Research Paper
Senate Group 6

Oil and Gas Revenue Management Options for Cambodia

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Contents

1. Introduction

At a moderate rate of production, Cambodia's oil and gas revenue could provide revenues of around $500 million a year for 20-25 years, and is estimated to peak in revenue at between $1.7 billion and $6 billion per annum for a small number of years[1]. However, a recent drop in the value of oil and gas, which is forecast to continue into the foreseeable future, largely due to a number of large gas projects commencing production across the world[2], may have reduced the interest and profitability in developing Cambodia's oil and gas reserves. This may have played a role in Chevron's recent sale of their production rights, at a loss of approximately $100 million[3]. Licenses for exploration and production of Cambodia's oil and gas wealth are divided into blocks, as shown in figure 1, below. Block A is so far the most advanced in terms of exploration, while the sovereignty of a number of blocks, referred to as Overlapping Claims Areas (OCAs) is currently under dispute between Cambodia and Thailand[4].

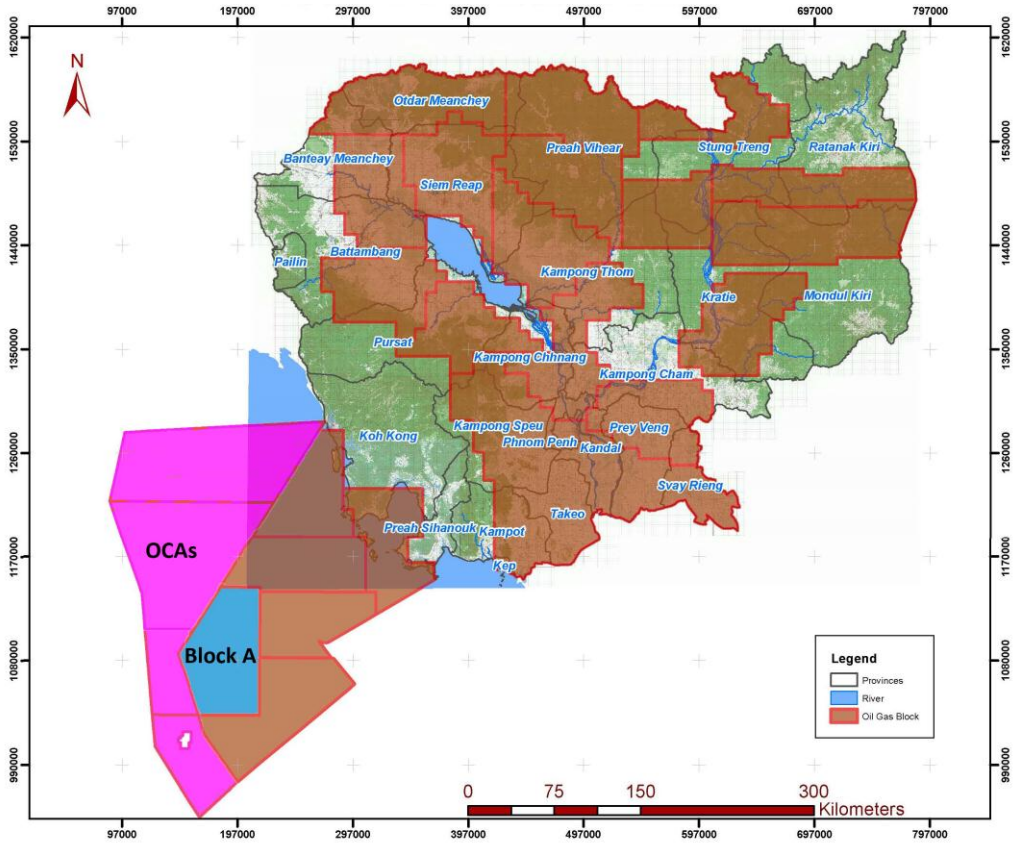

Figure 1. Oil and Gas Blocks and Overlapping Claims Areas (OCAs) which are jointly claimed by Cambodia and Thailand[5]

[1] IMF, *Cambodia: Selected Issues and Statistical Appendix*, Country Report (Washington DC: IMF, 2007), http://www.imf.org/external/pubs/ft/scr/2007/cr07291.pdf; UNDP, *Review of Development Prospects and Options For the Cambodian Oil and Gas Sector*, Discussion Paper, Insights for Action (Phnom Penh: UNDP Cambodia, 2006).

[2] "Shell's Massive Prelude Hull World's Biggest-Ever Floating Vessel and First Ocean-Based LNG Plant," *Financial Post*, accessed August 15, 2014, http://business.financialpost.com/2013/12/03/record-breaking-lng-ship-launched-bigger-one-planned/; "Chevron To Sell Shares of Cambodian Offshore Oil and Gas," *VOA*, accessed August 15, 2014, http://www.voacambodia.com/content/chevron-to-sell-shares-of-cambodian-offshore-oil-and-gas/2413411.html.

[3] "Chevron To Sell Shares of Cambodian Offshore Oil and Gas."

[4] "Oil and Gas Blocks | Open Development Cambodia," accessed August 18, 2014, http://www.opendevelopmentcambodia.net/briefing/oil-and-gas-blocks/.

[5] Ibid.

