to investment strategy. The minister may bypass the IAB if an urgent decision is required, but must subsequently report his decision to the IAB. In line with the law the Banking and Payments Authority is accountable for the operational management of the fund, but under a management agreement with the minister of planning and</p>	<p>The Petroleum Fund Law does not include guidelines or rules for how the petroleum revenue should be spent; once a withdrawal has been made, the revenue is deposited in the main budget and is indistinguishable from other state revenue.</p> <p>Parliamentary approval of the budget is the main limit on how the revenue is spent.</p> <p>The minister of planning and authority has considerable power over the fund, but ultimately the law states that 'The government is responsible</p>	<p>Quarterly Report of the Petroleum Fund of Timor-Leste by the Banking and Payments Authority for the Quarter ended 31 March 2008, www.bancocentral.tl/Download/Publications/Quarterly_report11_en.pdf</p> <p>Timor-Leste, EITI: http://eitransparency.org/Timor-Leste</p> <p>Deutsche Bank Research, 'Sovereign Wealth Funds – state investment on the rise', www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000215270.pdf</p> <p>President of the Parliament, Timor-Leste, 'Law/2005: Petroleum Fund Law', www.laohamutuk.org/Oil/PetFund/PFactPassedEn.pdf</p>

<p>finance.</p> <p>The external investment managers, whose duties are to maximize the return on the Petroleum Fund investments (Article 12.5), are appointed by the central bank and are bound by several constraints on the decisions they make regarding investment of the Petroleum Fund. Revenue saved in the Petroleum Fund must be prudently managed, invested securely in low-risk financial assets offshore, and investment performance is periodically evaluated.</p> <p>A Consultative Council, consisting of representatives from civil society, business and religious organizations, was established to advise parliament regarding the performance and operation of the Petroleum Fund. A diagram representing the roles of different bodies in the management and oversight of the fund is available (Drysdale 2007: 106).</p> <p>The government can only make withdrawals from the fund twice annually, after the publication of a Budget Law or any subsequent changes thereto. Withdrawals cannot exceed the appropriation amount approved by parliament for that fiscal year, considering the fund's Estimated Sustainable Income (ESI) – the maximum amount that can be withdrawn in a year without the value of the fund decreasing). To withdraw more than the ESI in any given year, the government must explain to parliament how the withdrawal serves the long-term interests of Timor-Leste, and provide a calculation of how much the following year's ESI will decrease as a result. In theory, parliament could approve the withdrawal of the entire fund in a single year; the system therefore relies on the institutional strength of the parliament vis-a-vis the government.</p>	<p>for the overall management of the Petroleum Fund' (Article 11.1), and it is unclear if a minister could be held legally responsible for contravening the Fund Law.</p> <p>Timor Leste was accepted as an EITI candidate country on 22 February 2008 and has until 10 March 2010 to undertake validation.</p> <p>The government's transparency website (www.transparency.gov.tl/) was offline in December 2007, but promised detailed information on the management of the Petroleum Fund.</p> <p>The central bank publishes quarterly reports on the management of the Petroleum Fund, as well as an annual report, and the reports are made public.</p>	<p>Drysdale, J. (2007) 'Sustainable development or resource cursed? An exploration of Timor-Leste's institutional choices', PhD Thesis, Australian National University, Canberra, Australia, Chapter 4, http://cres.anu.edu.au/~jenster/ChapterFour.pdf</p> <p>'Establishing a Petroleum Fund for Timor-Leste: public consultation discussion paper', www.laohamutuk.org/Oil/PetFund/Consult/TL%20MOPF%20Fund%20discussion%20paper.pdf</p> <p>World Bank, 'Timor-Leste – country brief', http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/TIMORLESTEEXTN/0,,contentMDK:20174826~pagePK:141137~piPK:217854~theSitePK:294022,00.html</p>
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