A United Nations Development Programme (UNDP) report notes that Cambodian oil and gas reserves and production estimates are still largely unproven and cautions against a number of economic policies. It suggests that developing the Cambodian intuitions such as the National Petroleum Authority will be the greatest factor which determines how much Cambodia benefits from its potential oil and gas wealth[6]. This presents a number of challenges to Cambodia, as the prevalence of natural resources, such as oil and gas, in a developing economy has a well-documented negative effect upon economic growth and development[7], the quality of governance[8], and political stability[9]. This is particularly the case in countries with weak institutions prone to poor governance or corruption[10]. This is often referred to as the 'resource curse', and has been widely accepted amongst economic experts for a number of decades, and has been confirmed by many well regarded studies[11]. In order to avoid such a resources curse, current research suggests that it would be necessary for Cambodia to develop appropriate contractual arrangements with oil and gas extractors, and the institutions necessary to successfully manage the generated revenue.

This paper will examine the factors most relevant to a country benefiting from its oil and gas revenue, in four sections: the fiscal terms of production contracts; oil and gas revenue management; and relevant risks, mitigation, and opportunities. Finally, case studies of Mexico and Timor Leste will be provided, as they offer illustrative lessons of both the risks and benefits which oil and gas revenue can realise. The First section examines the distinctions between different oil production contracts, as well the importance of carefully selecting contractual terms. These include striking an appropriate balance between attracting the investment necessary for expensive exploration, as well as the importance of ensuring that the state will gain sufficiently high royalties from production. The second section compares a number of oil and gas revenue management models. These are important to consider, especially for a developing country, as large amounts of early spending can have severely detrimental effects and squander a nation's wealth, while too little early spending can unnecessarily prolong poverty and reduce future economic development. The third section tables the major risks, mitigation strategies and opportunities borne of significant oil and gas revenues. The final section will offer a brief case study of Mexico and Timor Leste, in order to illustrate a number of points raised above.

2. Fiscal terms

2.1 Concessionary and Production Sharing Agreements

There are two models which contracts for oil and gas extraction can be classified into: concessionary or production sharing agreements (PSA)[12]. Concessionary agreements essentially involve a state renting an oil or gas field to an extraction company, in return for cash royalties[13], while PSAs involve the state actually

[6]UNDP, *Review of Development Prospects and Options For the Cambodian Oil and Gas Sector*.

[7]Jeffrey Frankel A, *The Natural Resources Curse: A Survey of Diagnoses and Some Prescriptions*, Working Paper, Faculty Research Working Paper Series (Cambridge, MA: Harvard University, Kennedy School of Government, 2012).p. 2.

[8]World Bank, *Oil and Gas: A Blessing or a Curse?*, Cambodia Oil & Gas Briefing Notes (Washington DC: World Bank, 2007), http://siteresources.worldbank.org/INTOGMC/Resources/cambodia_oil_gas_newsletter_2.pdf; The Economist, "The Curse of Oil: The Paradox of Plenty," *The Economist*, December 20, 2005, 20/12/2005 edition, http://www.economist.com/node/5323394.p. 2.

[9]The Economist, "The Curse of Oil."

[10]Robert Deacon T and Bernardo Mueler, "Political Economy and Natural Resouce Use," in *Economic Development and Environmental Sustainability*, ed. Ramon Lopez and Michael Toman A (Oxford: Oxford University Press, 2006). p. 138

[11]Frankel, *The Natural Resources Curse*.

[12]World Bank, *Contracts for Petroleum Development - Part 1*, Cambodia Oil & Gas Briefing Notes (Washington DC: World Bank, 2007), http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTOGMC/0,,contentMDK:21852379~menuPK:5242468~pagePK:210058~piPK:210062~theSitePK:336930,00.html#CambodiaO&GNotes.

[13] Royalties are a fee paid for the usage of something, which in this case would be oil or gas fields.

obtaining a set share of the extracted resources as payment[14]. However, neither system is clearly superior. The precise terms of a contract, the future price of oil and gas, and how much of the oil and gas is recoverable at an economically feasible cost will determine the benefit of such agreements to each party, rather than the broad category the agreement falls into[15]. Indeed, the World Bank argues that a government's decision to choose one form of agreement over the other is purely political. According to the World Bank this is because PSAs can be perceived as allowing the state to retain firmer control and ownership rights over their natural resources, rather than selling such rights completely as a concession may involve[16].

2.2 Structuring Royalties and Revenue

There are a number of different mechanisms which can be used to structure how the state will receive revenue from a project, and how that revenue will change over time. Regardless of the contracting regime selected, these can be paid in money or in oil or gas. Under PSAs, these are often arranged in such a way that the extractor is allowed to take a certain amount of the resource over a period of years, without sharing a portion with the state, in order to cover their investment costs. Under concessionary arrangements, extractors will typically pay minimal royalties until a predetermined value of 'cost oil' has been produced to cover the extractor's investment. An example of the revenue flows from such an arrangement can be seen in table 1[18].

$100 worth of oil		
Contracter		**State**
	Royalty 10%	$10
$25	**Cost oil** 60% yearly limit	
$26	**Profit oil** 40/60	$39
-$7.8	**Tax** 30%	$7.8
$43.2		
	Total	$56.8

Table 1 - An example of the split of proceeds from $100 worth of oil[17]

Windfall[19] clauses can be factored in, whereby if there proves to be sustainably greater deposits of a resource available than expected, or the prices for the commodity raises past a point, the state is entitled to further royalties. These are often incorporated, as from an extractor' perspective they do not create further risk of an unprofitable investment, because windfall clauses only apply after costs and an agreed amount of profit have been covered. While from a state's perspective such clauses are a prudent mechanism to ensure that the potential wealth from national oil and gas reserves is maximised[20].

There are two distinct approaches to oil and gas contracts: regressive or progressive. Regressive systems are so named, as the state's royalties are calculated at a fixed rate over the lifetime of a project which produces higher early earnings to the state. However, it also means that a state's royalties do not increase as profits increase due to rising oil prices or falling production costs. This can have the effect of the state's share of total profits regressing overtime, if the profitability of the field in question increases[21]. Alternatively contracts can be progressive, whereby a state's share of oil and profits increases, in line with the increased profitability of the field due to larger than

[14] World Bank, *Contracts for Petroleum Development - Part 1*.
[15] Ibid.
[16] Ibid.
[17] World Bank, *Contracts for Petroleum Development - Part 2*, Cambodia Oil & Gas Briefing Notes (Washington DC: World Bank, 2007), 2, http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTOGMC/0,,contentMDK:21852379~menuPK:5242468~pagePK:210058~piPK:210062~theSitePK:336930,00.html#CambodiaO&GNotes.
[18] World Bank, *Contracts for Petroleum Development - Part 2*.
[19] Windfalls refer to unexpectedly large profits.
[20] World Bank, *Contracts for Petroleum Development - Part 2*.
[21] World Bank, *Contracts for Petroleum Development - Part 3*, Cambodia Oil & Gas Briefing Notes (Washington DC: World Bank, 2008), http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTOGMC/0,,contentMDK:21852379~menuPK:5242468~pagePK:210058~piPK:210062~theSitePK:336930,00.html#CambodiaO&GNotes.

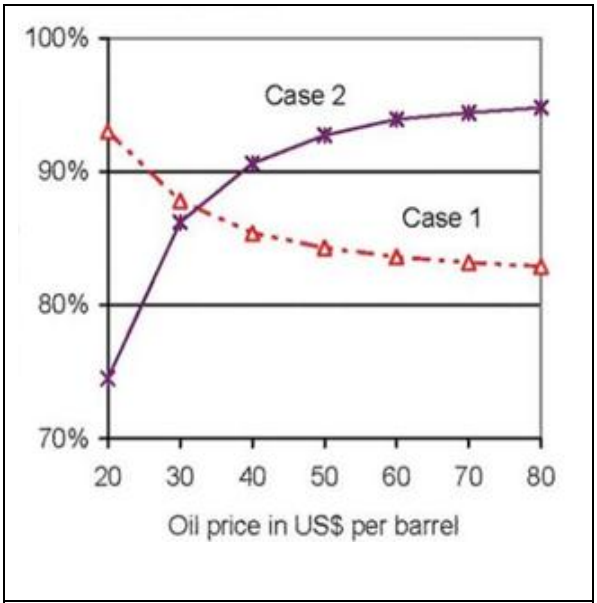

Figure 2. An example of a state's share of production over time, during increasing oil prices under a regressive regime (case 1) and a progressive regime (case 2)[22]

expected reserves or increased oil or gas prices. As depicted below in figure 2, this involves the state's royalties being smaller to begin with than under a regressive PSA however, if oil prices increase, this approach is structured in such a
way that it will return greater royalties to the state, but at a later point in the project's life cycle than under a regressive regime[23].

2.3 Balancing State Royalties and Attracting Exploration and Production Investment

If taxation and royalties are set too high, less profitable oil and gas fields may not be exploited, which results in the state losing out on potential income. If costs are set too low, the state also loses out on potential income. Setting the level correctly requires careful estimations of the quality and accessibility of the natural resources, the likely changes in costs of production, and future prices for the commodities. While a regressive approach will be more likely to guarantee state revenue when the commodity is not very profitable, it could also discourage investment in marginal fields – however such an approach would be attractive to investors when oil or gas prices are high, and thus encourage such investment. Conversely, progressive regimes can encourage investment when prices are low, but not be as attractive to investors when the market is more profitable[24]. In turn, this would result in the state taking less revenue from its oil and gas resources than possible[25]. However, the timing of government revenue collection from these resources is at least equally affected by the approach it takes to treating oil and gas profits. These will be examined in the following section.

3. Oil and gas revenue management models

The manner in which a country manages its oil and gas revenue is very important. The state expenditure of resource rich countries is on average 60 per cent more volatile than those lacking significant natural resource wealth[26]. This volatility in expenditure is largely due to the very changeable nature of resource prices, whereby a sudden fluctuation can almost immediately make a number of previously viable projects unprofitable, and significantly reduce government revenue. As such, it is necessary for oil and gas producing countries to select a revenue management regime which maximises their benefit from natural resources, insulates their domestic economies from economic shocks, and provides for long-term, sustainable and balanced growth[27].

There are four broad categories in which a state's oil and gas revenue management can fall into:

1. Spend-as-you-go
2. Bird in hand
3. Permanent income hypothesis

[22] World Bank, *Contracts for Petroleum Development - Part 2*, 2.
[23] World Bank, *Contracts for Petroleum Development - Part 3*.
[24] Ibid.
[25] World Bank, *Contracts for Petroleum Development - Part 2*, 2.
[26] IMF, *Macroeconomic Policy Frameworks for Resource-Rich Developing Countries* (Paris: IMF, 2012).p. 10.
[27] Steven Barnett and Rolando Ossowski, "Operational Aspects of Fiscal Policy in Oil-Producing Countries" (IMF, 2002).p. 8.

4. Sustainable investing tool/gradual scaling approach[28].

3.1 Spend-as-you-go

This entails a government spending oil and gas revenues as they arise, in an essentially year-by-year fashion. This approach means that increased revenue from oil or gas increases government spending, and transfers capital to the wider economy. This increases the country's non-oil economy, which increases government tax revenue from the non-oil sector, and in turn allows a government to transfer this wealth to increase household welfare and income[29]. This approach, however, generates minimal savings and closely links government spending and possibly large sectors of the economy as well as state debt viability, to oil and gas revenue which is highly volatile. While this approach performs very well at translating revenue from oil and gas into wider economic growth during periods of continually high oil and gas prices, it also transfers any reduction in price rapidly throughout the economy, which can be very destabilising, and cause long lasting economic damage[30].

Spend-as-you-go summary ➢ Oil and gas revenue goes directly into the state budget and ➢ Revenue is spent as it arises.	
Advantages	**Disadvantages** s
Effects of oil wealth are immediately visible	Generates minimal, if any savings
This increased government spending transfers capital to the wider economy	Can lead to high inflation
Works well during high oil and gas prices	Closely links the wider economy to volatile oil and has revenue
	Works poorly during low prices

3.2 Bird in hand

This is the most extreme precautionary approach a state can take towards its oil and gas wealth. Most basically it prescribes that governments should invest all oil and gas revenue in financial assets[31], and spend only the returns from these invests as they arise[32].

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[28]Paul Collier, "The Political Economy of Natural Resources: Interdependence and Its Implications," 2009, https://depot.gdnet.org/newkb/submissions/paul%20collier_paper_p2.pdf; Andrew Berg et al., "Public Investment in Resource-Abundant Developing Countries," *IMF Economic Review* 61, no. 1 (2013): 92–129; DhaneshwarGhura and Catherine Pattillo, "Too Much of a Good Thing?," *Finance & Development* 50, no. 3 (2013): 9; IMF, *Macroeconomic Policy*; Roberto Iacono, "Is It Really Worse with a Bird in Hand? A Comparison of Fiscal Rules for Resource-Rich Economies" (Norwegian University of Science and Technology, 2012).

[29]Christine J. Richmond, Irene Yackovlev, and MsShu-Chun S. Yang, *Investing Volatile Oil Revenues in Capital-Scarce Economies: An Application to Angola*, 13-147 (International Monetary Fund, 2013), p. 12. http://books.google.com/books?hl=en&lr=&id=AL1ZLw8zPYwC&oi=fnd&pg=PP1&dq=%22The+Government%22+%22Parameter+Calibration%22+%22and+third+largest+economy.+The+civil+war,+which+ended+in+2002,%22+%22gaps+underscores+the+challenges+faced+by+capital-scarce+developing%22+%22prices+stayed+up,+leading+to+the+belief+that+they+were+permanent,+spending%22+&ots=bXVIFq3GYp&sig=BMgAkQXM5orrAaZM6U-tyhOzPq8.

[30]Ghura and Pattillo, "Too Much of a Good Thing?".

[31] For example, these can include stocks, bank deposits, government bonds and foreign currencies.

[32]DariaZakharova and MsCharleen Gust, *Strengthening Russia's Fiscal Framework*, 12-76 (International Monetary Fund, 2012), p. 10. http://books.google.com/books?hl=en&lr=&id=DdlViXWhiHEC&oi=fnd&pg=PP2&dq=%22Hard+Landing,+Forceful+Response,+and+Difficult+Road+Ahead%22+%22Traditional+and+Nonoil+Fiscal+Indicators,+2004%E2%80%9310%22+%22the+rate+o

Instead of spending royalties or raising loans or making spending commitments based upon the estimated value of future oil and gas production, this approach forces governments to only factor into their planning and budgets the existing interest from oil and gas revenue which they have already invested at the present time, and make future spending plans based upon the assumption that there will be no further revenue from oil or gas[33].

This approach prevents governments from the possibility of financial collapse due to resource prices or reserves being lower than expected. However, this benefit has to be balanced against the large opportunity loses from failing to make prudent investments on the basis of oil and gas reserves. This is especially the case for developing countries, whereby earlier generations will tend to be poorer than those which follow, meaning that the ability to bring forward some investment can both better alleviate poverty, but also be of greater benefit to a country's development in both the short and long-term[34].

Bird in hand summary:

- Most precautionary approach
- Only the interest of invested oil and gas revenue is spent
- Budgets do not factor in the value of estimated future production

Advantages	**Disadvantages** s
This approach prevents governments from the possibility of financial collapse due to resource prices or reserves being lower than expected	This benefit has to be balanced against the large opportunity loses from failing to make prudent investments on the basis of oil and gas reserves
Minimises disturbances to the wider economy	This is especially the case for developing countries, where earlier generations tend to be poorer than those which follow
Also reduces the likelihood of the early squandering oil wealth	Early investment can alleviate poverty, but also be of greater benefit to a country's development in both the short and long-term

3.3 Permanent Income Hypothesis (PIH)

The PIH is based upon a theory by Milton Friedman, a Nobel Laureate for Economics, which states that an economic actor will aim to smooth their consumption and expenditure out between income peaks and troughs, and essentially expend the average of their expected total lifetime income[35].When applied to a country's oil or gas wealth, the PIH implies that a government will spend only the equivalent to the interest of their country's total oil and gas wealth[36]. This is typically achieved through investing all oil and gas revenue externally in a sovereign wealth fund, which then generates interest.

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f+extraction+of+oil,+and+the+use+of+oil+revenue+have+significant%22+&ots=_CqBZ0TRPo&sig=rIw9vWoW3w_S4bysNVz14AeaoLg.

[33]Barnett and Ossowski, "Fiscal Policy."p. 14.

[34]Ghura and Pattillo, "Too Much of a Good Thing?".p. 11.

[35]Michael R. Darby, "The Permanent Income Theory of Consumption--A Restatement," *The Quarterly Journal of Economics* 88, no. 2 (May 1974): 228, doi:10.2307/1883070.

[36]Alonso Segura, *Management of Oil Wealth under the Permanent Income Hypothesis: The Case of São Tomé and Príncipe*, vol. 6 (International Monetary Fund, 2006), p. 8.
http://books.google.com/books?hl=en&lr=&id=GesTSNZ0cVgC&oi=fnd&pg=PA4&dq=%222004+may+offer+the+best+chance+for+the+country+to+put+in+place+strong%22+%22sustainable+government+consumption+and+intergenerational+equity+while%22+%22of+US%243+billion.+These+figures+are+noticeably+high,+considering+that+for+2006+the%22+&ots=qhr_mh_XHl&sig=WT__K5XdcTEP6C76qKFDqKCy3Fg.

This has the advantage of avoiding the instability of the spend-as-you-go-approach, while also preserving the wealth for future generations to benefit from, and it also makes greater sums available for expenditure than the Bird in the Hand approach, while still preserving wealth for the future. However, there is an argument to be made that this approach, by allowing the government to spend an even amount of wealth during and after the resources' production, both overlooks current generation's poverty, and the greater economic utility which capital expenditure may have in a capital scare environment[37]. These problems are further addressed below in Sustainable investing tool/gradual scaling approach.

PIH summary:

- Involves spending the only the equivalent of the interest of a country's estimated *total* oil and gas wealth
- This averages the income out over the country's lifetime
- Typically achieved through investing all oil and gas revenue externally in a sovereign wealth fund

Advantages	**Disadvantages** s
Avoids the instability of the spend-as-you-go-approach	Limits increasing higher levels of earlier spending
Preserves wealth for future generations	Can overlook the current generation's poverty and the greater value of investment in such a capital scarce environment
Brings some spending forward to benefit earlier, poorer generations	

3.4 Gradual Scaling Approach

Also known as the 'sustainable investing tool', the gradual scaling approach can be understood as a compromise between the spend-as-you-go and PIH approaches. This is because it aims to introduce greater oil and gas revenue into the economy at an earlier point in time. Like the former approach, public investments from oil and gas revenue are only gradually increased to minimise domestic economic imbalances from a surge of government spending and to allow the economy time to develop the capacity to absorb increased investment[38], while like the latter model, oil and gas revenue is used to build up a fund of financial assets. Under normal circumstances, this 'stabilisation fund' is not to be withdrawn from, and thus a reduction in oil and gas revenue needs to be met with a reduction in government spending. However the interest generated from stabilisation fund provides the government with a long-term revenue source, which can be used to temper the impact of oil and gas price fluctuations upon the domestic economy and growth[39].

While this approach results in less visible results than more rapid investment models, such as the spend-as-you-go approach, it is also capable of providing greater investment and consumption to earlier generations than other approaches allow for, which may be of greater economic and social utility to many developing countries[40]. The volatile nature of oil and gas markets, and the well documented boom and bust cycles experienced by developing economies which are overly exposed to these fluctuations, demonstrates the need for a stabilisation fund to facilitate sustained economic growth[41].

[37] Berg et al., "Public Investment in Resource-Abundant Developing Countries."p. 93.

[38] Ghura and Pattillo, "Too Much of a Good Thing?"; Berg et al., "Public Investment in Resource-Abundant Developing Countries." p. 11

[39] Richmond, Yackovlev, and Yang, *Investing Volatile Oil Revenues in Capital-Scarce Economies*.p. 12.

[40] Berg et al., "Public Investment in Resource-Abundant Developing Countries."P. 93.

[41] Ghura and Pattillo, "Too Much of a Good Thing?".p. 11.

This approach to managing oil and gas wealth and spending is being successfully applied in Timor Leste[42], and for similar reasons could be suitable for Cambodia also. This is because it provides both stability and long-term wealth by developing strong savings, but also factors in an increasing level of domestic spending. Especially in a less developed country such as Cambodia, this gradual increase in spending is necessary to develop Cambodia's non-oil economy, which will increase the levels of local spending and investment possible, further developing the country and reducing poverty.

Gradual scaling approach summary:

- Can be understood as a compromise between the spend-as-you-go and PIH approaches
- Oil and gas revenue is used to build up a 'stabilisation fund' of financial assets
- This cannot be withdrawn from - a reduction in revenue needs to be met with a reduction in government spending
- Interest generated provides the government with a long-term revenue source, and tempers the effects of oil price volatility

Advantages	Disadvantages s
Can shift spending forward to earlier generations	Requires strong state institutions to successfully manage the fund
Government spending increases gradually to develop the non-oil economy	This can overlook the current generation's poverty, and the greater value of investment in such a capital scarce environment
Reduces revenue instability	Well targeted, long-term investments are need to develop the non-oil economy
Reduces revenue instability	Results are not as immediately visible as under spend-as-you-go

4. The Political and Economic Risks and Opportunities Associated with Large Oil and Gas Revenues

4.1 Risks

Mainstream political and economic theory finds that country's rich in natural resources, such as oil and gas, have worse outcomes in terms of economic growth, corruption and political stability[43].

One factor in this is known as "Dutch Disease", named after the economic difficulties the Netherlands had after producing its North Sea Gas. This economic malady is due to the outflow of valuable natural resources leading to a rapid inflow of dollars and a subsequent appreciation of a country's local currency. This renders its other economic sectors, such as garment production or tourism, to be less competitive in export markets[44].This concept was popularised in a well-received paper by Jeffery Sachs, who demonstrated that economic data indicated that countries with abundant natural resources have experienced weaker economic growth than countries without such resources[45]. Sachs hypothesised that this was due to the value of natural resources distracting economic activity away from manufacturing, which then prevented the creation of economic links and inputs into manufactured products, and goods and services. This is thought to be

[42]World Bank and Independent Evaluation Group, *Timor-Leste Country Program Evaluation, 2000-2010: Evaluation of the World Bank Group Program* (Washington, D.C.: World Bank Group, Independent Evaluation Group, 2011).

[43]RabahArezki and Markus Brückner, *Oil Rents, Corruption, and State Stability: Evidence from Panel Data Regressions*, IMF Working Paper (Washington DC: IMF, 2009), http://www.sciencedirect.com/science/article/pii/S0014292111000316.

[44]The Economist, "The Curse of Oil."

[45]Jeffrey Sachs and Andrew Warner, *Natural Resource Abundance and Economic Growth*, Working Paper (Cambridge, MA: National Bureau of Economic Research, 1995), http://www.nber.org/papers/w5398.pdf. pp. 2-7.

detrimental as the economic activity created by manufacturing is broadly regarded as a major mechanism which economies both develop industries and train a skilled work force necessary for economic development[46].

More recent research has refined this "resource curse" to cover oil and gas in particular. As Michael Ross notes "good geology has led to bad politics"[47]. Ross finds that since 1980 oil and gas rich countries with strong institutions, developed economies and high incomes such as Canada, Norway or the United States, have avoided negative side effects of oil and gas production. Conversely, less developed low to medium income countries have fared much worse. By compiling data from 170 countries, Ross finds that oil and gas rich developing countries are twice as likely to suffer dictatorship or civil war, are more financially insecure, have worse corruption and poorer Human Development Index (HDI)[48] scores[49].

The price volatility of hydrocarbons also poses a serious hazard to states. While prices are high, it makes sense for countries to borrow money and invest heavily in exploration and increasing hydrocarbon export capacity, and for poorer states to increase social spending in the hopes of increasing a government's popularity, and decreasing poverty. However, this strategy is very risky as it requires oil and gas prices to remain high. This means that states can quickly become bankrupt once oil drops below their budgetary break-even point[50].

A final risk to consider is the temptation of spending significant oil revenue in the form of fuel subsidies. While these policies which reduce fuel prices are often very popular amongst the general population, and therefore politically attractive, they are also very expensive, wasteful and can facilitate high levels of corruption. Risks include encouraging subsided fuel to be illegally exported, subsidies being provided to the rich, in the form of petrol for their cars, rather than to more economically beneficial targets, and the possible facilitation of high level corruption, whereby subsidies are not fully passed on to consumers. Such corruption is estimated to have cost Nigeria almost 12 billion US dollars between 2009 and 2011[51].

4.2 Mitigation

The Importance of Capable Institutions

The mitigation of these risks depends firstly upon developing strong and stable institutions. These are necessary in order to effectively design and implement long-term, stable policy and guard against corruption. As Jeffery Frankel, a macroeconomic professor at Harvard University, notes "the quality of institutions is the deep fundamental factor that determines which [oil and gas producing] countries experience good performance and which do not"[52].

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[46] Ibid.

[47] Ross Michael, *The Oil Curse* (Princeton: Princeton University Press, 2012).p. 2.

[48] The HDI was developed as a holistic indicator of a country's development, which takes into account a number of factors which influence the population's quality of life, as well as economic factors. For more information see: http://hdr.undp.org/en/content/human-development-index-hdi; and http://www.kh.undp.org/content/dam/cambodia/docs/PovRed/2013HDRAnalysisonCambodia.pdf

[49] Michael, *The Oil Curse*. pp. 1-27.

[50] Paul Stevens and Matthew Hulbert, *Oil Prices: Energy Investment, Political Stability in the Exporting Countries and OPEC's Dilemma* (Chatham House, 2012), http://www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/1012pp_opec.pdf. pp. 8-9.

[51] Sarah Kent, "Nigeria Loses Billions to Inefficiencies in Oil Sector - Watchdog," *Wall Street Journal*, July 30, 2013, sec. Markets, http://online.wsj.com/news/articles/SB10001424127887324809004578637443141740504.

[52] Frankel, *The Natural Resources Curse*. pp. 9-10.

These institutions include an effective taxation regime and capable, independent bodies able to appropriately manage fiscal policies and resource revenue spending. Institutional safeguards are also necessary to prevent revenues and savings being spent in an unsustainable manner for political expediency, as are supporting institutions such as courts and anti-corruption regimes[53].

Avoiding the Resource Curse

There is no perfect formula for avoiding the resource curse, as each country's different circumstances requires a unique approach. The development of sound institutions can provide necessary policy to diversify a country's economic base, and develop counter-cyclical fiscal policies necessary to smooth out the peaks and troughs of oil prices and also avoid the worst aspects of Dutch Disease[54].Sound governance measures can facilitate the sustained development of a country long after its natural resources have been exhausted[55].

The Extractive Industries Transparency Initiative

The World Bank has identified sufficient transparency as being crucial to facilitating the development and functioning of these institutions[56]. One means to achieve such transparency is through joining the Extractive Industries Transparency Initiative (EITI). Supported by the World Bank and the UN[57], EITI requires and facilitates governments and oil producers to disclose financial information which relates to royalties, fees, payments and taxes paid, the disclosure of limited production information and contractual terms, and the establishment of a credible, independent auditor[58].EITI has widespread international and industry support and membership[59].

Relevant United States and European Union Policy Promoting Oil & Gas Transparency

Similar pressures on transparency and accountability are being created by the policies of major countries which influence the behaviour of the leading oil and gas companies. Legislation in the United States (US) requires all US listed extractive industry companies to publicly declare every payment made to governments. Similar legislation is under consideration in the European Union[60].

4.3 Opportunities

Properly managed oil and gas production provides significant opportunities for both human and economic development. These can include developing industries which feed into oil and gas production, or which are facilitated by oil and gas production by providing subsidised electricity and industrial inputs. Examples of such an approach could be the development of a petrochemical plant, which could use Cambodian oil to produce synthetic fibers, which in turn could be applied to the garment sector to increase the local content of manufacturing, and gradually manufacture more advanced products. Manufacturing could be aided by supplying cheap and reliable electricity from a natural gas plant.

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[53]Yanchun Zhang and Office of Development Studies, UNDP, "Managing Resource Revenue in the Context of Increasing Commodity Price Volatility" (presented at the International Conference: Avoiding the Resource Curse - Managing Extractive Industries for Human Development, Ulaanbaatar: UNDP, 2011), http://www.undp.mn/mining/index.php?page=6.

[54]Michael, *The Oil Curse*. pp. 223-254., Helen Clark, "Avoiding the Resource Curse: Managing Extractive Industries for Human Development," in *Keynote Speech* (presented at the Avoiding the Resource Curse: Managing Extractive Industries for Human Development, Ulaanbaatar: UNDP, 2011), http://www.undp.org/content/undp/en/home/presscenter/speeches/2011/10/20/helen-clark-avoiding-the-resource-curse-managing-extractive-industries-for-human-development-/.

[55]Clark, "Avoiding the Resource Curse."

[56]World Bank, *Extractive Industries Transparency Initiative*, Cambodia Oil & Gas Briefing Notes (Washington DC: World Bank, 2007), http://siteresources.worldbank.org/INTOGMC/Resources/cambodia_oil_gas_newsletter_15.pdf.p. 1.

[57]Ibid.

[58]EITI, *EITI Rules* (Oslo: EITI), accessed July 28, 2014, http://eiti.org/document/rules.p. 11.

[59]EITI, *EITI Fact Sheet* (Oslo: EITI), accessed July 28, 2014, http://eiti.org/document/factsheet.

[60]"IISS," accessed July 28, 2014, http://www.iiss.org/en/iiss%20voices/blogsections/iiss-voices-2013-1e35/march-2013-6eb6/avoiding-resource-curse-65e7.

In another example, the quality of local engineering could be increased by linking employment opportunities in oil and gas related plants to local university programmes. Managed successfully, this could in-turn create a virtuous circle whereby labour demand in oil and gas related industries increases the demand for local graduates, while an increasing number of trained graduates in an industrialising economy could then add to the growth of the economy and skilled labour demand, thus completing the cycle.

The most sustainable, long term-approach is to use oil and gas revenue for investments which diversify a country's non-oil or gas sectors, and minimise national exposure to volatile oil and gas prices. This can be accomplished through such means as funding prudent infrastructure projects and investing in higher education. Also, the wealth from oil and gas resources can be used to address the Millennium Development Goals to reduce poverty, permanently augmenting the state budget, or simply transferring profits directly to citizens as in Alberta or Alaska, through a sovereign wealth fund[61]. These opportunities are large, as they have the potential to dramatically increase the growth rate and stability of an economy, and drastically increasing the quality of life of a country's population.

Different Expectations for Gas

The opportunities presented to Cambodia by natural gas are distinct from oil. This is because natural gas is much harder to transport than oil. While pipelines are sufficient for shorter distances or one centralised destination, such as a gas power plant, liquidification is generally required for longer-distance transportation. As liquidification requires billions of dollars of infrastructure at both export and import terminals, as well as specialised shipping, it is often not economical to extract unless in very large quantities. Nevertheless, natural gas is a far cleaner and efficient fuel than either coal or oil. This means that one potential application for Cambodia's gas reserves, if liquidification or export-infrastructure proves uneconomical, could be to fuel a natural gas power plant, or provide industrial inputs for products such as fertiliser, which in turn could support the continued development of Cambodia's economy[62].

5. Case Studies

These case studies have been selected as they are developing countries[63], which in very general terms can mean that they have more comparable levels of institutional capacity. The reason for this is, as the above literature makes clear, developing suitable institutions are the crucial ingredient to realising a positive outcome from oil and gas revenue. For this reason, it would be of little comparative value to include case studies from developed countries such as Canada, Norway or the US, as they have already had capable institutions in place to handle windfall-revenue

5.1 Mexico

A classic example of economic crisis due to over investment in oil can be found in Mexico's 1982 sovereign default of public debt. Following the 1973 Oil Crisis which drastically increased the value of oil, Mexico discovered large oil deposits. During the same period Mexico took advantage of low interest rates to invest heavily in oil projects. Simultaneously, Mexico increased its politically popular subsidisation of staple goods such as food.

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[61] Jeffrey Sachs, "How to Handle the Macroeconomics of Oil Wealth," in *Escaping the Resource Curse*, ed. Macartan Humphreys, Jeffrey Sachs, and Joesph E. Stiglitz (New York: Columbia University Press, n.d.). pp. 173-94.

[62] World Bank, *Introduction to Oil and Gas*, Cambodia Oil & Gas Briefing Notes (Washington DC: World Bank, 2007), http://siteresources.worldbank.org/INTOGMC/Resources/cambodia_oil_gas_newsletter_15.pdf.

[63] "Country and Lending Groups | Data," October 22, 2013, http://data.worldbank.org/about/country-and-lending-groups; IMF, *World Economic Outlook: April 2014* (Washington DC: IMF, 2014), http://www.imf.org/external/pubs/ft/weo/2014/01/pdf/text.pdf.

This increase in spending drove up inflation rates to damaging levels, and crowded out investment in other economic sectors. The greatest damage came, however, in 1982 when rapidly falling oil prices, combined with increasing international interest rates, meant that the Mexican state was unable to pay its large debts[64]. Decades later Mexico is still left with high public debt, a weakened industrial base and precarious government revenue as a result of overreliance on oil revenues, and over expectations on its profitability[65].

The lesson most applicable for Cambodia is the importance of effective long-term economic policies needed to stabilise volatile oil and gas income.

5.2 Timor Leste

In 2002 Timor Leste emerged from over two decades of occupation and violence as one the world's poorest countries with very limited infrastructure, education or state capacity[66]. Like Cambodia, Timor Leste's oil reserves are small on a global scale, but large in comparison to the national economy. For Timor Leste, these reserves presented three main problems: firstly how to safeguard oil wealth from corruption: secondly how to use this wealth to facilitate development given the small economy's very limited ability to absorb capital; and thirdly how to balance current spending against savings[67].

The first question was addressed by setting up a sovereign wealth fund, modeled after Norway's. By law, the fund receives all oil and gas income. This fund is managed by the central bank, and withdrawals can only be made directly to finance the state budget below a prescribed limit of three per cent of Timor Leste's estimated total oil and gas wealth, with the interests of maintaining a long term fund to serve future generations[68].

This leads to the second question, which is how to utilise this income in a small economy which has a very limited ability to absorb capital, without causing harmful side-effects such as high inflation. Timor Leste, with World Bank support, has pursued a gradual scaling approach. This targets revenue spending in order to expand Timor Leste's non-oil economy, through investment in areas such as agriculture, infrastructure and education, which in turn develops the economy, allowing it to absorb greater amounts of oil and gas revenue[69].

The third major question regarding Timor Leste's oil and gas revenue is perhaps the most contentious. This is because the question of balancing current spending of oil revenue, against savings and future spending, requires one to estimate the answers to two complex sets of questions: how much is the total oil worth, and what are the merits of spending or saving more of this wealth[70]? It is impossible to arrive at definitive answers to these questions, as they necessarily consist of many unknown variables. For instance, in order to estimate the oil wealth, one needs to consider the future price of oil, the technical feasibility of extracting and transporting this oil, and future regional security challenges. In order to determine the balance between spending and saving, one has to estimate just how much capital the economy can absorb, the likelihood of

[64] Tim Merrill and Miro Ramon, *Mexico: A Country Study* (Washington DC: Library of Congress, 1996), http://lcweb2.loc.gov/frd/cs/mxtoc.html. Ch. 'Recovery and Relapse, 1976-82'.

[65] Nick Dearden, "Thirty Years since Mexico's Default, Greece Must Break This Sadistic Debt Spiral," *New Statesman*, 2012, Online edition, http://www.newstatesman.com/blogs/economics/2012/08/thirty-years-mexicos-default-greece-must-break-sadistic-debt-spiral.

[66] "CIA World Factbook: Timor Leste," *CIA World Factbook*, 2014, https://www.cia.gov/library/publications/the-world-factbook/geos/tt.html.

[67] HengDyna and Ngo Sothath, *Extractive Industries Revenue Management: A Tale of Six Countries* (Phnom Penh: Cambodia Economic Association, 2013). pp. 7-9.

[68] Ibid. pp. 7-8.

[69] World Bank and Independent Evaluation Group, *Timor-Leste Country Program Evaluation, 2000-2010*. pp. xvii-xviii

[70] Dyna and Sothath, *Extractive Industries Revenue Management: A Tale of Six Countries*. pp. 9; World Bank and Independent Evaluation Group, *Timor-Leste Country Program Evaluation, 2000-2010*.

this wealth being wasted on poor policies or corruption, and how beneficial a strong short-term development programme will be to the country's future, in terms of reducing poverty, improving stability, education, infrastructure and employment conditions, as opposed to developing a long-term savings fund for the country's future[71].

Timor Leste's long-term and reasonably successful approach could be of interest for further study. This is because of the number of parallels between the two countries, a small economy still unable to efficiently absorb large amounts of investment, low Human Development Index scores, and perhaps most relevantly, limited institutional capacity.

6. Conclusion

As this brief study shows, oil and gas revenues are not necessary beneficial to a country, unless properly managed in a long-term manner. This management starts with the selection of correct contractual terms, which balance the need to attract larger and risky investment in exploration, against the need for the state to recoup reasonable royalties. The management of the revenue itself is no less complicated. However, there are a number of existing management models which have been applied in various countries and extensively studied. The most suitable approach depends on a number of factors, such as a country's level of development and institutional capacity. However, the Gradual Scaling Approach, which balances long-term savings and stability against the need to reduce poverty through investment for economic development, is performing well in Timor Leste and might be of relevance to Cambodia. Nevertheless, it should be noted that there are a number of specific risks which come with oil and gas revenue, such as greater economic instability or corruption. However, there are a number of well-studied policies to mitigate these risks, and maximise the benefits. Key amongst these is the development of appropriate institutions to manage the wealth.

[71] Michael, *The Oil Curse*. pp. 223-254.

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